Orenstein & Koppel General Export Catalogue Nr 600

Central Queensland Archives/Special Collections Folio 1563/13, scanned with permission of Mary Bevis, Archives Librarian, January 2003. The Catalogue originally came from the Mount Morgan Mining Company Archives.

Orenstein & Koppel General Export Catalogue Nr 600 is undated but inquiries in Germany indicate that it was issued between 1899 and 1909.

Eljas Pölhö <poelhoe@telia.com>: Catalogue 551 publ. 1898, catalogue 700 publ. 1907. Berlin Drewitz opened 1899. Berlin Spandau opened 1900, not mentioned in the catalogue. Warschau started 1900, not mentioned. I would place the catalogue to 1899-1900.

Richard A.Bowen <Richard.Bowen@t-online.de>: The Aktiengesellschaft für Feld- und Kleinbahnen-Bedarf, vormals Orenstein and Koppel came about on 18 December 1897 on the conversion of O+K from an OHG to an AG. The new company was registered on 22 February 1898. In 1899 they took over another firm and instantly needed a larger site for building, that was Drewitz, opened 1 April 1899, so this is the earliest that the catalog could be. The firm purchased Templehofer Ufer 24 in 1899, and then Spandau in 1900. This called called itself a Weichenbauanstalt, but built wagons. Also in 1899/1900 the Work Kolo near Warschau started up and provided Feldbahn material. This also does not feature on your catalog front page. The next major legal change was the merger with Arthur Koppel in 1909 and the assumption of the Orenstein and Koppel name (again). The catalog is numbered 600, rather like the start of a new era. So my guess is that the catalog is from 1899, the very latest it could be would be 1909.

Rüdiger Fach <fach@vcockpit.de>: We think catalogue Nr. 600 as shown in your email might be produced between 1905 and 1910 due to the type of letters used (we call it "Jugendstil").

Jens Merte <jens@merte.de>: This catalogue was published between April 1899 to 1908 because only in this period the name of the company was "AG für Feld- & Kleinbahnen-Bedarf, vormals Orenstein & Koppel". It changed in 1908 to "Orenstein & Koppel - Arthur Koppel AG".

Several items have hand written notations that indicate they were stocked in Sydney.

The cover was missing but remains would suggest that it was likely a shiny brown card, bound around the spine with cloth tape and at least partially glued in place. The printed area of each page was roughly A4 with a margin outside that of roughly 25 mm. Double pages (ie sheets larger than A3 printed and folded for 4 pages) were assembled into sections of various multiples of 4 pages (signatures) and stapled together with three iron/steel wire staples. The staples did not puncture the sections fully with only one end of two of the staples clinched over.

The manuscript was in very poor condition with the binding gone, edges light to dark brown colouration and many pages loose from the staples. The last page was missing the top outside corner. Discolouration was removed from the image files after scanning.

A green Enquiry Form was perforated and glued into the Catalogue between pages 4 and 5. The green page colour was removed from the image files after scanning.

Images files were reduced to a maximum 18 cm wide at 144 pixels per inch and contrast adjusted for printing after scanning.

CaneSIG: A C Lynn Zelmer, February 2003

www.zelmeroz.com/CaneSIG

THE GENERAL MINING & TRAMWAY APPLIANCE
PROPRIETARY, LIMITED,
40 HUNTER STREET, SYDNEY.

General Export Catalogue Nr. 600

of

PORTABLE AND PERMANENT RAILWAYS

WAGONS, LOCOMOTIVES ETC.

of the

Aktiengesellschaft für Feld- und Kleinbahnen-Bedarf vormals Orenstein & Koppel

(Limited Company for the Supply of Portable and Narrow Gauge Permanent Railways, Successors to **ORENSTEIN & KOPPEL**).

HEAD OFFICE:

BERLIN SW.

TEMPELHOFER UFER 24.

WORKS:

TEMPELHOF near BERLIN
DORSTFELD near DORTMUND
LIEBEN near PRAGUE
ST. LÖRINCZ near BUDAPEST.

LOCOMOTIVE WORKS: **DREWITZ** near POTSDAM.

BRANCH OFFICES:

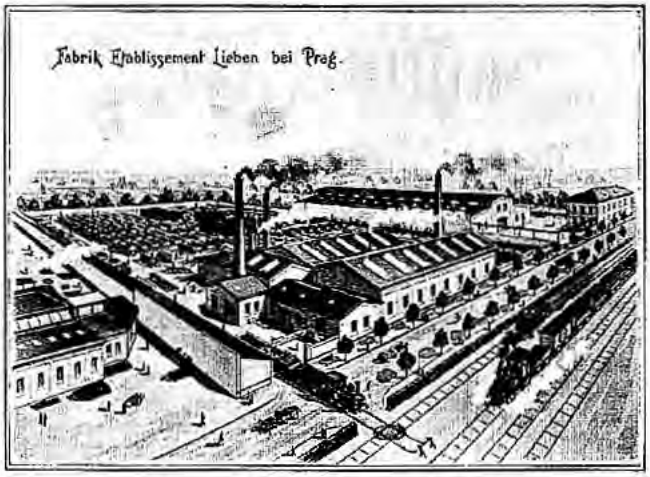
HAMBURG	**COLOGNE**	**DRESDEN**	**KOENIGSBERG**	**VIENNA**	**ODESSA**
MAGDEBURG	**STRASSBURG**	**LEIPZIC**	**DANTZIC**	**BUDAPEST**	**JOHANNESBURG**
DORTMUND	**MUNIC**	**BRESLAU**	**PRAGUE**	**ST. PETERSBURG**	

Address for Telegrams:
Railways — Berlin.

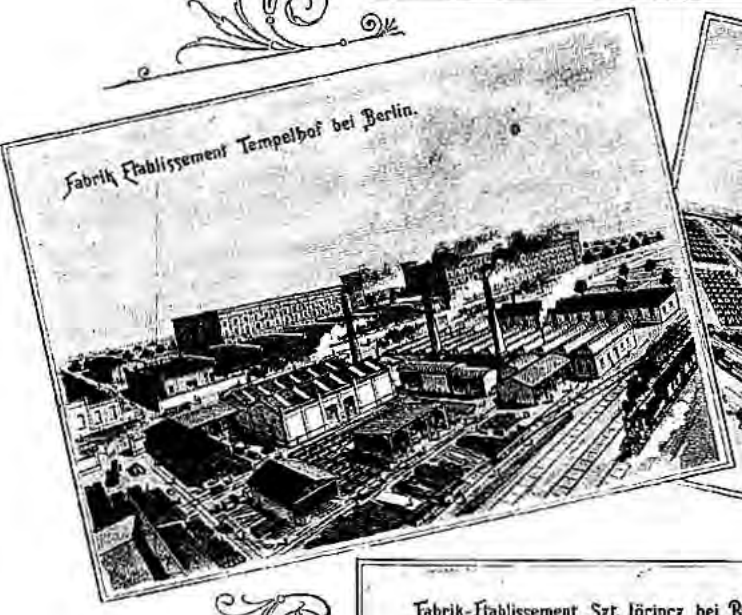
Codes used:
A. B. C. 4th edition
A. I. 1888
Stendt & Hundius
Our Special Code

Catalogues in all modern languages free on application.

ORENSTEIN & CO., BERLIN SW.



Fabrik-Etablissement Lieben bei Prag.



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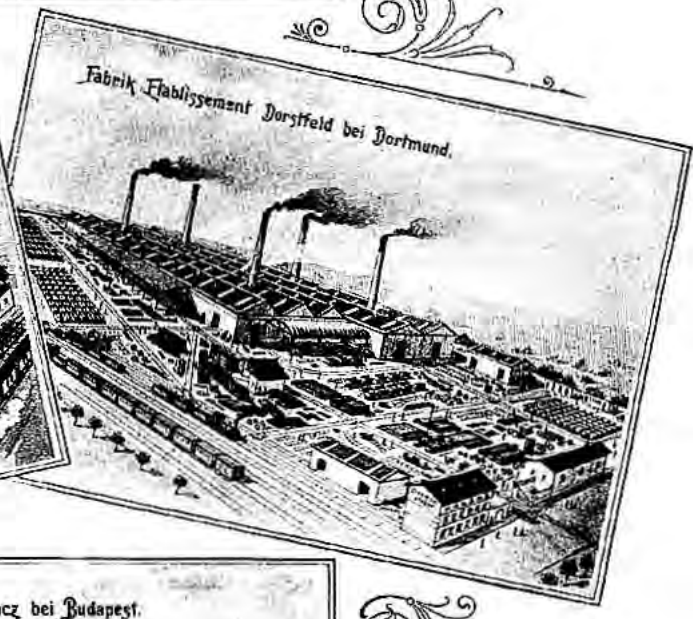
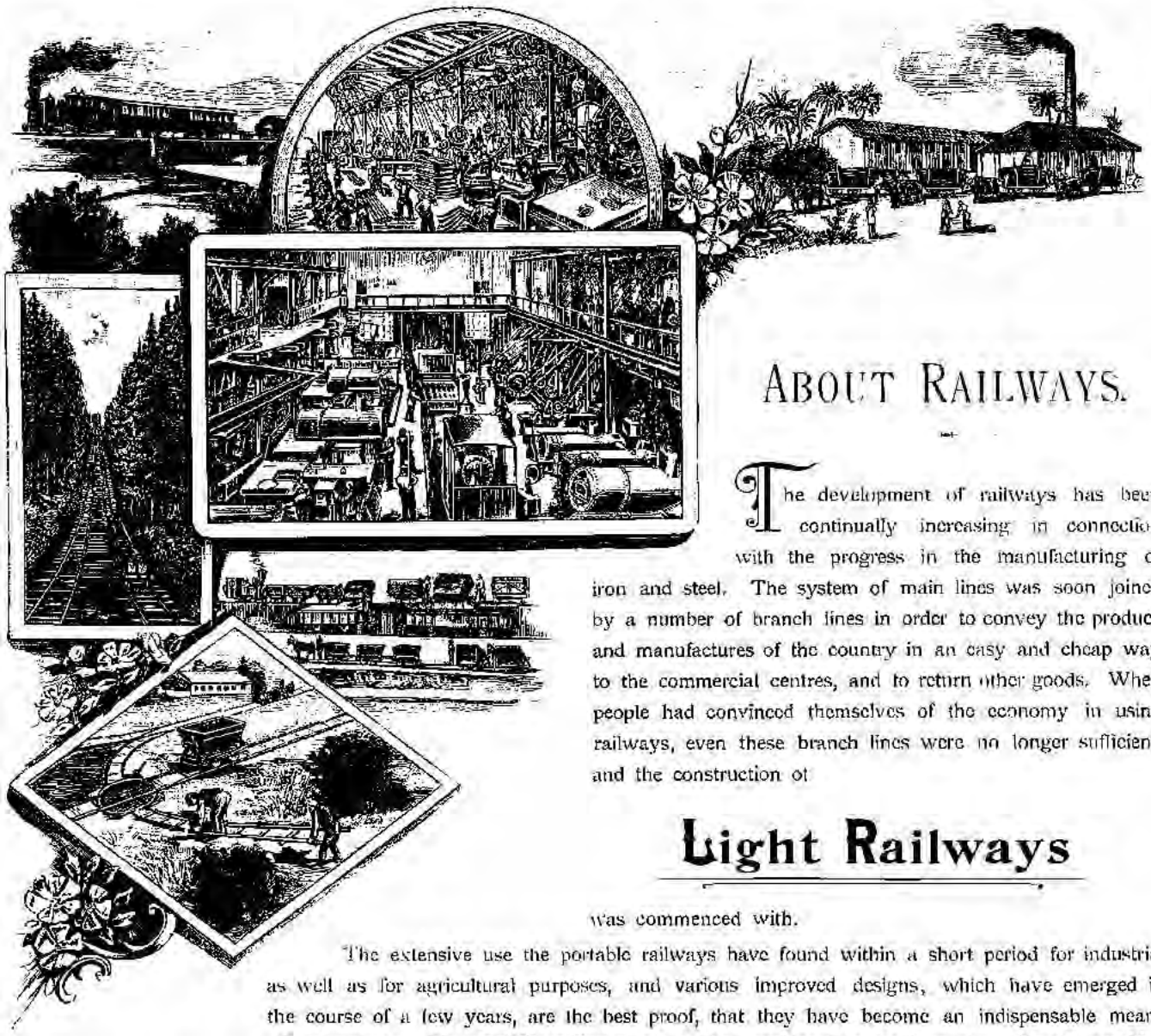


Fabrik-Etablissement Dorstfeld bei Dortmund.

Fabrik-Etablissement Szt. Lörincz bei Budapest.



ABOUT RAILWAYS.

The development of railways has been continually increasing in connection with the progress in the manufacturing of iron and steel. The system of main lines was soon joined by a number of branch lines in order to convey the produce and manufactures of the country in an easy and cheap way to the commercial centres, and to return other goods. When people had convinced themselves of the economy in using railways, even these branch lines were no longer sufficient, and the construction of

Light Railways

was commenced with.

The extensive use the portable railways have found within a short period for industrial as well as for agricultural purposes, and various improved designs, which have emerged in the course of a few years, are the best proof, that they have become an indispensable means of conveyance. The **portable railways** are to be considered in the first place for the **working of mines** and for **sylvicultural** and **agricultural purposes**, where it is of importance to find a cheap way of removal. They have also found a general use in the construction of **Railways, Roads, Canals** and **Harbours,** in **Quarries, Sand-** and **Gravel-Pits, Brickyards, Factories, Stores &c,** also in the **Construction of Fortresses** and for other **Military Purposes.**

A workman conveyes by means of a wheel-barrow on pretty level ground about 180 lbs., while on rails, well laid down, and by means of suitable vehicles, he can convey about 2000 lbs., or 13 times as much in the same time.

A horse draws at the average-rate on a level field-way about 1800 lbs.
„ „ „ road „ 2½ tons.

On rails the horse will draw under the same conditions, and with less exertion, about 10 tons, and in one third of the time.

According to circumstances, the working by **locomotives** offers considerable advantages and savings compared with that by animals. As regards the capacity of the narrow-gauge locomotives, they will convey, according to their size, 50 tons to 150 tons, at a speed of 8 to 15 miles per hour.

All kinds of Railway Plant and Rolling Stock are fully described and illustrated in this catalogue together with sufficient data to enable buyers to determine in the readiest manner their requirements.

This catalogue is being published for the export trade.

Introductory.

Since we published our previous General Catalogue, the preface to which will be found on the preceding page, the development of Railways of local interest and Industrial Railways has again much increased and their application for many other purposes made indispensable various alterations in our standard designs and the introduction of new designs into the market. Our former catalogues, the prices of which we herewith cancel, are therefore partly incomplete and not up to date and we have compiled the present revised catalogue, which we have pleasure in submitting to our friends and customers, with the view to satisfying this long felt want.

We may point out, that we were amongst those, who introduced the Light Railway System to the public and we have no doubt this catalogue will convince buyers of the fact, that since starting our works a quarter of a century ago, we maintain the leading position in the line, both as regards technical perfection and cheapness, which is the result from manufacturing substantial quantities with latest improved machinery.

The following pages illustrate and describe our leading designs and sizes supplied to all parts of the world, but should our clients be unable to find anything suitable for their purposes we shall be glad to furnish any other particular designs, sizes and gauges and to submit estimates on receiving the necessary data.

The woodcuts represented in this catalogue are merely to show the general class of our railway plant and rolling stock and we always avail ourselves of any improvements that are brought about by the constant progress in the technical art.

Any enquiries or orders, our friends should favour us with, shall be promptly and carefully attended to.

Orenstein & Koppel, Ltd.

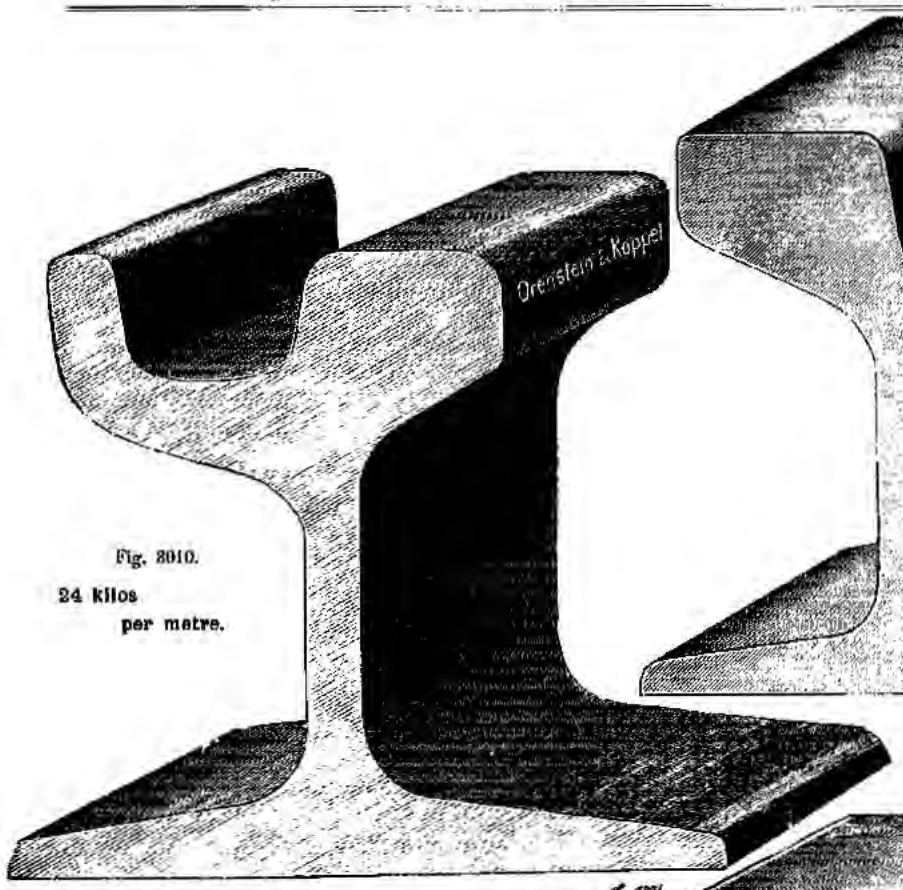


Fig. 3010.
24 kilos
per metre.

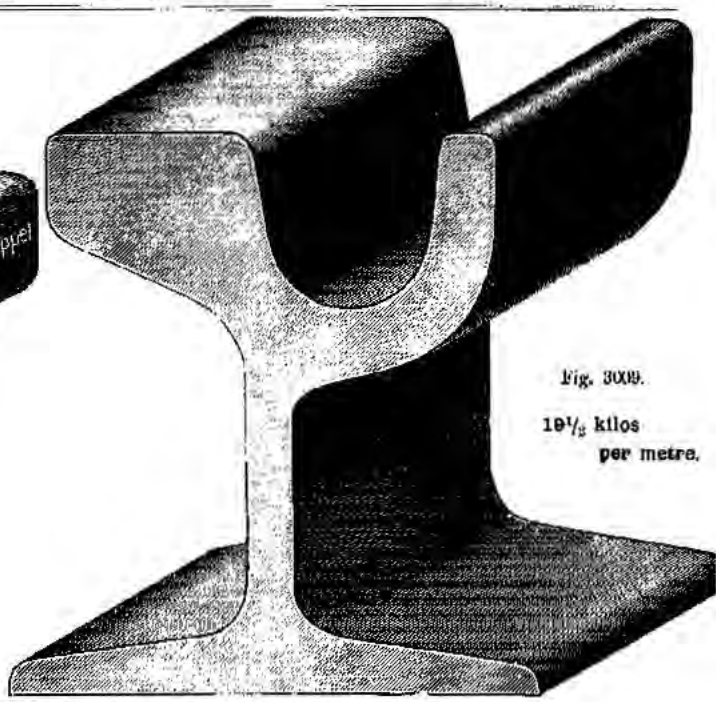


Fig. 3009.
19½ kilos
per metre.

Standard Sections

of

Grooved Steel Tram Girder Rails.

(Full Size.)

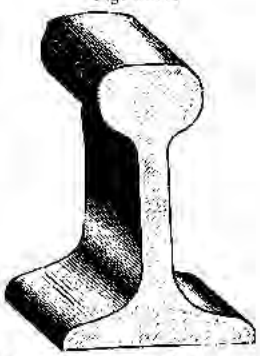
Fig. 3011.
33½ kilos
per metre.

We shall be glad to quote for any other particular sections of Tram Girder Rails on receiving a sketch of what is required.

Standard Sections

The resistance of our rails is stated hereafter in Kilos as the utmost pressure of one sole wheel upon the rails but of an actual resistance to breaking strain of 45 Kilos, offering thus a sixfold security, which will fully meet the or smaller distance than 1 metre between sleepers, multiply the resistance given below by $\frac{100}{a}$ a being the distance between

Fig. 8000.



Weight per metre abt . . 4 kg
Height . . . . . 46 mm
Resistance abt . . . . . 336 kg

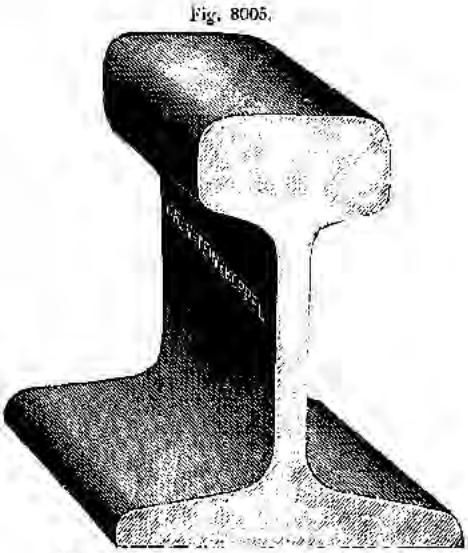
Fig. 8001.

Weight per metre abt . 4,5 kg
Height . . . . . 55 mm
Resistance abt . . . . . 475 kg

Fig. 8002.

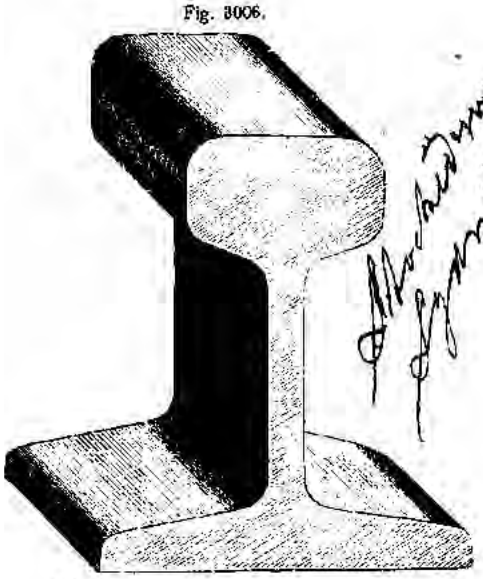
Weight per metre abt . . 5 kg
Height . . . . . 60 mm
Resistance abt . . . . . 544 kg

Fig. 8005.



Weight per metre abt . . 9 kg
Height . . . . . 70 mm
Resistance abt . . . . . 1130 kg

Fig. 8006.



Weight per metre abt . . 10 kg
Height . . . . . 70 mm
Resistance abt . . . . . 1316 kg

We roll out a large variety of other sections as per separate sheet attached to this catalogue,

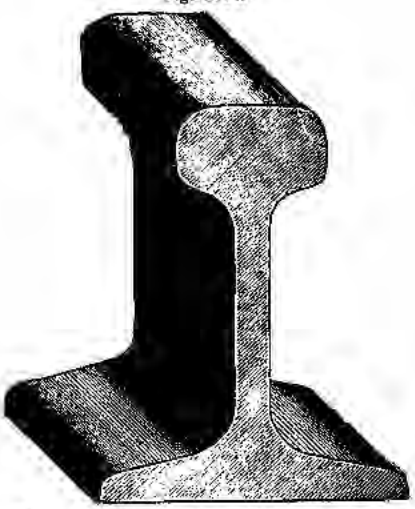
# of Steel Rails. (Full Size.)

at a distance of 1 metre between sleepers, assumed for a strain of 7,5 Kilos per square millimetre of the sectional area, requirements of light portable and permanent railways. In order to ascertain the resistance of the rails in case of a larger sleepers in centimetres.) The figures stated hereafter must necessarily be taken as approximate.

Fig. 3003.

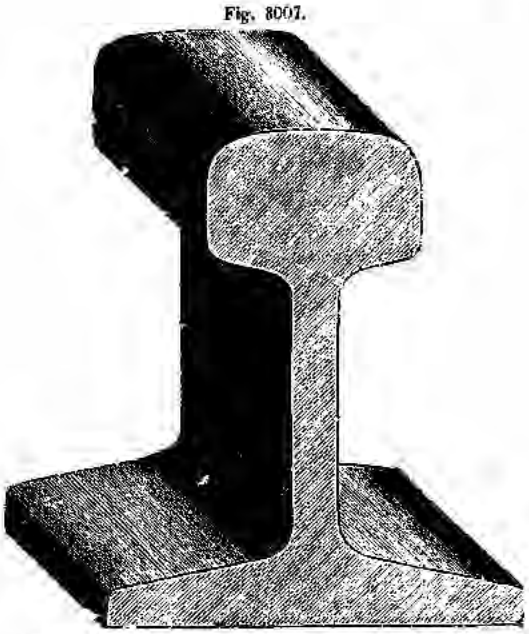
Weight per metre abt . . 6 kg
Height . . . . . 65 mm
Resistance abt . . . . . 637 kg

Fig. 3004.



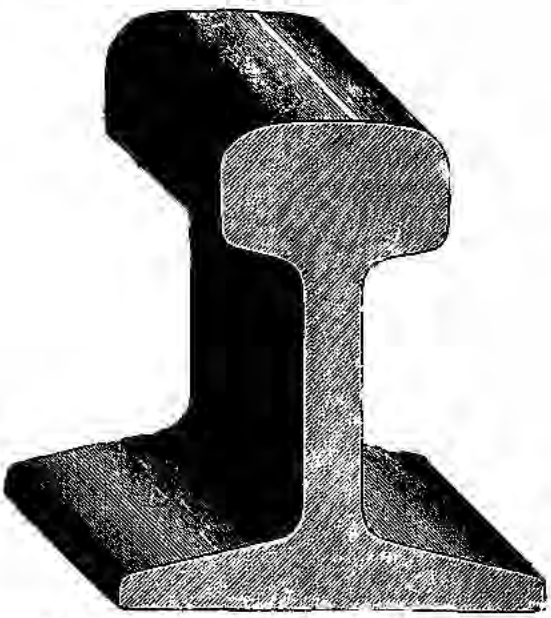
Weight per metre abt . . 7 kg
Height . . . . . 65 mm
Resistance abt . . . . . 823 kg

Fig. 3007.



Weight per metre abt . . 12 kg
Height . . . . . 80 mm
Resistance abt . . . . . 1892 kg

Fig. 3008.

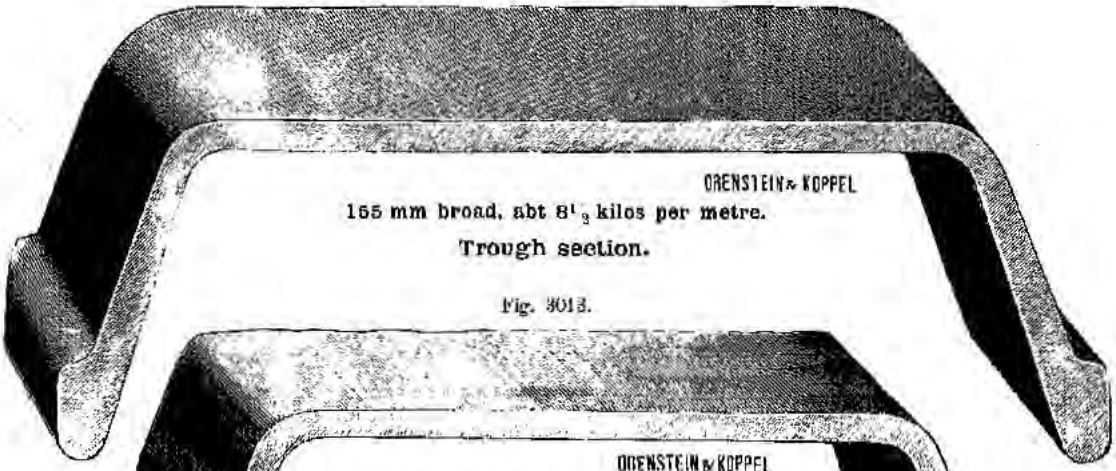


Weight per metre abt . . 14 kg
Height . . . . . 80 mm
Resistance abt . . . . . 2057 kg

but we would recommend buyers to adhere, if possible, to our Standard Sections.

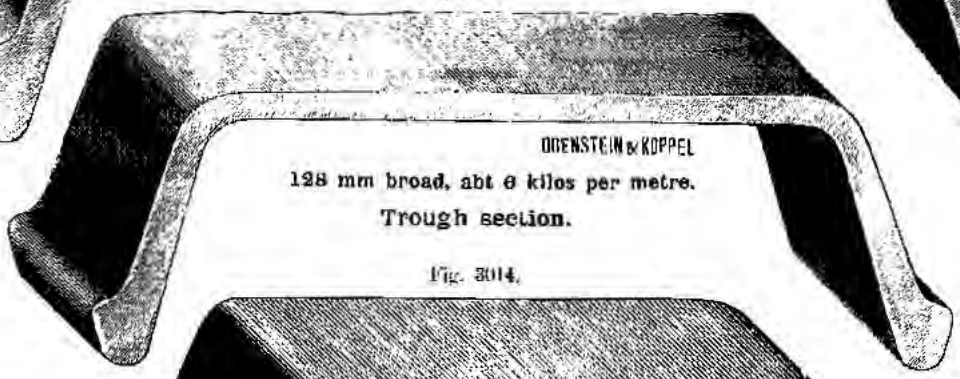
Standard Sections of Steel Sleepers (Full Size).

Fig. 3012.



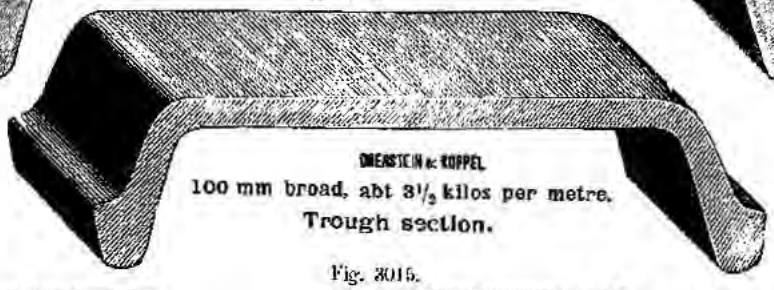
165 mm broad, abt 8½ kilos per metre.
Trough section.

Fig. 3013.



128 mm broad, abt 6 kilos per metre.
Trough section.

Fig. 3014.

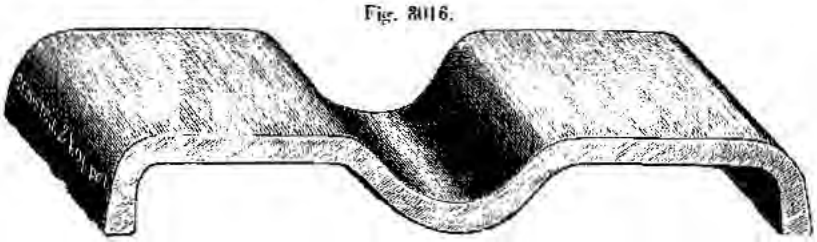


100 mm broad, abt 3½ kilos per metre.
Trough section.

Fig. 3015.

128 mm broad, abt 5½ kilos per metre.
Corrugated section.

Fig. 3016.



105 mm broad, abt 3½ kilos per metre.
Corrugated section.

Fig. 3017.

This cut represents the trough section sleeper with ends blocked.

We shall be glad to quote for any other particular sections of sleepers on receiving a sketch of what is required.

THE CENTRAL MINING & TRAM PROPRIETARY, LIMITED, 40 HUNTER STREET, SYDNEY.

Railway Plant.

In selecting a light railway system the following points should be taken into consideration:

1st. **Total quantity of goods to be removed in a certain time.**

2nd. **Whether the quantities may be divided in small lots.**

3rd. **Approximate time the railway will be in use.**

Railway Systems.

1. In case the goods are to be removed between points changing frequently, we suggest to use the **Portable System,** the trace of which may be altered with the least possible waste of time and labour. The portable railways are therefore suitable for estates, yards, in constructing main-railroads, harbours, buildings, and for cutting down woods etc. etc.

2. Is the trace of the railway between two points to remain the same for a long period, it will be advisable to use the Permanent System, which should be laid on a carefully constructed bed. This system is therefore the one designed to connect two places for passenger and goods traffic.

We give hereafter a full description of the two systems viz:

A. Portable Railways.

Portable railways are those, of which the rails and sleepers are fitted to ladder-like frames, the comparatively small weight and easy joints of which will permit their being laid down and taken up again at any time, quickly and without skilled labour.

1. Rails.

The rails are rolled out of steel and although being of small weight they possess a great bearing strength and power of resistance. Sections No. 3000 to 3004 are most suitable for portable railways.

2. Sleepers.

a. **Steel sleepers** should be used wherever practicable on account of their lightness and durability. They are rolled out of best ingot steel and have a great bearing strength. Their form is adapted to their purpose, so that they will bed themselves firmly in the ground, and not give way or sink.

The sleepers are laid apart at a well calculated distance and project the rails, so as to secure a safe traffic, combining strength with stability. Sections 3013 to 3016 are very suitable for portable railways.

b. **Wood-Sleepers.** In places with abundance of wood there are frequently used wood sleepers. In this case only the rails and fastenings are ordered, whilst the wood sleepers are made on the spot, but we would only recommend wood sleepers for such portable railways as are intended to be laid on soft ground, where the support of the sleepers is of more importance than a frequent change of the plant. In all other cases steel sleepers are more advisable than wood sleepers, as these, having to be often renewed, turn out in course of time more expensive than steel. Oak or resinous wood is the most suitable quality for wood sleepers and to prevent their becoming rotten they should be impregnated with carbolineum.

3. Securing Rails to Sleepers.

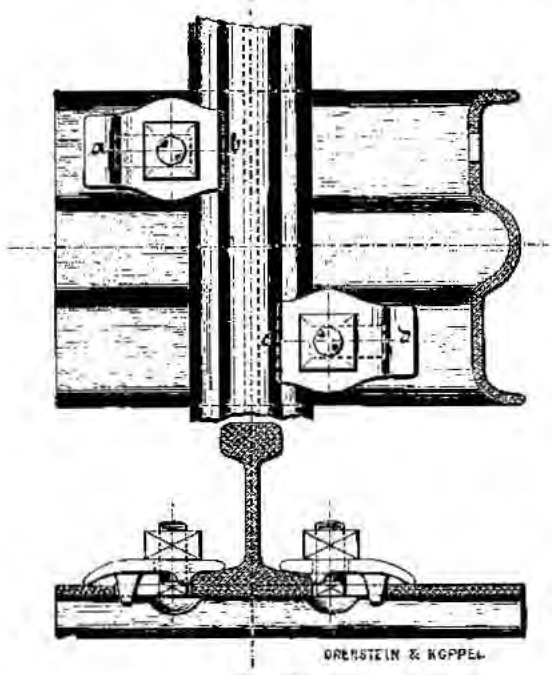


Fig. 3018.

a) Rails upon Steel Sleepers.

The way of fastening the rails to the sleepers being of the utmost importance for the durability of the line and safety of the traffic, more particularly in portable railways, we have selected a system which is specially adapted for the purpose.

Fig. 3018 represents the fastening of the rail upon corrugated steel sleepers. The fastening consists of 2 screwbolts with nuts and clips. The clips are pressed of toughened wrought iron and have three horn like projecting parts, which take up the lateral pression of the rails and transfer it to the sleepers.

This system of fastening has the following advantages, even under the greatest strain on the line:

1. **The screwbolts are laterally almost totally discharged and therefore very durable.**
2. **The track is always kept true to gauge.**

Fig. 3019/20 represent a system which is used in various countries.

This fastening is made by clutch-bolts and steel chairs rivetted to the sleepers at the correct distance apart for the gauge required. Passing the clutch-bolt under the rail and chair along the corrugation of sleeper and tightening the nut, the inner flange of the rail is gripped by the clutch-bolt and the rail firmly held under the chair. This fastening is both simple and strong and will exclude a lateral yielding of the rails, thus keeping the track always true to gauge.

If desired, we supply the rails rivetted to steel sleepers, but we suggest our customers to rather select the above systems, as the fastening through bolts and clips offers various advantages: viz:

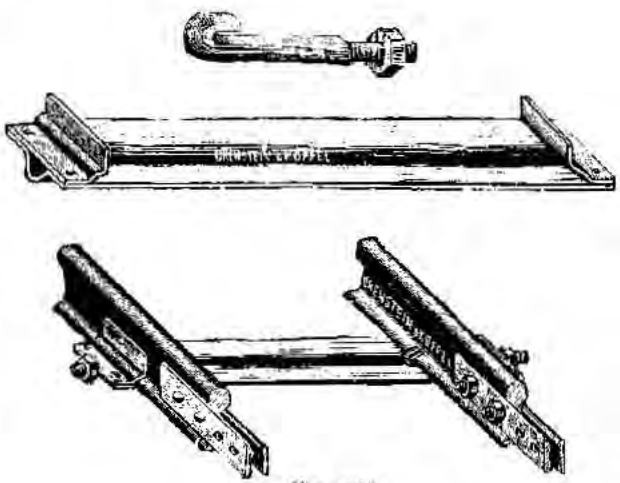


Fig. 3019.

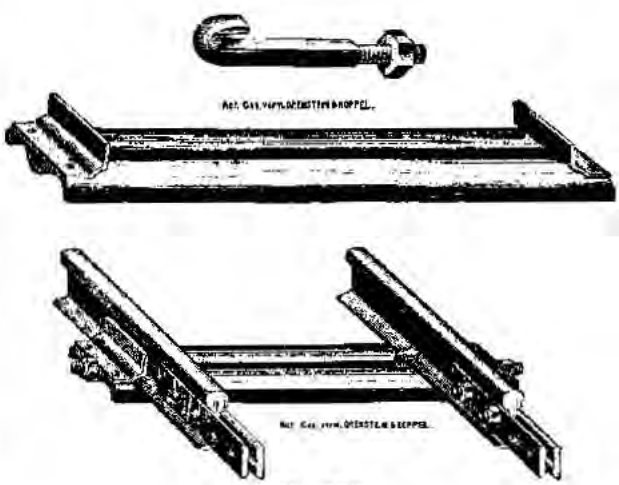


Fig. 3020.

1st. **Rails and sleepers are shipped loose and pay freight by weight and not by measurement.**

2nd. **Duplicate parts can be immediately attached while keeping the line in almost continuous service.**

3rd. **Buyers are able to make suitable curves according to their requirements.**

b) Rails upon Wood Sleepers.

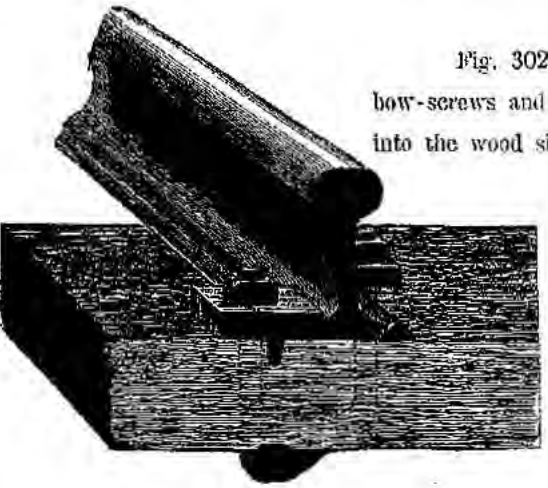


Fig. 3021.

Fig. 3021 shows how the rails are fastened to wood sleepers by means of bow-screws and clips. The clips have 2 teeth which are pressed towards the rail flanges into the wood sleepers, to secure always a correct gauge.

To prevent the wood being split, the screws are fixed in a diagonal position. — Fastening the rails to the wood sleepers by means of spikes is not advisable for portable railways, since the spikes are able to split the wood of the comparatively weak sleepers.

Impregnating Substance for wood sleepers, we supply in casks of 50, 100 and 200 Kilos.

It is advisable to impregnate wood sleepers to prevent their becoming rotten.

4. Joints.

The most suitable and efficient rail joint, which is now almost universally adopted for Light Railways, consists of 2 pairs of ordinary steel fishplates formed to match the rails and of 8 bolts and nuts to suit.

In case of temporary use the joint by means of the bolts may be dispensed with; the fishplates are screwed to one end of the rails and it will be sufficient to make the joint by sliding the rail into the open end of the fishplates, which are long enough to take up and hold the rail.

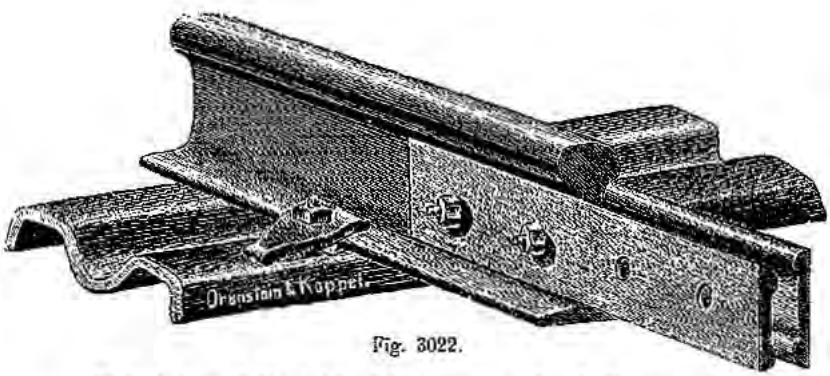


Fig. 3022.

Fish Joint of Portable Railways on Steel Sleepers.

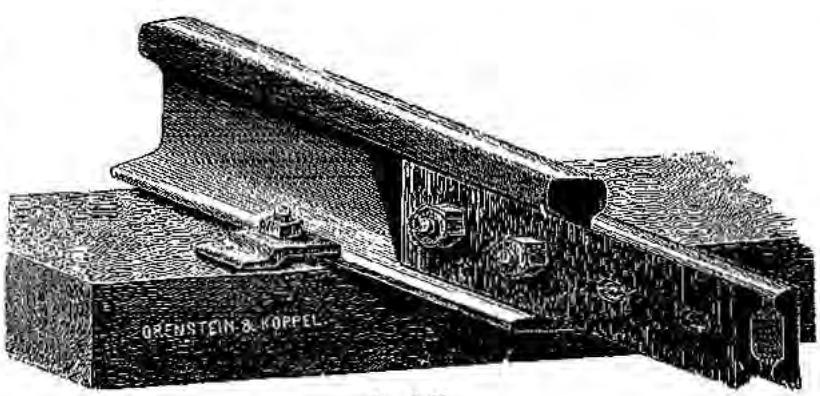


Fig. 3023.

Fish Joint of Portable Railways on Wood Sleepers.

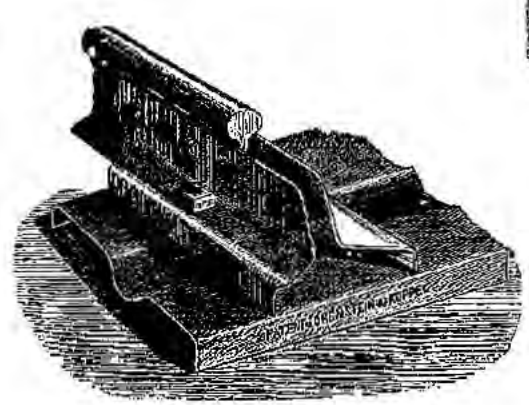


Fig. 3024.

Patent Bracket Joint.

Besides the above joint we supply various other systems, of which, however, we hereafter illustrate and describe only the Bracket Joint, Fig. 3024.

In laying portable railway sections with bracket joints it should be borne in mind, that the steel sleeper below the joint has a particular punching, which is different from that of the other sleepers.

B. Permanent Railways.

The substructure for such railways should be made carefully and strongly and in order to make the best use of the hauling power any unevenness should be avoided as much as possible. Curves of a small radius, which cause unusual friction of the wheels, increasing thus wear of or injury to rolling stock, should be avoided. Care should further be taken to have a good bedding of gravel or broken stones, which secures a great bearing strength of the line.

1. Construction.

Lightness of permanent plant not being as important as durability is will be advisable to use comparatively heavier rails and more and longer sleepers than for portable railways.

2. Rails.

For permanent railways all sections of rails are used as shown on pages 6 and 7.

3. Sleepers.

a) The **steel sleepers** most suitable for these lines, are those illustrated on page 8. The sleepers, more particularly in connection with heavy rails and locomotive power, are usually blocked at either end to prevent the escape of the ballast, thus keeping the sleeper firmly to the bed of the line — see fig. 3017, which is a matter of importance, especially in curves.

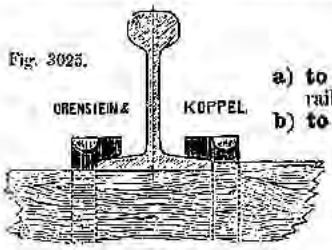
Fig. 3017.

b) **Wood Sleepers** are frequently used for permanent railways in quarters with abundance of wood, more particularly abroad, where, if the wood sleepers are made on the spot, they prove to be cheaper than steel sleepers, as no freight on them need be paid.

To withstand the decaying influences of the weather, insects etc. in hot climates, the wood sleepers should be impregnated with carbolineum or any other efficient impregnating substance.

We supply impregnating substance for wood sleepers in casks of 50, 100 or 200 Kilos.

Fig. 3025.



4. Securing Rails to Sleepers.

a) **to Steel Sleepers** the rails are secured in the very same way as those of the portable railways (see Fig. 3018, 3019 and 3020).

b) **to Wood Sleepers** the rails are secured either by means of

Spikes (Fig. 3025) or by means of **Screws** (Fig. 3026).

The fastening by spikes is easily made, but the fastening system by means of screws is more durable, affording great safety against the rails getting loose from the wood sleepers.

Fig. 3026.

Fig. 3025 shows the fastening of rails to wood sleepers by means of spikes

„ 3026 „ „ „ „ „ „ „ „ „ „ „ screws

Fig. 3027.
Full Size of Spikes.

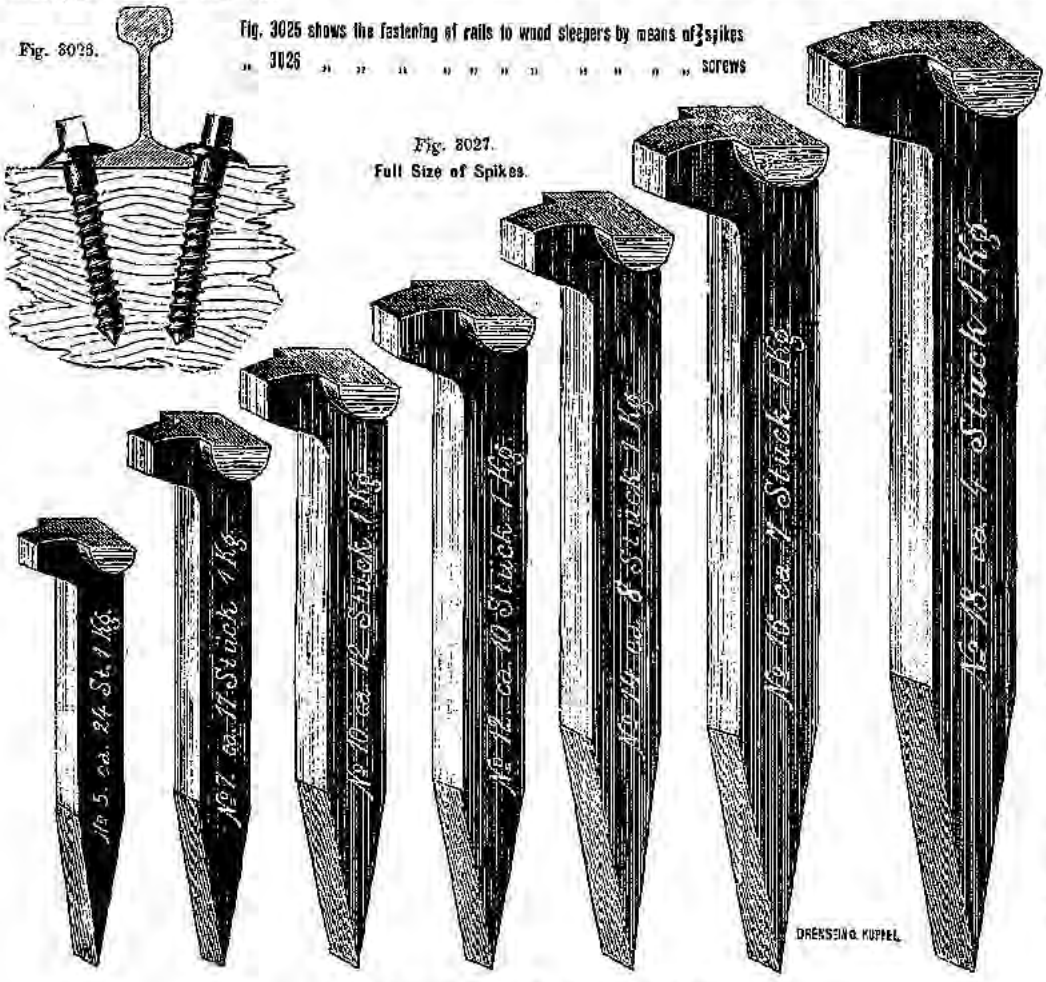


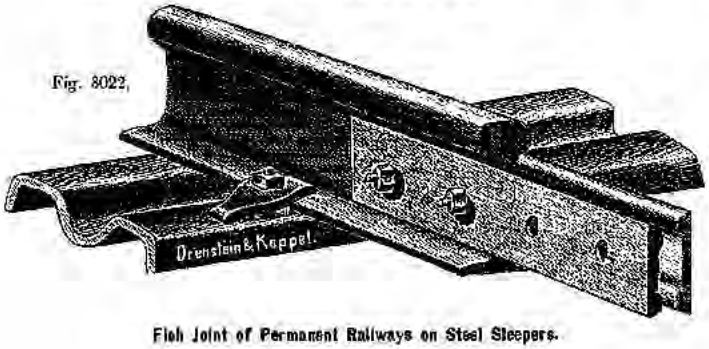
Fig. 3028. Screw No. 1.

Fig. 3029. Screw No. 2.

5. Permanent Rail Joints.

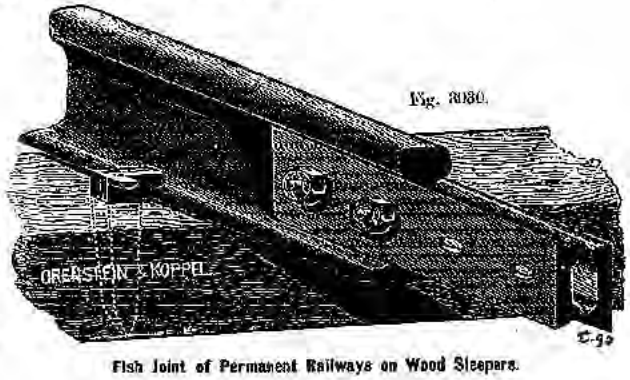
The joint is made of the ordinary steel fishplates, which are formed to match the rails, and of bolts and nuts to suit; see Fig. 3022 and 3030.

Fig. 3022.



Fish Joint of Permanent Railways on Steel Sleepers.

Fig. 3030.



Fish Joint of Permanent Railways on Wood Sleepers.

Portable Railway Sections.

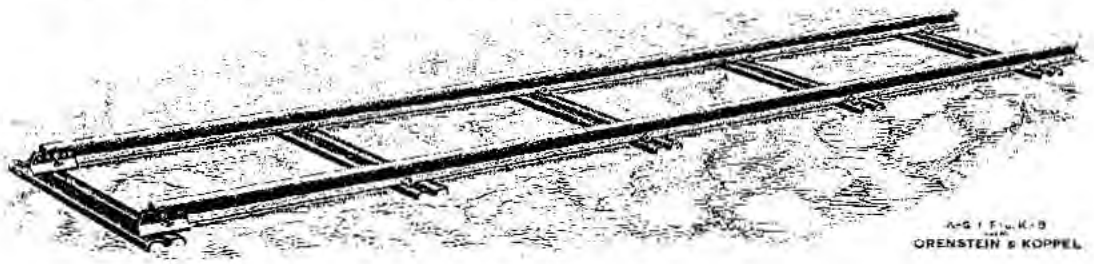


Fig. 3083.

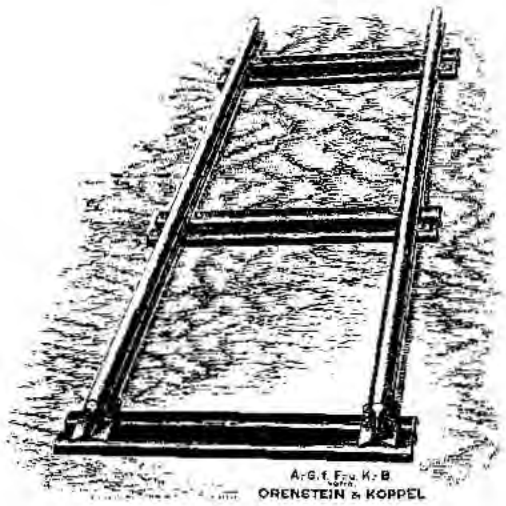


Fig. 8081.

We supply portable railway sections in any required length and with any particular number of steel sleepers. Our standard lengths of railway sections are 5 and 2½ metres upon 5 and 3 sleepers respectively. Curved sections of 5 metres lengths are fitted on 6 sleepers to meet the heavier strain on them. The 500 and 600 mm gauges are the most suitable gauges for portable railways and, therefore, almost universally adopted, but we supply also any other particular gauge required.

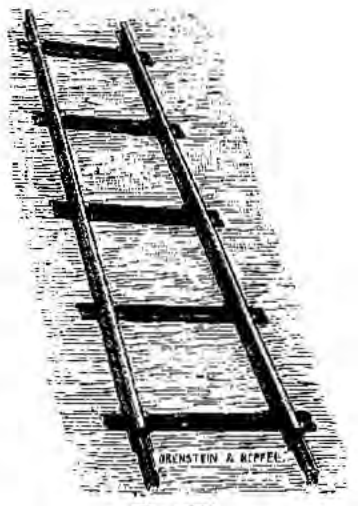


Fig. 8084.

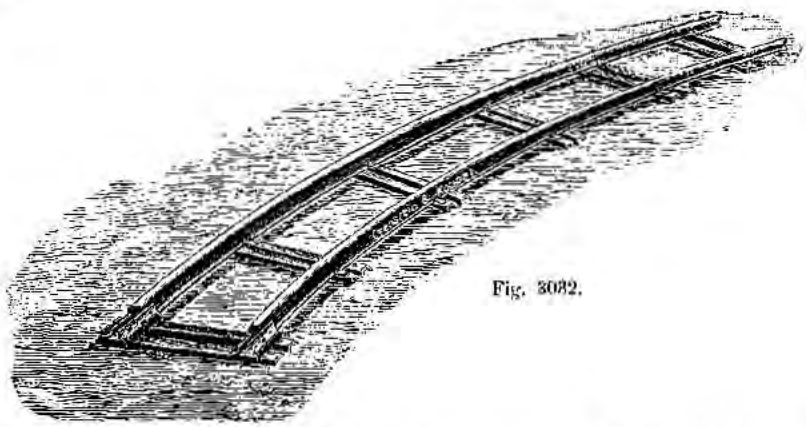


Fig. 3082.

Permanent Railway Sections.

Are supplied in any required length and with any particular number of sleepers.

The standard lengths are 7 and 5 metres upon 9 and 7 sleepers respectively or upon 6 and 5 sleepers respectively according to the requirements of the traffic. Curved sections are fitted upon 1 sleeper more, to meet the heavier strain on them. The standard gauges adopted for permanent railways are 1435, 1000, 750 and 600 mm.

Practical Hints for fitting up Railway Sections.

To save in freight we usually ship rails and sleepers not fitted together and therefore give hereafter a few hints, which will be found useful in arming the tracks. If required, we furnish a complete sample railway section fitted up to work after.

In securing rails to sleepers it should be borne in mind, that they must be placed at right angle to each other, which can easily be attained with the aid of a square. The fastening of the rails to the steel sleepers is made by bolts, nuts and clips, as per Fig. 3018.

The best way of proceeding is to screw off the nut and introduce the bolt from below, then put on the clip and tighten the nut after the correct gauge has been secured by the measure-rule, see Fig. 3035 hereafter.

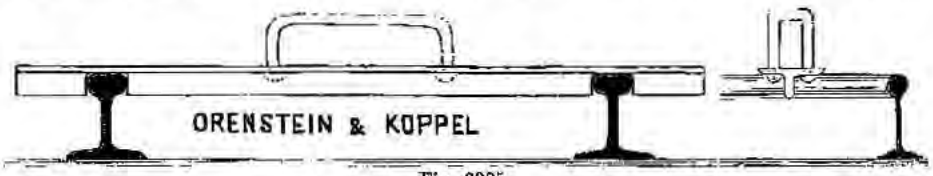


Fig. 3035.

Although the steel sleepers are carefully punched by us, a small deviation from gauge may happen in some instance owing to the position of the bolts and tightening of the nut. We suggest, therefore, to use a measure-rule, as illustrated by Fig. 3035, which will always secure a correct gauge. If desired, we shall supply such a measure-rule and a square, which are extra, together with rails and sleepers.

Making the rail-joint by the ordinary fishplates, it must be borne in mind, that the end of the rail ought to project the sleeper half length of fishplates. This joint is called the suspended joint and represented by Fig. 3022 hereafter.

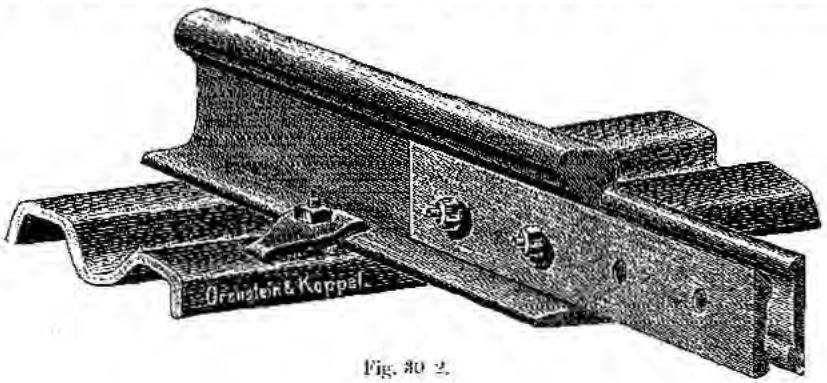


Fig. 30 2.

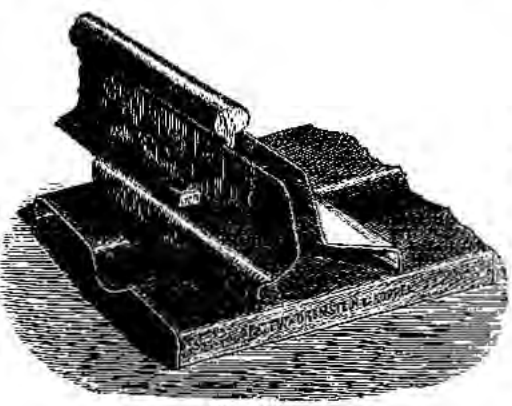


Fig. 3024.

In case however, the joint is made by the brackets or angle-plates, faston the sleeper, which is below the joint, to the rail by a bow-screw, which at the same time keeps the brackets in position, in such a way that the end of the rail occupies the smaller part of the width of the said sleeper, the greater part of the width of the sleeper giving thus a long bearing surface to the other rail, which is to slide into the brackets. The sleeper below the joint has a particular punching, which must be borne in mind in fastening rails.

This joint is known as the supported or fixed joint and illustrated by Fig. 3024 hereafter.

The first sleeper of the joining railway section should be placed about 40 centimetres from the end.

Standard Curves.

If not required otherwise we supply curved sections in the following radii, which have proved to be the most suitable curves for portable railways.

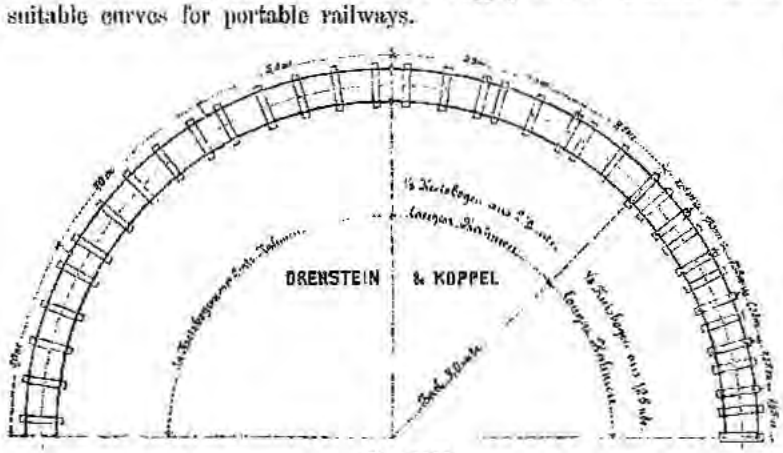


Fig. 3030.

For Railways of steel rails 3008 about 14 Kilos p. metr. } Radius of outer rail 25 metres.
" " " " " 3007 " 12 " " "
" " " " " 3006 " 10 " " "
" " " " " 3005 " 9 " " "

The circumpherence of a quadrant of this radius is 39,2 m.

For Railways of steel rails 3004 about 7 Kilos p. metre } Radius of outer rail 10 metres.
" " " " " 3003 " 6 " " "
" " " " " 3002 " 5 " " "
" " " " " 3001 " 4,5 " " "
" " " " " 3000 " 4 " " "

The circumpherence of a quadrant of this radius is 15,72 m.

Patent Tramway Rails.

This Tramway consists of Grooved Steel Girder Rails, made under a patent process, and is decidedly the cheapest and most simple of the various existing systems, being now almost universally adopted by the Tramway Companies. The advantages claimed for it are:

1st. The rails form a continuous girder, doing away with all loose parts except the fastenings.

2nd. They can be laid quickly and at a small expense.

3rd. The weight is on the centre of the rail, therefore uniformly divided over the whole of the bed, which is not the case with any other system now in use.

4th. The fishjoint is very simple and, in fact, the only efficient form of joints in existence.

5th. Repairs are merely nominal. This system is eminently suitable for electric or steam motor power. The rails are rolled in sections of 36 to 100 lbs. per yard in standard lengths of 9 metres. Fig. 3037 shows the very simple laying of this tramway system in street pavement.

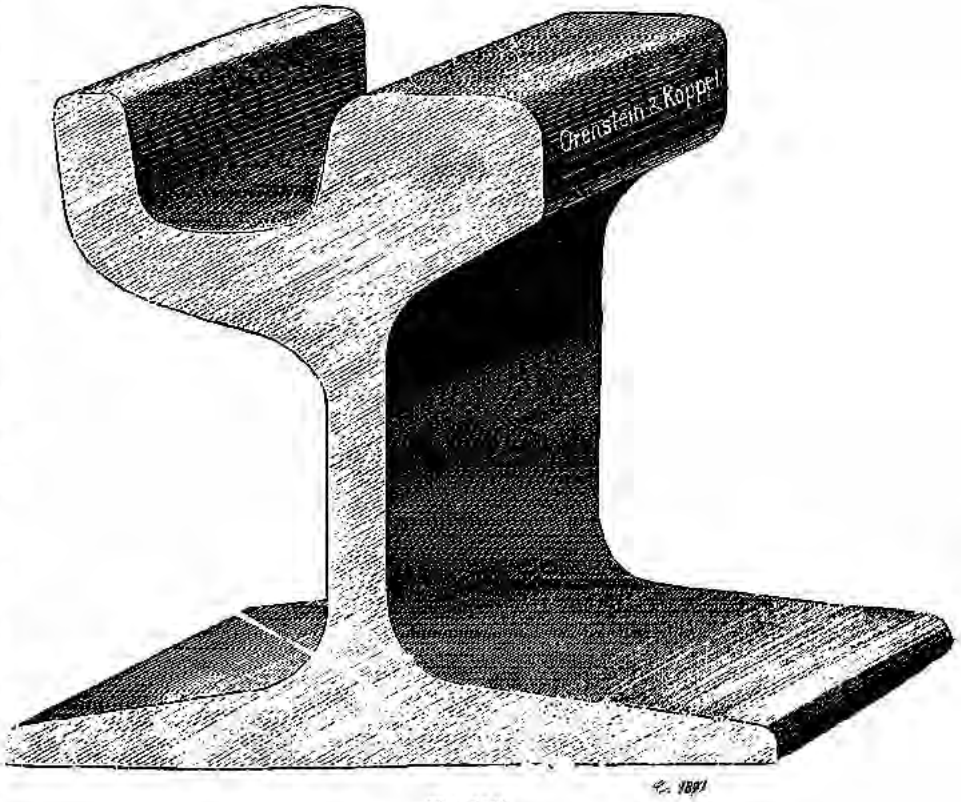


Fig. 3010.

To keep the track true to gauge, the rails are connected by tie-rods with bolts and washers.

In straight track the tie-rods are about 2 metres apart, and in curves about 1,50 metres. Our standard curves have a radius of either 15, 25 or 40 metres, as may be required.

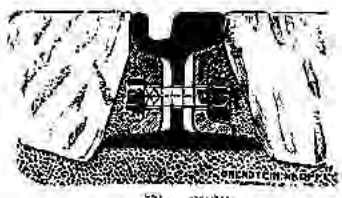


Fig. 3038.

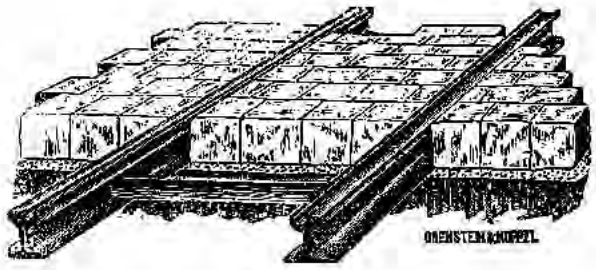


Fig. 3037.

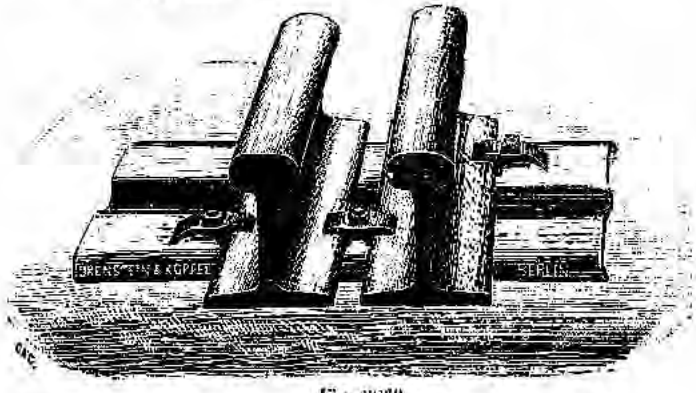


Fig. 3039.

Fig. 3039 illustrates an arrangement of line, which will be found convenient to allow a crossing of people, carts etc., when the ordinary line is to pass through towns and villages, where the rails are laid in street pavement. Two rails are secured together to form a groove and are fastened down to steel sleepers by clips and bolts.

Crossings.

We illustrate on this page various designs of our standard crossings which are generally used in portable and permanent railways.

1. Right Angle Crossing

riveted to a wrought iron steel sheet.

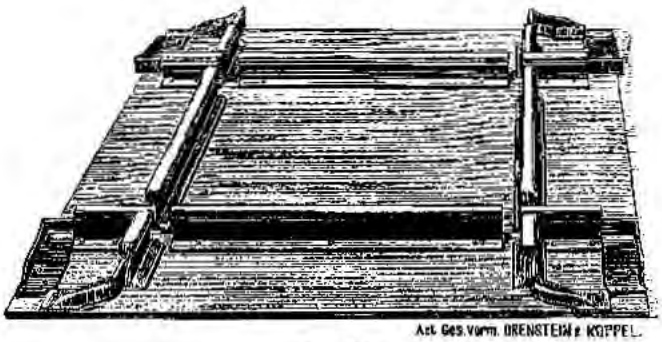


Fig. 3040.

2. Diamond Crossing

as per Fig. 3041 is made to any required angle.

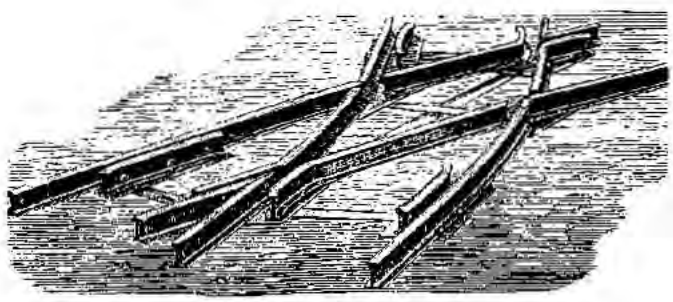


Fig. 3041.

3. Double Inclined Plane

consists of a section of line 1,5 m long with a pair of tongues at either end and may be found useful where a portable line is to cross a permanent line.

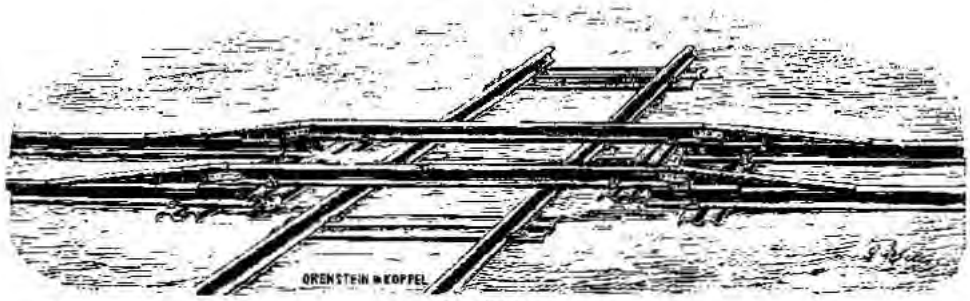


Fig. 3042.

Connecting Bridge.

When a track is being laid down simultaneously at either end and no short section will suit the small space remaining, the connection is then made by the bridge represented by Fig. 3043.

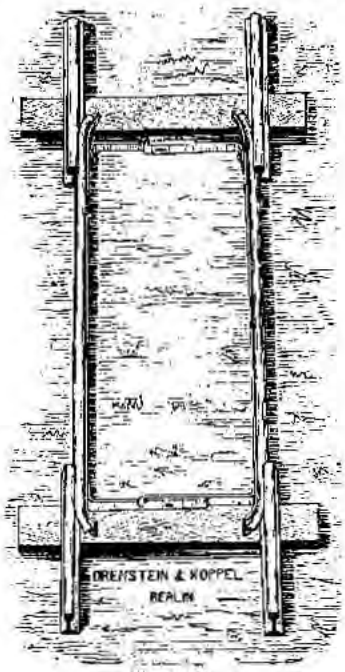


Fig. 3043.

Portable Level Crossing.

Fig. 3044 below illustrates a portable level crossing made of wood planking which will be found useful where the track is crossed by a cart-road.

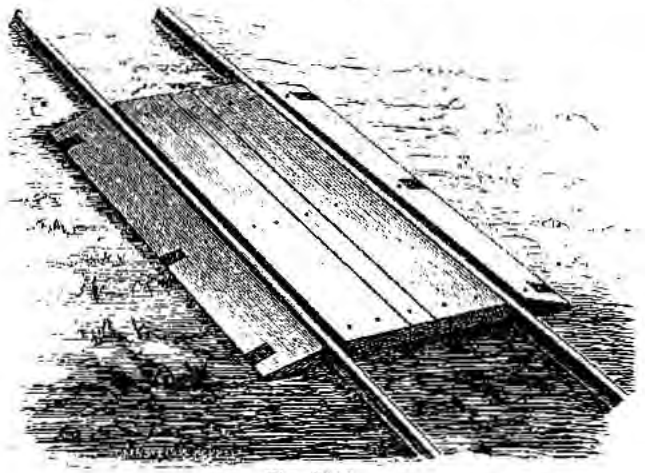


Fig. 3044.

Turntables

are designed to connect crossing tracks.

In constructing our turntables we have been striving in the first place to secure easy working, combining strength and the least possible wear. We illustrate and describe hereafter our standard designs of turntables; are, however, open to make any other practicular design and size, and shall be glad to quote for same.

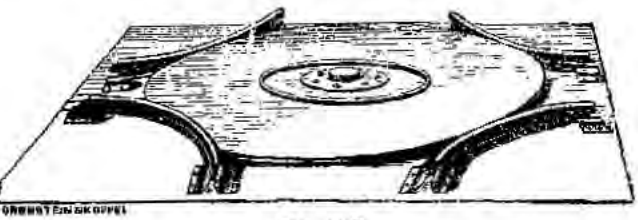


Fig. 3045.

I. Portable Wrought Iron Turntable.

This turntable is constructed of wrought iron and the revolving gear consists of 4 rollers and a steel centre-pin.

They are suitable for right angle and diamond crossings as shewn by Fig. 3045.

Standard diameter 940, 1000, 1100, 1200, 1500 or 1550 mm and gauge up to 1000 mm. Carrying capacity 750, 1500, 2000, 2500 or 3000 Kilos.

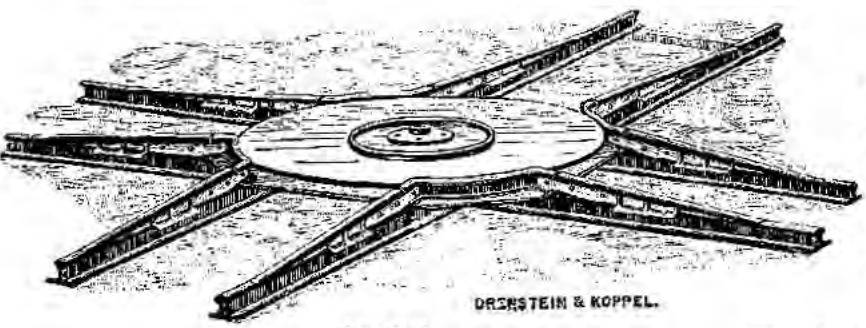


Fig. 3046.

II. Right Angle Crossing and Turntable

as illustrated by Fig. 3046, are made of wrought iron and will be found useful where a temporary right angle turn off is required without disturbing the permanent line. The turntable being put on the track, the cars will be removed by aid of the tongues from one track to another. The revolving gear and other particulars are quite the same as before.

III. Portable Wrought Iron Ball Turntable.

Fig. 3047 represents a turntable which turns on balls and does not require any greasing. This turntable is suitable for right angle and diamond crossings. It is entirely covered and prevents the entrance of dirt or sand, securing thus easy working combined with the least possible wear.

Standard diameter 940 mm, gauge 500 or 600 mm, carrying capacity about 2000 Kilos.

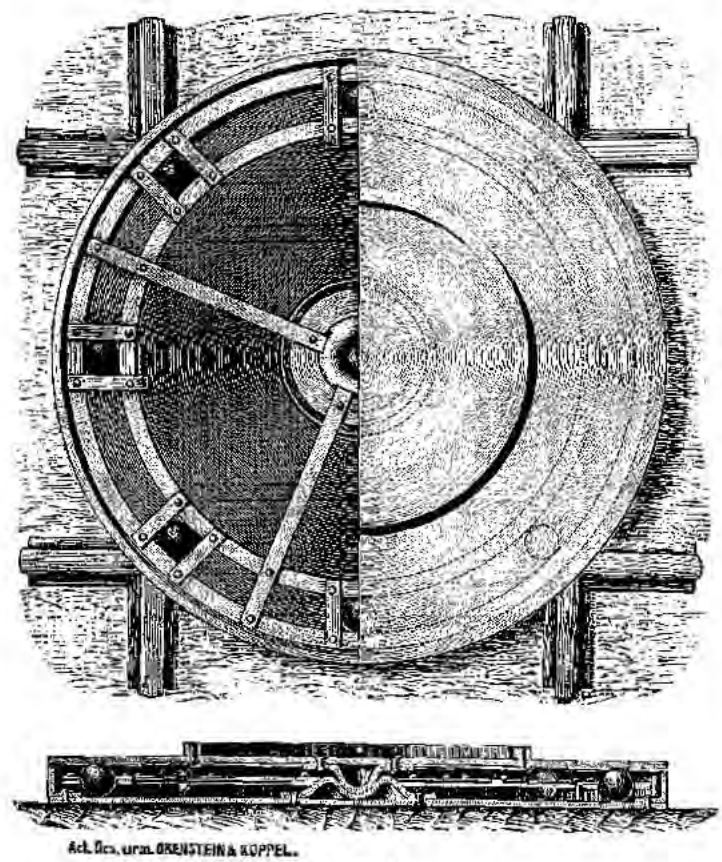


Fig. 3047.

IV. Portable Cast Iron Turntable

as per Fig. 3048, is suitable for loads up to 2500 Kilos and can be laid without skilled labour. They have a cast iron table with a dished centre and locking gear, and turn on a large cylindrical centre-pin. Diameter either 1000 or 1100 mm. Gauge 500 or 600 mm.

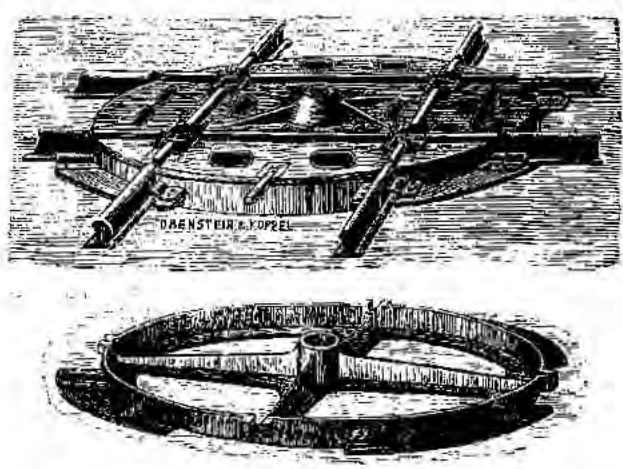


Fig. 3048.

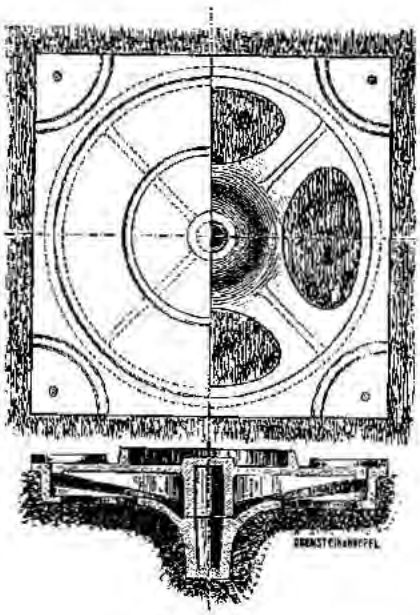


Fig. 3049.

V. Portable Cast Iron Pan Turntable.

This design, as per Fig. 3049, is different from those described on the preceding page, in as much as the cylinder and the centre-pin are partly placed in the ground, leaving thus only the flange and the guide-rails above the level.

Standard diameter 940 mm.

Gauge 500 or 600 mm.

Carrying capacity up to 2500 Kilos.

VI. Portable Cast Iron Plate Turntable.

Fig. 3050 represents a turntable which should be used when the tracks starting from the turntable, are frequently to be changed in direction.

It carries 1500 Kilos.

Dia of table 940 mm for gauges up to 600 mm.

This turntable is not closed by a casing and has no flange nor guide-rails.

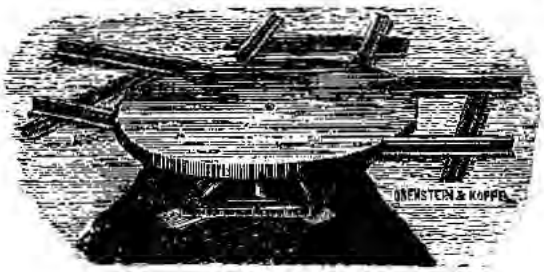


Fig. 3050.

VII. Tramway Turntable,

as per Fig. 3051, turns round pivots and live rollers, has a locking gear, a chequered cast iron table with grooves and is designed to be laid down in street pavement.

Dia of table 1100 mm.

Gauge 500 or 600 mm.

Carrying capacity up to 2500 Kilos.

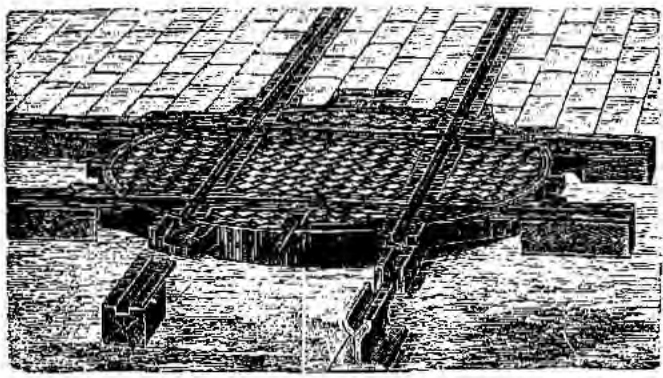


Fig. 3051.

VIII. Portable Iron Skid Plate,

as illustrated by Fig. 3052, will be found suitable in curves for turning wheel-barrows and wagons of small wheel-base and small carrying capacity. To suit gauges of 500 and 600 mm.

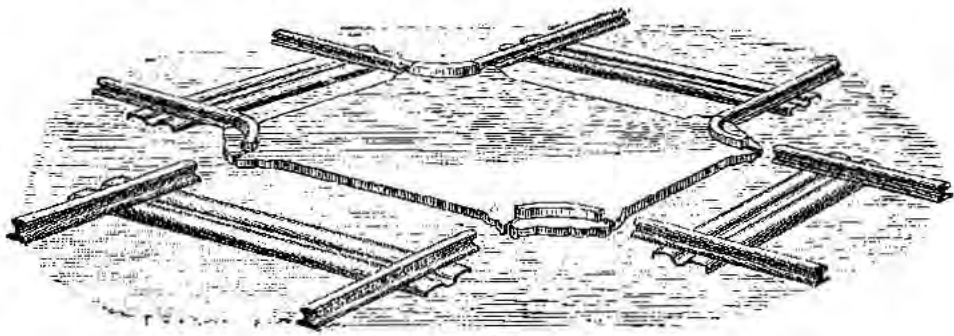


Fig. 3052.

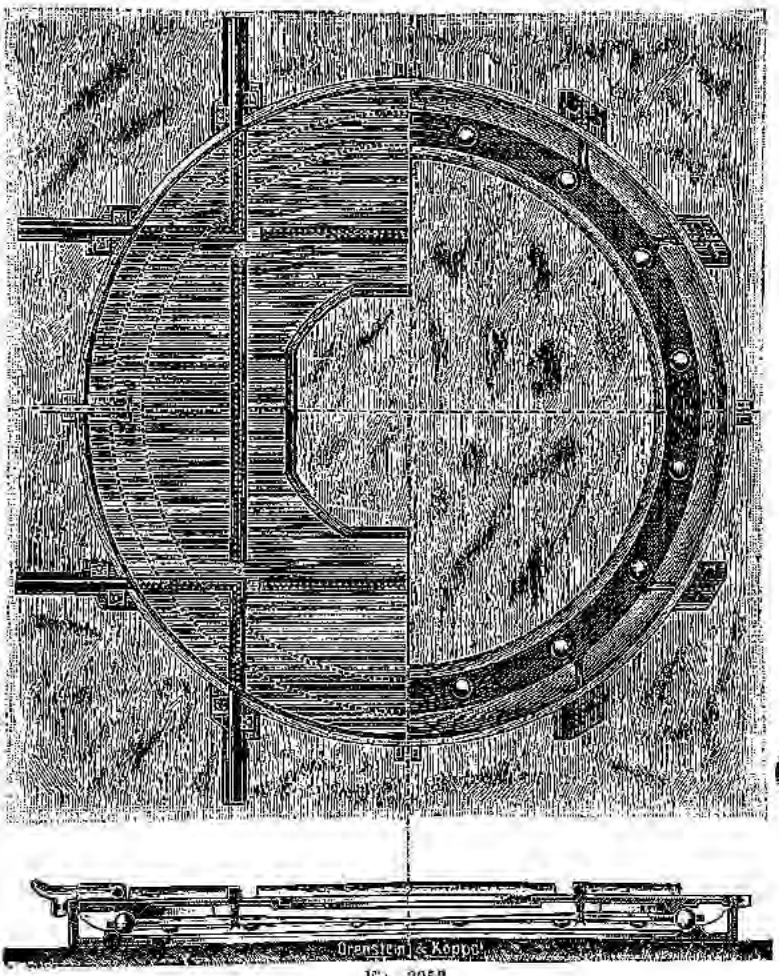


Fig. 3053.

IX. Ball Turntable for Portable, Permanent and Tramway-Lines.

Turntables represented by Fig. 3053 turn on balls and are suitable for portable, permanent and tramway lines.

The advantages claimed for this design are:

1. **No masonry.**
2. **No greasing.**
3. **Very little wear.**
4. **Easy working.**

This turntable, requiring no masonry, will be found most convenient for permanent tracks.

Standard diameter 1250, 1550 and 1800 mm.

Gauge 600, 750 or 1000 mm.

Built for carrying capacities up to 5000 Kilos.

X. Turntables for Permanent and Tramway Lines.

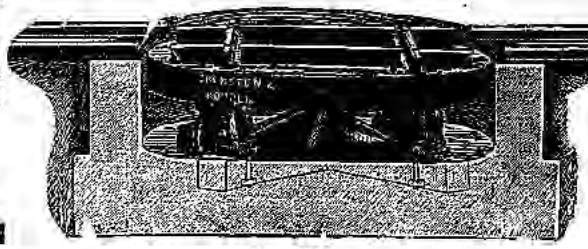


Fig. 3054a.

Turning on a steel-centre-pivot and iron rollers. They are floored with wood and placed into a pit of wood or stone as may be most convenient. We supply these turntables either fitted up with boarded floor and wood framing or only the iron-work taken to pieces.

The ironwork comprises:

1. The steel centre piece and pivot.
2. The ring of curved rails.
3. The rollers with bearings viz 4 rollers for 500 and 600 mm gauge and 6 rollers for 750 and 1000 mm gauge.
4. The track.
5. The adjusting gear.
6. The iron socket for the insertion of the stick.
7. The necessary screws.

Diameter either 1000, 1200 or 1500 mm.
Gauge either 500, 600, 750 or 1000 mm.
Built for loads up to 2500 Kilos.

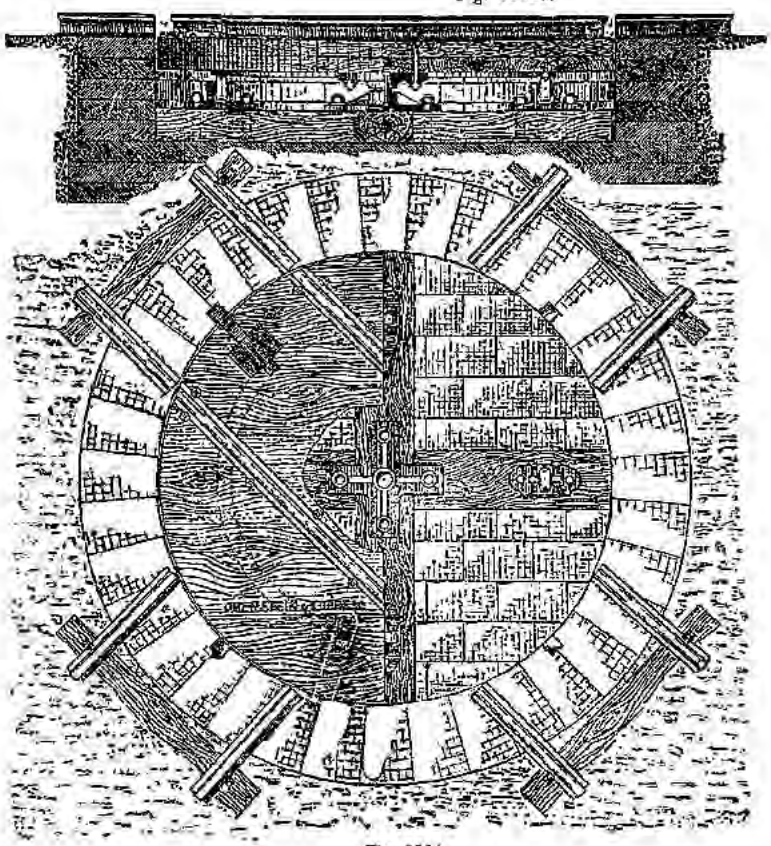


Fig. 3054.

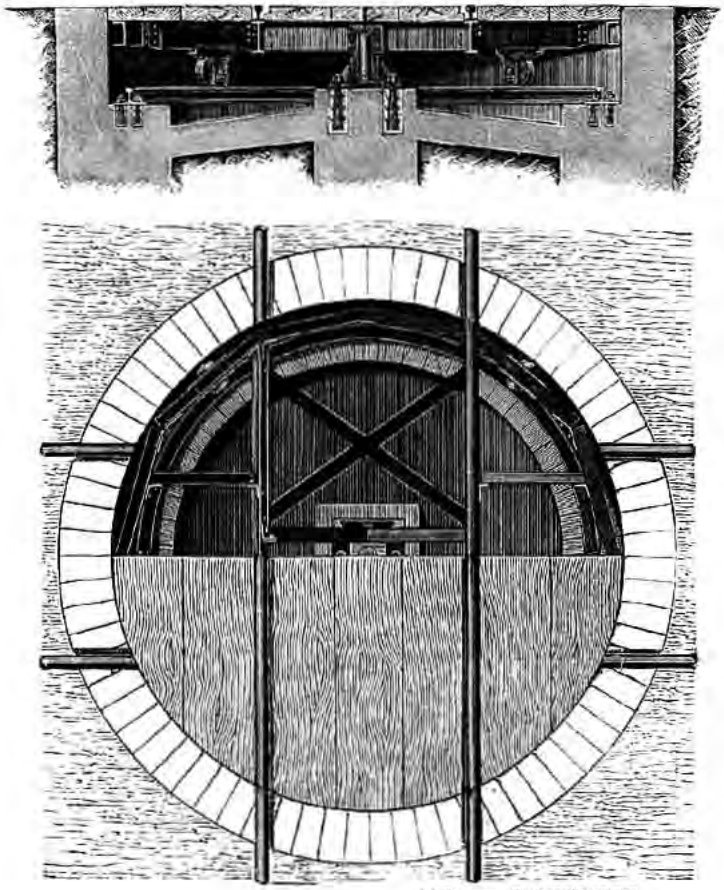


Fig. 3055.

XI. Turntable for Permanent Lines, specially for Street Tram-Cars and Bogie Wagons.

They turn on a steel pivot and rollers on the bottom ring made of curved rails. Fig. 3055.

The turntable is placed into a pit and has a wood floor. The pit may be made of wood or stones, as may be most convenient.

The turntable is constructed in such a way that the steel pivot takes up the entire weight thus securing an easy working.

We supply above turntable in the following sizes:

Diameter:	Carrying Capacity:	Gauge:
2,5 m.	4000 kg.	600, 750, 1000 mm.
3 „	6000 „	1000 and 1435 „
5 „	8000 „	1000 „ 1435 „

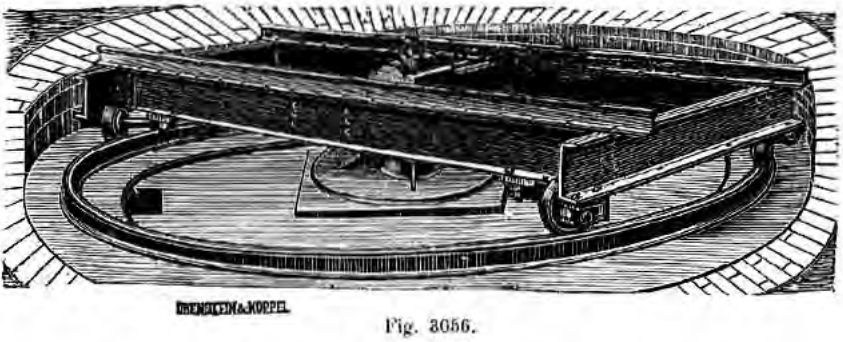


Fig. 3056.

XII. Locomotive Wrought Iron Turntable.

Fig. 3056 represents a turntable which is made entirely of iron and steel. It consists of strong iron girders, and the rails are securely rivetted to the main girders. The turntable which is laid into a pit of masonry, revolves on a steel center-pin and 4 strong rollers with axles and bearings. They roll easily on the bottom ring made of curved steel rails. The turntable has 2 sockets for the insertion of sticks and an adjusting gear consisting of a latch and 4 ears. The steel centre piece takes up the entire weight, securing thus easy working of the turntable, even with the heaviest loads.

We supply these turntables of the following sizes:

Diameter:	Carrying Capacity:	Gauge:
5 m	10000 kg	1000—1435 mm
7 „	16000 „	1000—1435 „
8 „	25000 „	1435 „

Traversers.

Serve to connect two or more parallel tracks.

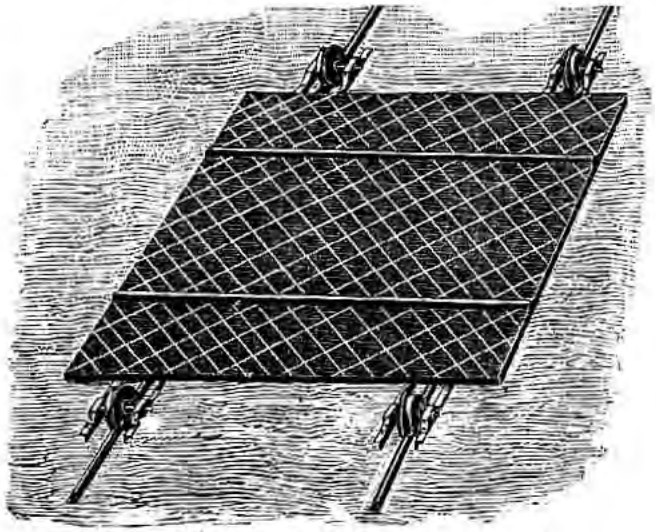


Fig. 3145.

Fig. 3145 represents a **traverser for** small loads.

Standard Design: 750 kilos bearing strength, gauge of track on traverser 500 or 600 mm. Length of track 900 mm. Gauge of track on which the traverser travels 750 mm.

Traversers as per Fig. 3146 are designed for medium loads.

Standard Sizes: 2 and 4 Tons bearing strength, Gauge of track on the traverser 500, 600, 750 and 1000 mm, length of track 1350 mm. Gauge of track on which the traverser travels 1000 mm.

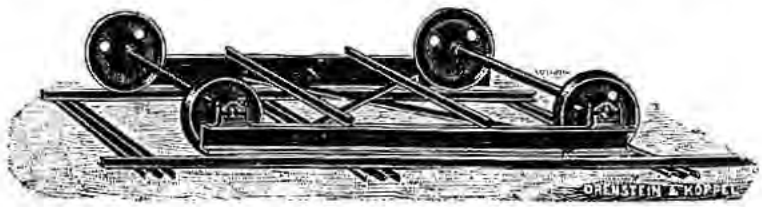


Fig. 3146.

Traversers as per Fig. 3147 are suitable for carrying larger loads. Two tracks are fitted to the side channels so that always 2 wagons can be removed at the same time.

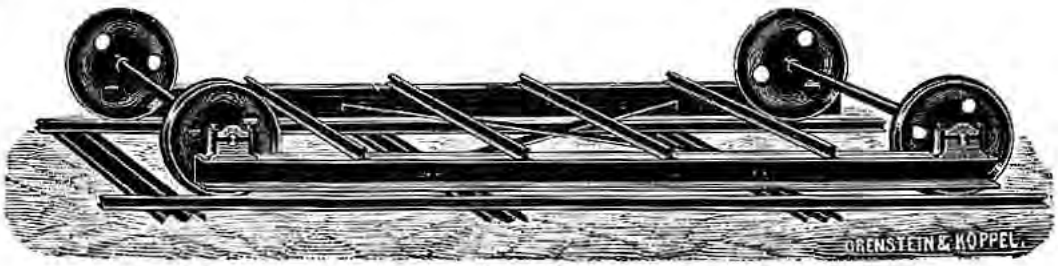


Fig. 3147.

Standard Sizes: I. Load of each track 2000 kilos, total load 4000 kilos.

II. Load of each track 4000 kilos, total load 8000 kilos.

Gauge of tracks on traverser 500, 600, 750 and 1000 mm. Length of tracks on traverser 1350 mm. Gauge of track on which the traverser travels 1000 mm.

Switches.

A. Portable Switches and Crossings

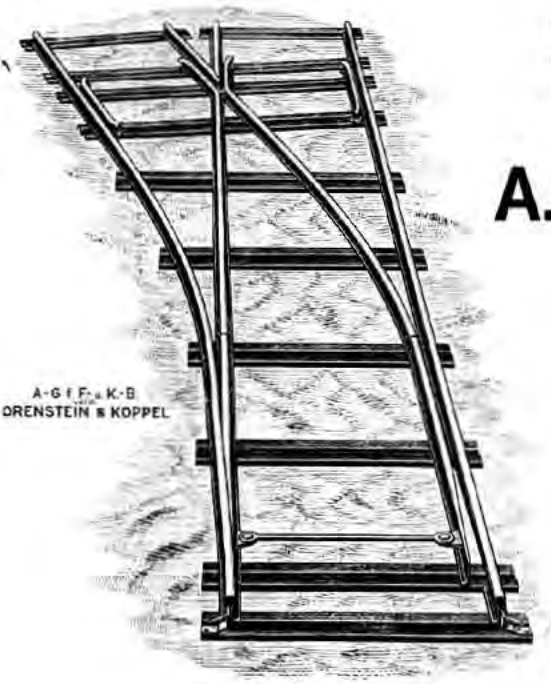


Fig. 3058.

dispense altogether with the use of wood sleepers, as they are rivetted to steel-sleepers to make a complete set. We construct two designs viz:

a) **Stub-Switches and Crossings.**

b) **Point-Switches and Crossings.**

A portable set of Switches and Crossing is laid down in the same way as a railway-section, either in cases where a branch is required or a pass-by for opposite trains.

According to the direction of the tracks joining the crossings, either right hand, left-hand or both simultaneously, so that the original direction of the main track is abandoned, we make:

Right-Hand Switches and Crossings,
Left-Hand Switches and Crossings,
Two-Way Switches and Crossings

and in complete sets $2^1/_2$, 5 or 7 metres long.

The longer the sets of switches and crossings, the longer the radius of their curves. Curves of a large radius can, of course, be easier worked than curves of a small radius and we recommend:

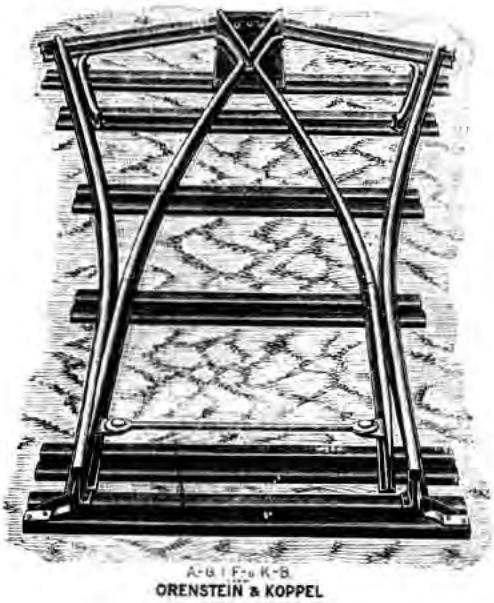


Fig. 3059.

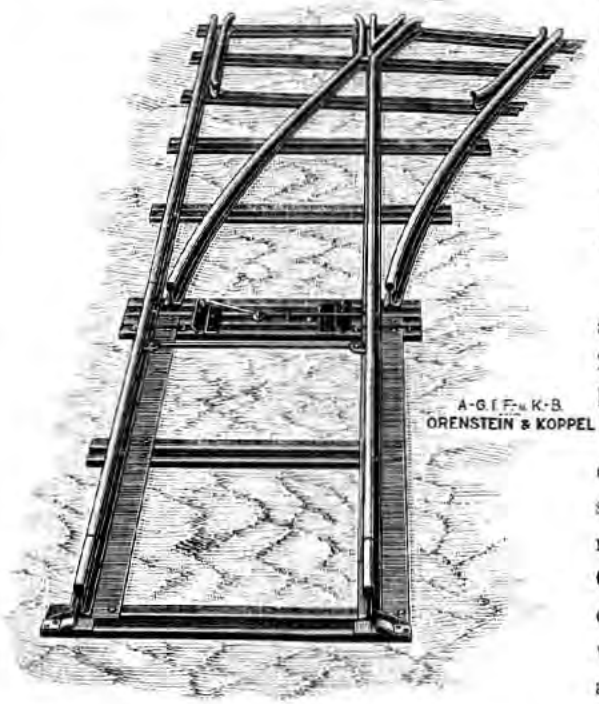


Fig. 3057.

1st) Sets of Switches and Crossings 7 metres long Radius 20 metres for wagons with a larger wheel-base
2nd) „ „ „ „ „ 5 „ „ „ 10 „ „ „ „ „ medium „
3rd) „ „ „ „ „ $2^1/_2$ „ „ „ 3 „ „ „ „ the smallest „

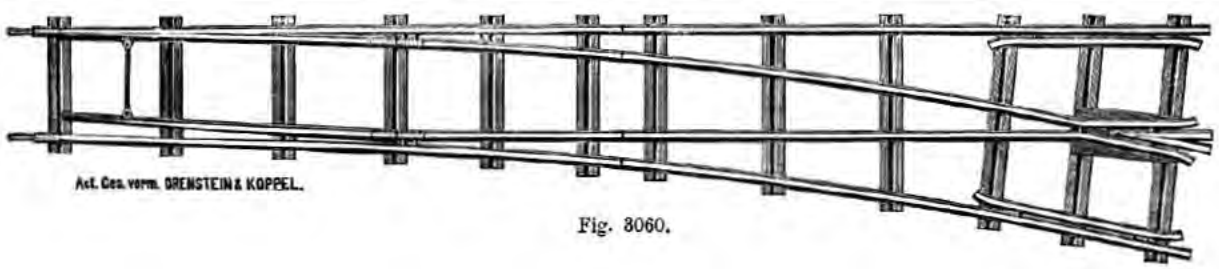


Fig. 3060.

1. Stub Switches and Crossings.

The stub switch is held in position by the adjusting gear consisting of 2 pins in the centre of the track and a lever.

Fig. 3057 illustrates a complete set of right hand stub switches and crossing.

2. Point Switches and Crossings.

The points which are connected by a rod, are moveable and can be easily adjusted by hand or foot.
Fig. 3058 represents a complete set of left-hand point switches and crossing.

SPECIAL DESIGNS.

Fig. 3061.
Three-Throws.

1. Three Throws.

Fig. 3061. Will be found suitable in cases where it is necessary to turn off right hand and left hand, continuing at the same time the main track. Three Throws are constructed as stub switches, as a correct working of points will meet with some difficulties.

2. Automatical Stub Switches and Crossings.

Fig. 3062 below represents an automatical set of stub switches and crossing which will be found convenient in cases where the cars coming from the crossing and passing the stub switches are to return to the same track. The automatical gear consists of a frame arranged rod of the switches between the rails connected with the tie and constructed in such a way that the flange of one wheel puts the stub switches in position.

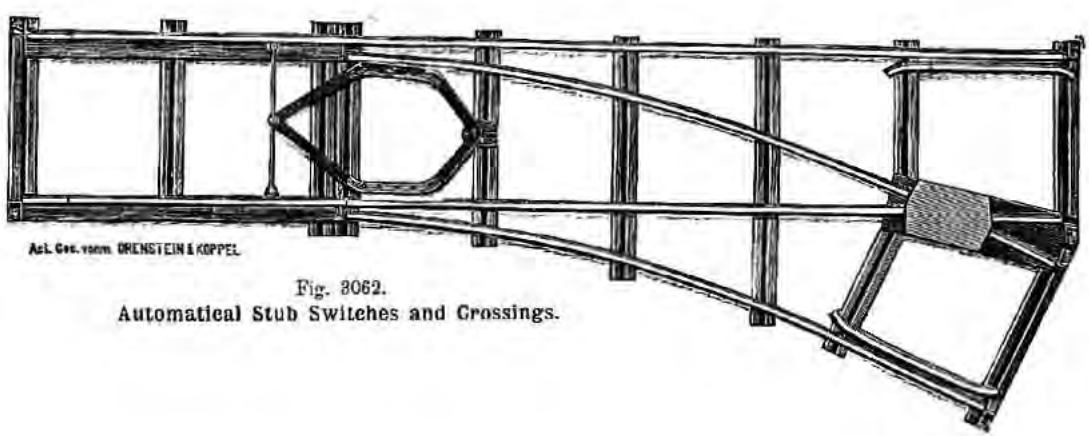


Fig. 3062.
Automatical Stub Switches and Crossings.

Diagrams of Pass-Bys.

We illustrate hereafter two designs of a pass-by. Fig. 3063 requires a left and a right hand set of switches and crossings, Fig. 3064, either 2 left or 2 right hand sets. The length of the intermediate track depends upon size and number of cars to be hauled in one train.

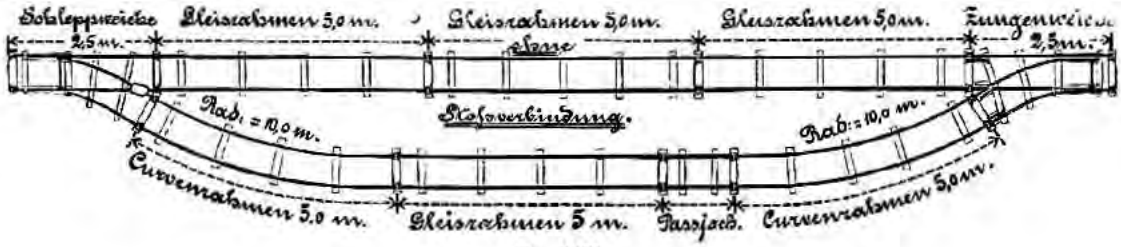


Fig. 3063.

Above pass-by consists of

1 set of right hand switches and crossing, 1 set of left hand switches and crossing,	4 straight sections of track each 5 metres long, 2 curved sections of track each 5 metres long, 1 connecting bridge Fig. 3043.

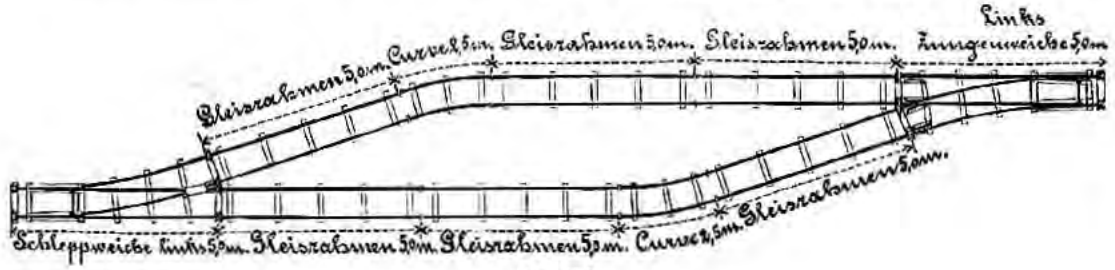


Fig. 3064.

Pass-By, as per Fig. 3064, consists of

2 sets of left hand switches and crossing, 6 straight sections of track each 5 metres long,	2 curved sections of track each 5 metres long. Rad. 10 metres.

The above lengths of tracks refer to 500 mm gauge and 2,15 metres distance between centres of tracks. The length of the intermediate track may be increased by using more straight sections of 5 metres length.

Inclined Planes.

We illustrate on this page various designs of inclined planes. They will be found convenient in cases where a temporary branch is required without disturbing the main track. The inclined planes can at once be laid upon the track without any arrangements whatever. The cars ascend with ease the tongues and curved sections, thus running above the rails of the main track.

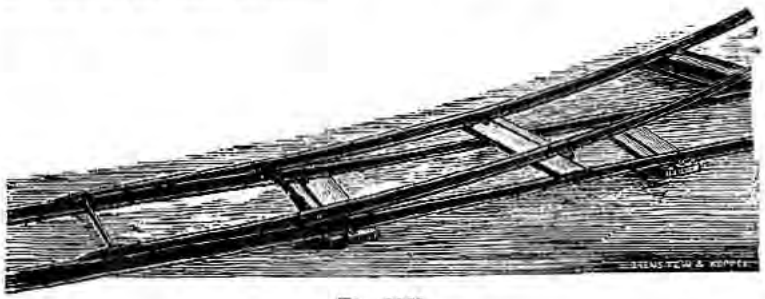


Fig. 3065.
Single Inclined Plane.

We construct the following designs of inclined planes:

1. Single Inclined Plane.

Fig. 3065 illustrates a single inclined plane. They consist of a curved section of track 5 metres long and a pair of ascending tongues connected by a tie-rod.

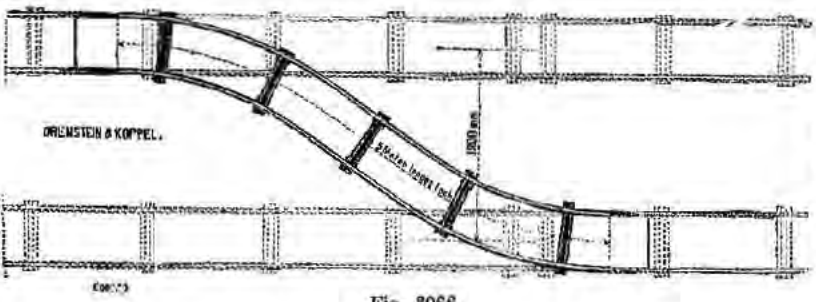


Fig. 3066.

2. Double Inclined Plane

Fig. 3066 represents a doubled inclined plane as the means of obtaining access from one pair of metals to another parallel. They consist of a reverse curved section of track 5 metres long and a pair of ascending tongues at either end, each connected by a tie-rod.

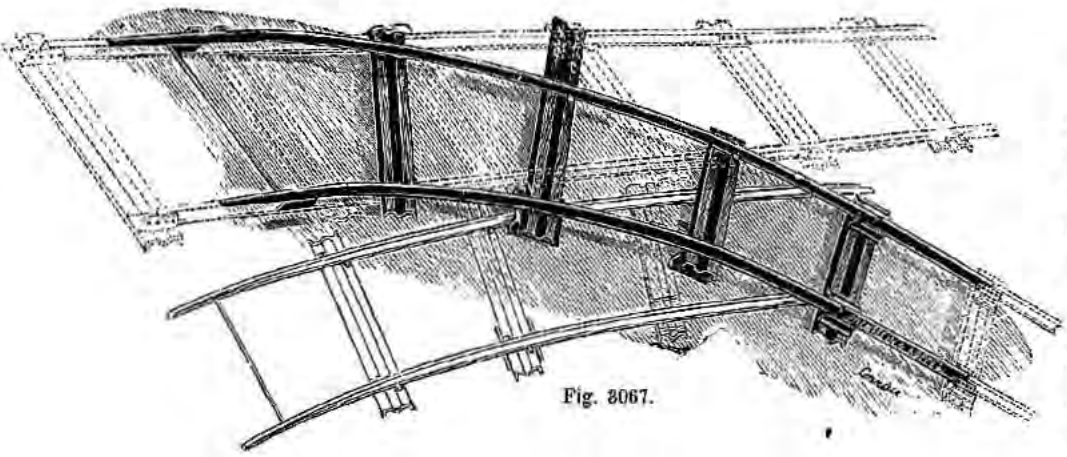


Fig. 3067.

3. Adjustable Inclined Planes,

as illustrated by Fig. 3067, consist of a curved section of track 3½ metres long, a pair of ascending tongues connected by a tie-rod and a straight section 1½ metres long. The turning point of the inclined plane is on the joint sleeper of the straight section.

The advantage claimed for adjustable inclined planes is that they can be laid upon the main track by a simple turning, and removed in the same way without loosening the fish plate bolts.

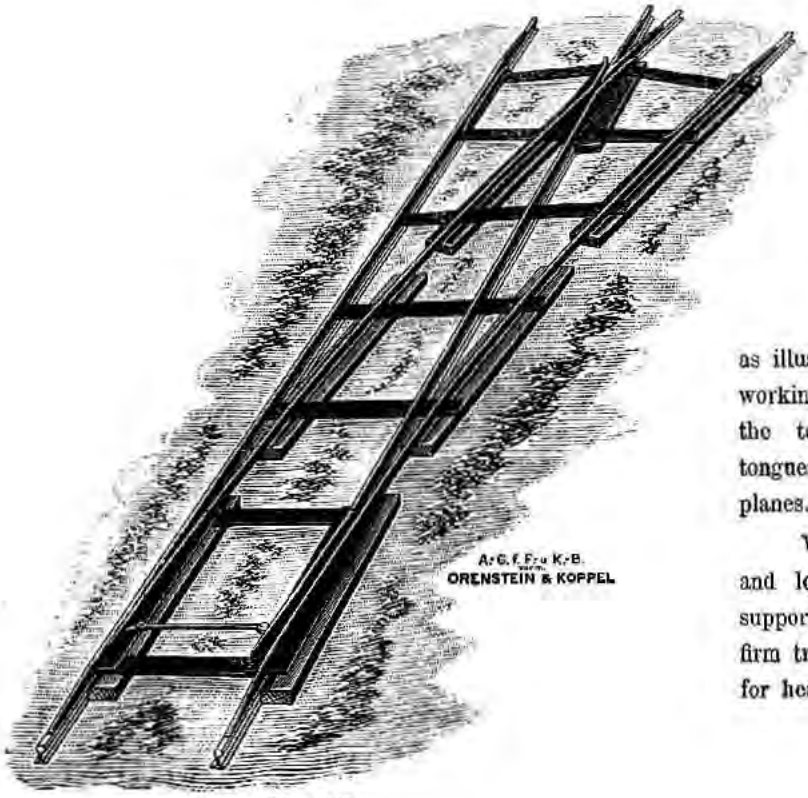


Fig. 3068.

4. Inclined Planes with 3 pairs of ascending tongues and point switches,

as illustrated in Fig. 3068, have the advantage of working the main track at the same time with the temporary branch without removing the tongues, as is necessary with the ordinary inclined planes.

We construct these inclined planes for animal- and locomotive-power. As the outer rails are supported by wood sleepers, securing thus a firm track, these inclined planes may also be used for heavy loads.

B. Permanent Switches and Crossing.

1. For Narrow Gauge Railways.

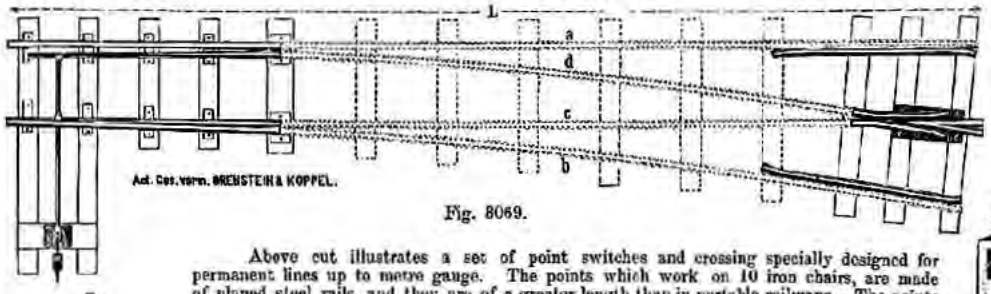


Fig. 3069.

Above cut illustrates a set of point switches and crossing specially designed for permanent lines up to metre gauge. The points which work on 10 iron chairs, are made of planed steel rails, and they are of a greater length than in portable railways. The points are worked by the switch-box which is arranged outside and at right angle to the track. The switch-box is fitted with a counter-weight which secures always a correct position of the points and a close joining to the stock rails. To notify the approaching train, the position of the points, the switch-box is furnished either with a disk-signal or a signal-lamp, see Fig. 3070 and 3071.

We construct the crossings to the standard angle of 1 in 6, 750 or 1000 mm gauge, and 40 or 50 metres radius, but, if desired, we supply crossings to any other particular angle, gauge and radius. The intermediate track being usually fitted up on the spot, without our furnishing same, we state hereafter the necessary lengths of rails, viz:

1st)	Total length (L)	9,7 metres	Gauge 750 mm Radius 40 m
2nd)	Rail a	7 "	
3rd)	" b	6,92 "	
4th)	" c	5,727 "	
5th)	" d	5,767 "	
1st)	Total length (L)	11,7 metres	Gauge 1000 mm Radius 50 m
2nd)	Rail a	9 "	
3rd)	" b	8,89 "	
4th)	" c	7,72 "	
5th)	" d	7,78 "	

Fig. 3070.

Fig. 3071.

For one set of permanent switches and crossing we supply the following parts, provided the intermediate rails not being specially ordered:

1) 2 point rails planed and fitted,
2) 2 stock rails,
3) switch-chairs,
4) the rod connecting point rails,
5) the lever switch box with adjusting gear, draw-bar and counter-weight,
6) the crossing,
7) 2 check rails,
8) the screws to fasten above parts to wood sleepers.

2. Permanent Switches and Crossings for Standard Main and Secondary Lines.

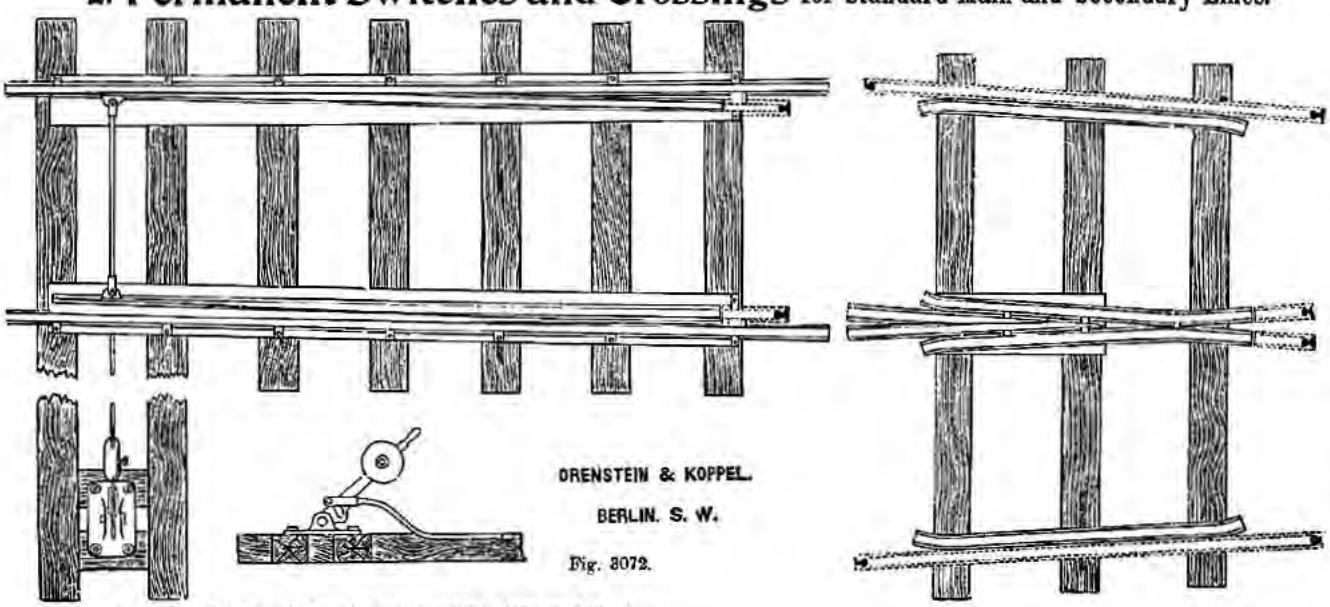


Fig. 3072.

A set of Switches and Crossing as illustrated above consists of:

1) 2 strong base-plates running all length of point rails,
2) 2 steel point rails planed and fitted,
3) 2 stock rails rivetted to above base-plates,
4) switch-chairs for the points
5) rod connecting the point-rails,
6) lever switch box with adjusting gear, draw-bar and counterweight,
7) crossing,
8) 2 check rails with fastenings,
9) screws and nails for wood sleepers.

C. Tramway Switches and Crossings.

1. For Tram-Lines made of ordinary Rails.

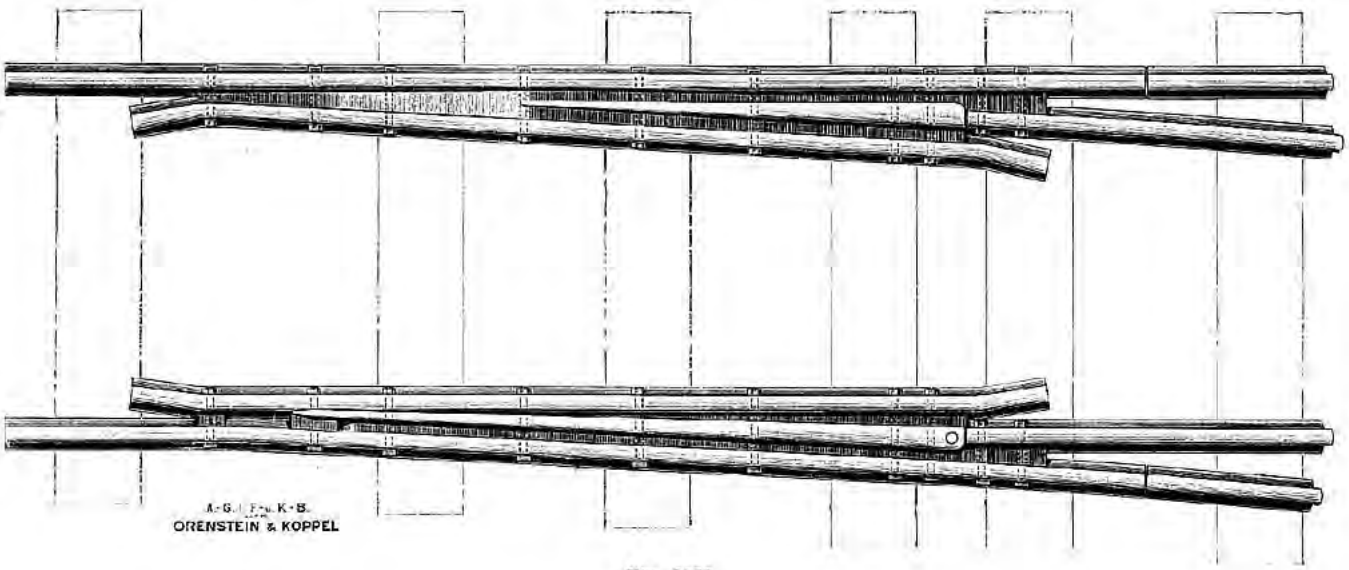


Fig. 3073.

They are made of ordinary steel **T** rails with point switches, and the parts which we supply for same, are

1. **a moveable point,**
2. **a fixed point,**
3. **a crossing,**
4. **fastenings.**

We supply these switches and crossing of any required sections of rails and radii. Our standard designs are of 10, 12, 14 and 16 Kilos rails and of the following radii and gauges:

Point Switches and Crossing	of 10 kg rails,	Radius 15 and 25 m,	Gauge	600, 750, 1000 and 1435 mm.
do.	„ 12 „ „	„ 15, 25 and 40 m,	„	600, 750, 1000 and 1435 mm.
do.	„ 14 „ „	„ 25 and 40 m,	„	750, 1000 and 1435 mm.
do.	„ 16 „ „	„ 25 and 40 m,	„	750, 1000 and 1435 mm.

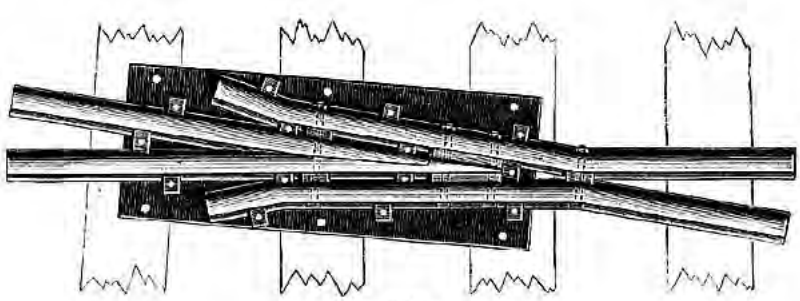


Fig. 3078a.

In ordering, buyers should state whether right hand, left hand or two-way switches are required and to what radius.

2. For Tram-Lines made of Grooved Girder Rails.

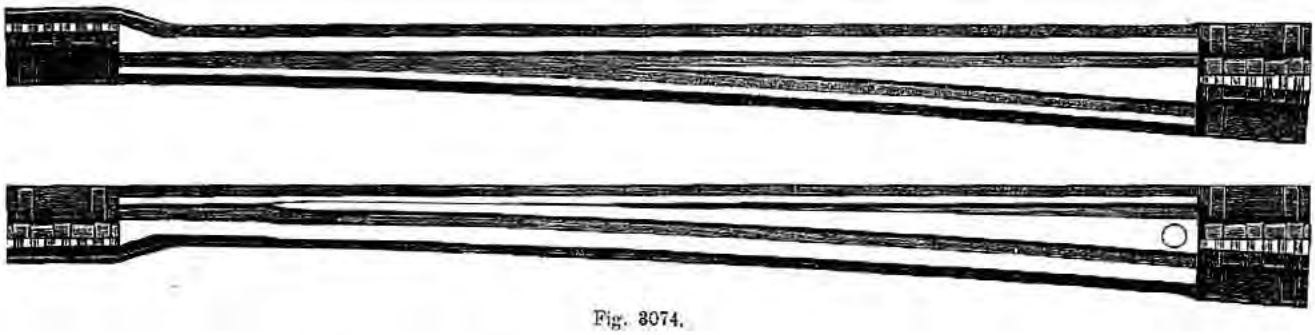


Fig. 3074.

They are point-switches and crossings and consist of

1. a moveable point (right side),
2. a fixed point (left side),
3. a crossing,
4. fastenings.

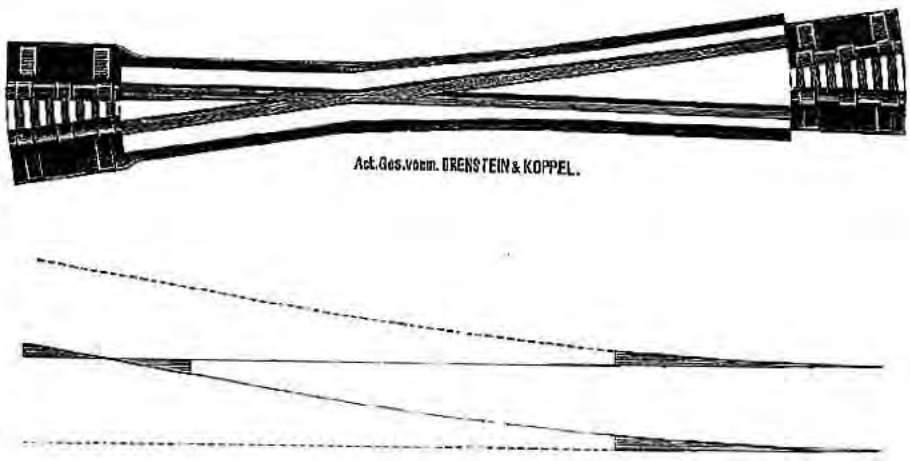


Fig. 3074a.

We supply these tramway point-switches and crossings of any required sections of girder rails and radii. Our standard designs are made of rails 90, 100 and 140 mm high and of the following radii and gauges:

Height of Rails	Radius	Gauge
90 mm	15 and 25 m	600, 750, 1000, 1435 mm
100 „	15, 25 and 40 „	600, 750, 1000, 1435 „
140 „	15, 25 and 40 „	750, 1000, 1435 „

Rolling Stock.

A. Wheels.

Our wheels are made of first class cast steel, the best material known for the purpose. Cast steel wheels claim the following advantages over chilled iron wheels: 1st. They very little wear out, 2nd. They give greatest possible security against fractures, 3rd. They have a uniform temper which secures a continuous round and smooth tread, 4th. Although they have a greater bearing strength and resistance, they have a smaller deadweight than the chilled iron wheels.

Standard Steel Wheels.

We supply 3 designs of wheels viz:

1. **Solid Disk Wheels,** Fig. 3075,
2. **Crooked Arm Wheels,** Fig. 3076,
3. **Turned Tram Wheels,** Fig. 3077,

and give hereafter a selection of our leading designs and sizes, arranged by ordinals, may however say that we possess a great number of other patterns, and shall be glad to figure for any required designs of wheels.

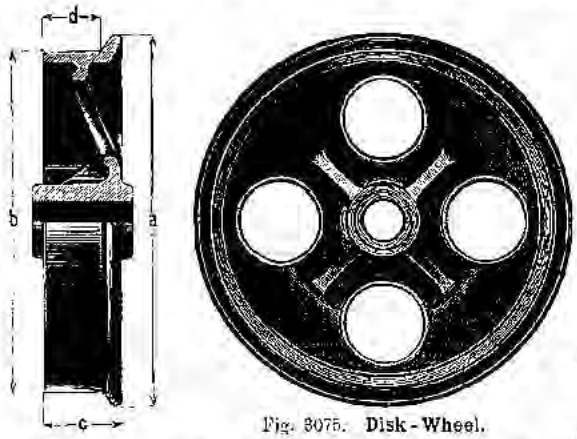


Fig. 3075. **Disk-Wheel.**

We state hereafter the principal dimensions of each wheel viz:

A. **Total Diameter,**
B. **Diameter of Tread,**
C. **Total Width,**
D. **Width of Tread.**

1. Solid Disk-Wheels.

	A.	B.	C.	D.		A.	B.	C.	D.
1.	304	270	63	50	7.	430	400	85	65
2.	340	300	74	54	8.	450	400	100	77,5
3.	340	300	90	70	9.	500	450	93	70
4.	380	350	74	54	10.	500	450	100	77,5
5.	390	350	75	56	11.	545	500	104	80
6.	400	350	95	67,5	12.	550	500	114	90

We make the light wheels also with 2 flanges, as shown in Fig. 3075 hereafter. Such wheels will be found convenient in cases where light rails are worked with heavy loads, as the strain on the rails produced by a two flanged wheel is exactly vertical, thus preventing the rails giving way laterally.

	A.	B.	C.	D.		A.	B.	C.	D.		A.	B.	C.	D.
13.	304	270	60	32	14.	350	300	73	48	15.	346	300	66	21

2. Arm-Wheels, Fig. 3076.

	A.	B.	C.	D.		A.	B.	C.	D
16.	340	300	72	50	18.	430	390	85	65
17.	340	300	74	52	19.	430	390	87	65

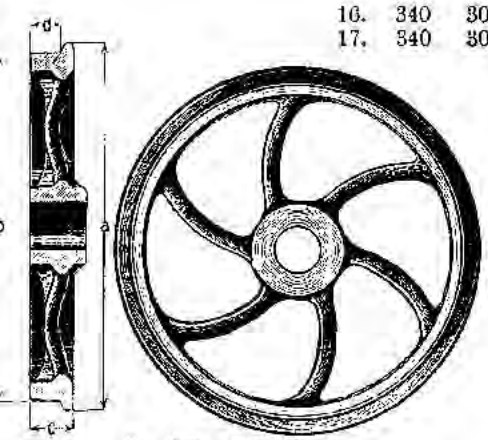


Fig. 3076. **Arm-Wheel.**

3. Tram-Wheels

with turned tread

Fig. 3077.

Wheels for street tram-cars are accurately turned on tread, so as to ensure a continuous quiet running of the cars.

	A.	B.	C.	D.
20.	630	600	70	57
21.	640	600	80	64

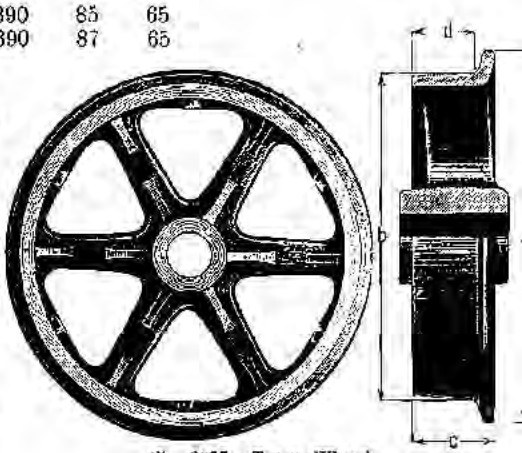


Fig. 3077. **Tram-Wheel.**

Steel Wheels on Axles.

We supply:

1. **Sets of Wheels on axles with outside or inside journals to suit the corresponding axle-boxes.**
2. **Sets of Wheels on axles with special greasing arrangement.**

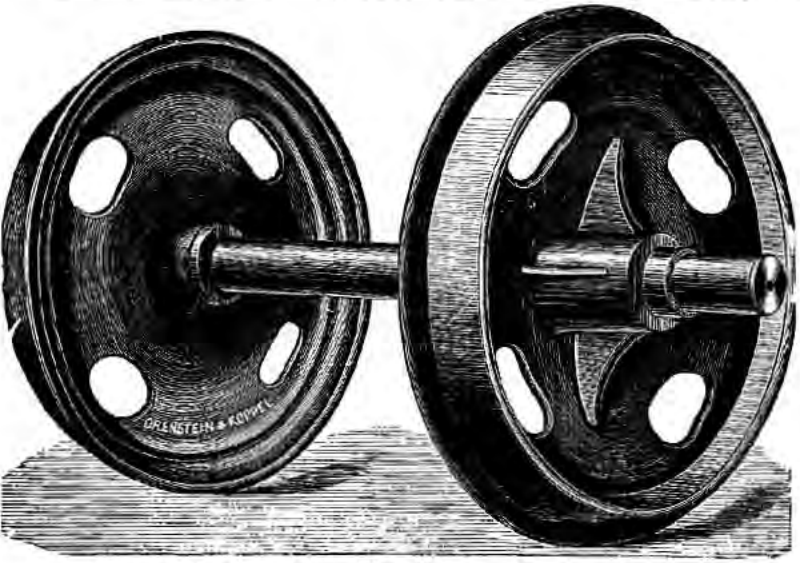


Fig. 3078.

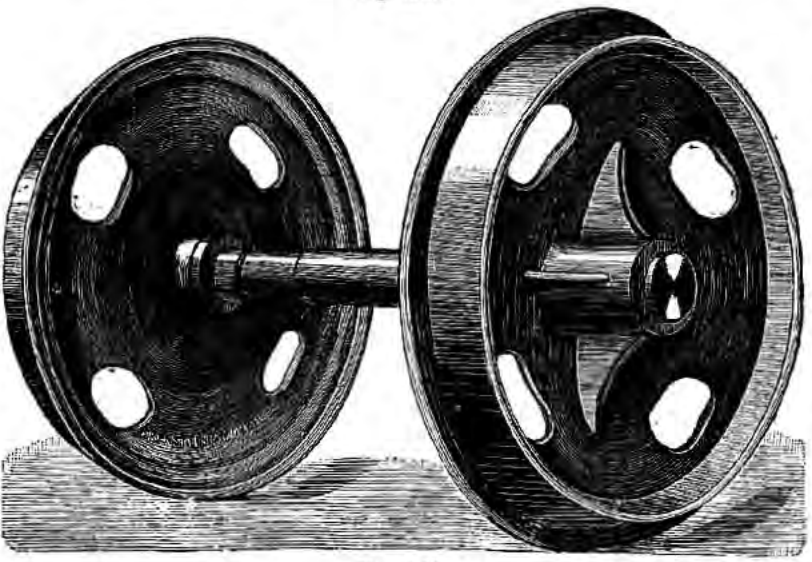


Fig. 3079

a) Sets of Wheels on axles with outside and inside journals.

The wheels are fixed to round axles by hydraulic pressure.

The design of the outside axle-boxes being different from that of the inside axle-boxes, buyers should always state, whether the boxes are to suit inside or outside journals.

We supply our standard sets with wheels illustrated on page 29. The axles which are of steel, are made in the standard diameters of 40, 45, 50, 55, 60, 65, 68, 72 and 85 mm and for gauges of 500, 600, 750, 1000 and 1435 mm.

b) Sets of Wheels on axles with special greasing arrangement.

a) **Fig. 3080** represents a set of wheels on a square axle. The greasing of the wheels which are loose on the axle, is made through the holes in the hub which are closed by screws.

Standard sets: Wheels 235 mm dia, Gauge 500 and 600 mm.

b) **Fig. 3081** illustrates a set of wheels on a square axle. The wheels which are loose on the axle, are greased with consistent fat through two capsules screwed on to the hub.

Standard sets: Wheels 290 mm, Gauge 500 and 600 mm.

c) **Sets of wheels** with round axle and self lubricating bearings formed by a cilindrical casing round the entire axle, as represented by Fig. 3082. One of the wheels is fixed to the axle, the other being loose. These sets have the advantage that, by means of their excellent greasing, they can be used for great loads and will, therefore, be found suitable for miners' wagons and work under ground.

Standard sets have wheels of 300, 380 and 390 mm dia, for gauges of 500 and 600 mm, 18 and 24 inches.

Fig. 3080.

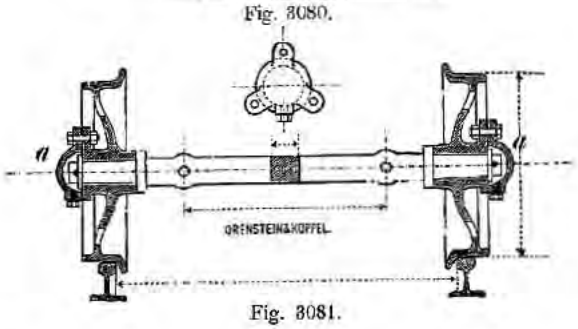


Fig. 3081.

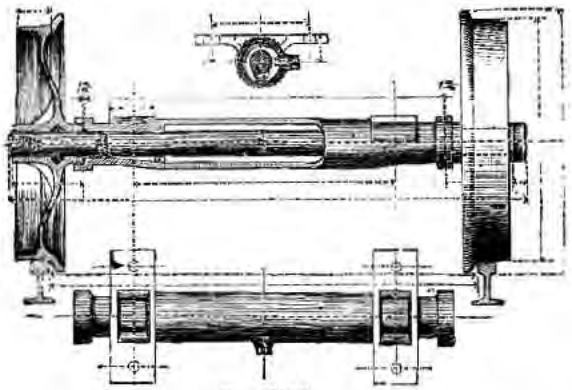


Fig. 3082.

Should our clients require sets which are not to our Standard dimensions, they should state the measurements on the sketch of the enquiry-form and forward us the sketch together with the enquiry or order.

3. Axle-Boxes.

We have given special attention to the construction of the axle-boxes, as they are very important parts of wagons. They consist of two main parts, viz: the upper bearing and the lower bearing, secured together by 2 bolts with nuts and 8 Keys. The complete axle-boxes are fastened to the channel iron beams of the wagons by 2 strong stay-bolts.

The advantages claimed for our axle-boxes are:

1st) **The upper-bearing projects the lower part,** the grease-hole is closed by a lid, and all openings are tightened by **felt-packings,** so that the axle-box is protected against sand, dirt and dust.

2nd) **The oil-chambers in both upper and lower** bearing secure a double and, at the same time, economical greasing. To ensure the effect of the oil-chambers, the small axle-boxes have sponges and the large axle-boxes grease-pads with sucking-threads which are pressed towards the axle journal by a spring.

3rd) **Our system of axle-boxes,** consisting of upper and lower bearing, allows easy access, so that new brasses and other duplicate parts can be quickly attached.

In case of manual or animal-power for goods-traffic, we suggest to use fixed axle boxes which are secured to the beams of the wagon frame without springs, but in case of passenger traffic or removal of animals and fragile goods, we recommend spring axle-boxes which are universally used for locomotive-power.

We illustrate hereafter some of our **standard fixed** and **spring axle-boxes.**

a) Fixed Axle-Boxes.

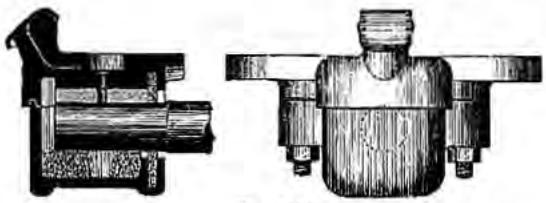


Fig. 3083.
Outside Axle-Box for axles of 40 to 50 mm dia;
suitable for wheels of 270 to 350 mm dia.

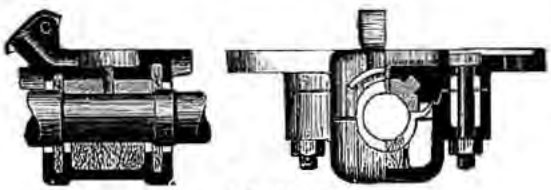


Fig. 3086.
Inside Axle-Box for axles of 40 to 50 mm dia;
suitable for wheels of 300 and 350 mm dia.

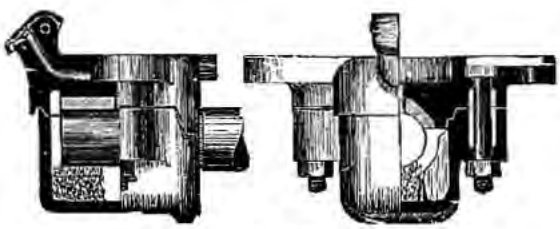


Fig. 3084.
Outside Axle-Box for axles of 50 to 60 mm dia;
suitable for wheels of 300 and 350 mm dia.

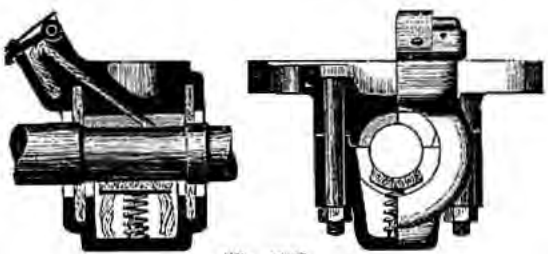


Fig. 3087.
Inside Axle-Box for axles of 50 to 60 mm dia;
suitable for wheels of 400 and 450 mm dia.

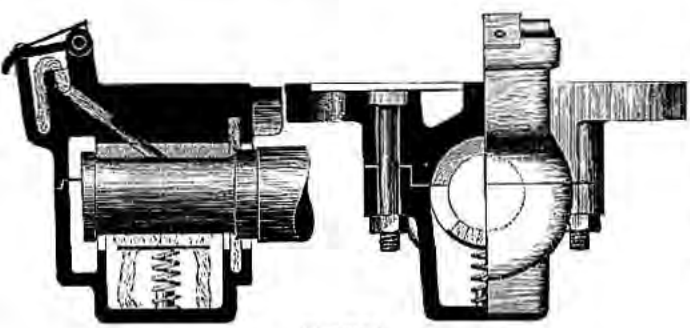


Fig. 3085.
Outside Axle-Box for axles of 60 to 85 mm dia;
suitable for wheels of 500 mm dia.

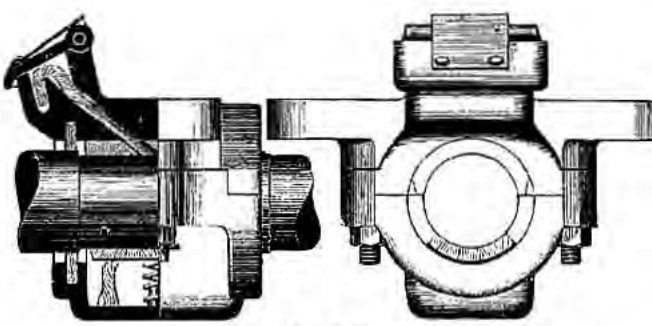


Fig. 3088.
Inside Axle-Box for axles of 60 to 85 mm dia;
suitable for wheels of 500 mm dia.

b) **Spring Axle-Boxes.** Fig. 3089—3091.

We have given special attention to the construction of our spring axle-boxes, to ensure smooth going of the cars, which is a matter of importance for locomotive traffic.

We supply:

1. Wagons of small loads up to 5 tons with one volute spring as per Fig. 3089 on each axle-box, to suit axles of 40 to 60 mm diameter.
2. Wagons of medium loads up to 7½ tons with two volute springs as per Fig. 3090 on each axle-box, to suit axles of 65 to 85 mm diameter.
3. Wagons of large loads up to 10 tons with plate-springs as per Fig. 3091, to suit axles of 85 to 130 mm diameter,

For axle-boxes represented by Fig. 3089/90 we supply guide-bars of wrought iron or steel casting, one or two volute-springs and the axle-box itself.

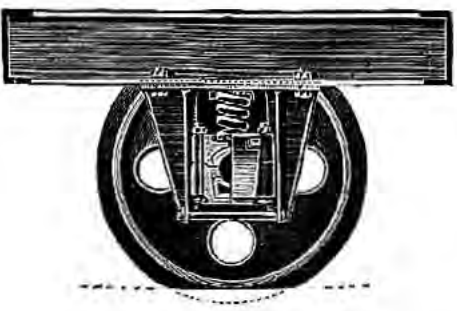


Fig. 3089.

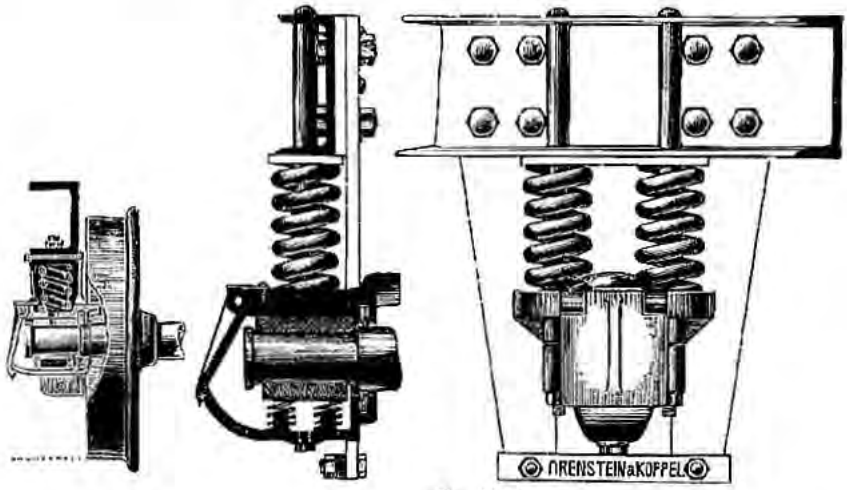


Fig. 3090.

For axle-boxes illustrated by Fig. 3091 we supply guide-bars of wrought iron or steel castings with connecting plate, a plate-spring with hoop, and 2 iron links for the suspension of the spring, and the axle-box itself.

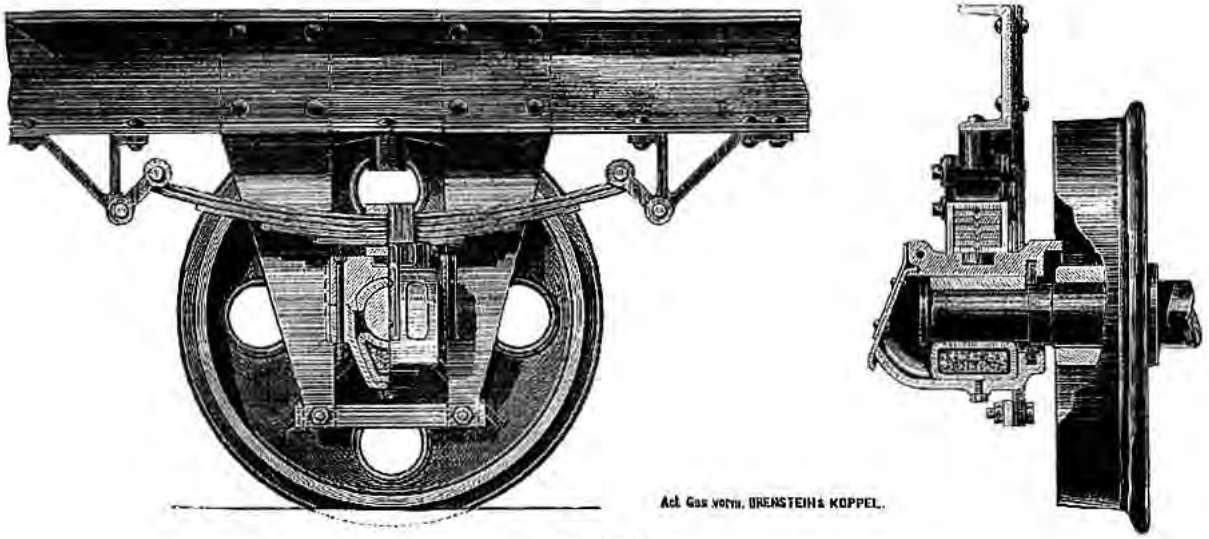


Fig. 3091.

We shall be glad to supply any other particular designs of spring axle-boxes and to quote for same on application.

Pewter for Bearings.

This metal, which is fusible in open ladles, and which is most successfully used for being cast direct into the axle-boxes, meets the highest requirements as to tenacity and durability as well as to easy applying. We supply our pewter in blocks of 25 Kilos and of 2 qualities, viz Second Quality for small wagons for animal-power, First Quality for wagons for locomotive-power.

Directions for use.

The smelting of the metal

should be done in wrought-iron pans upon an ordinary forge. In order to have as little waste as possible it must be borne in mind not to over-heat the metal and to keep it covered with a tin lid. The metal should only be made so hot, that it would cause a piece of paper laid upon it to coal, but not to burn.

Preparing the box to receive the metal.

In order to make the metal adhere to the box to be filled up, the old metal must be removed and the holes and grooves cleaned for fixing the metal. The axle-box is then burned out to remove the parts of grease still existing and the mould is firmly fitted into the upper-bearing, so that the liquid pewter can now be cast in by means of the ladle.

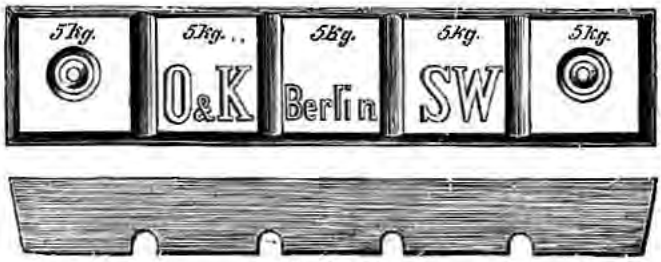


Fig. 3092.

Buffers.

For locomotive traction we furnish our wagons with spring buffers of wrought iron or steel casting as per Fig. 3093 to 3095.

Fig. 3093 represents a light design of wrought iron buffer, consisting of a wrought iron buffer-rod, buffer-head with link and hook attached and of a spring protected by a flat iron bracket. This design will be found suitable for wagons of small loads up to $2^1/_2$ tons.

Fig. 3094 illustrates a buffer of steel casting, consisting of buffer-head with coupling-pin and link, buffer-guide plate, spring, spring-plate and bolts. This buffer is designed for wagons of $2^1/_2$ to 5 tons loads.

Fig. 3095 shows a heavy design of wrought iron buffer comprising the following parts: buffer-head with pin and coupling link, guide-plate, spring, spring-plate and bolts. This design is suitable for wagons of heavy loads up to 10 tons.

Fig. 3093.
Light wrought iron buffer.

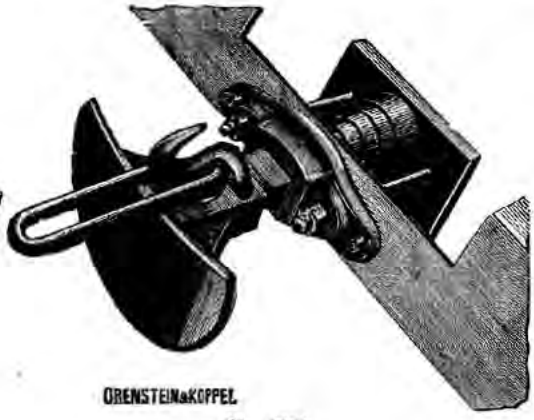


Fig. 3094.
Cast steel buffer.

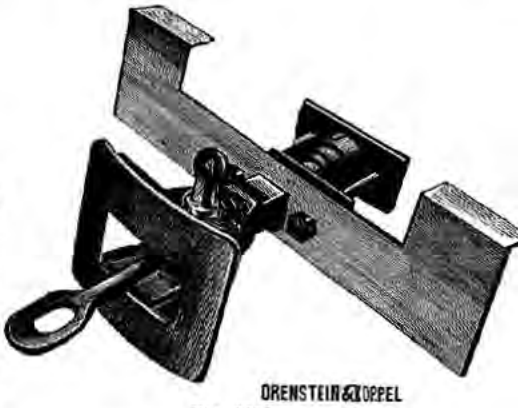


Fig. 3095.
Heavy wrought iron buffer.

B. Wagons.

They are made of the best material and steel is used wherever practicable, to ensure durability and strength. We construct our wagons for the standard gauges of **500, 600, 750, 1000** and **1435 mm**, but shall be glad to supply wagons for any other particular gauges.

I. Trucks (Bogies).

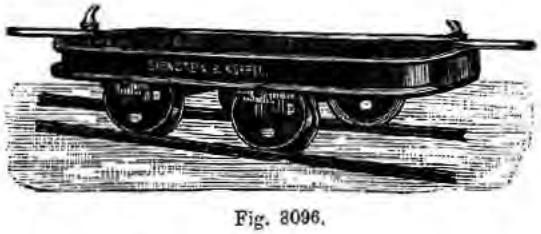


Fig. 3096.

To suit various purposes the wagons are intended for, we have been striving to adapt for our wagons a standard truck. This truck illustrated by Fig. 3096 has a channel steel frame curved at ends for buffering, so that special buffers may be dispensed with.

The truck may be converted into a great variety of wagons, viz:

Platform Wagons are made by giving the truck a wood or iron floor.
Tipping Wagons can be arranged by screwing standards to the end channels, to hold the box.
Box Wagons is made by flooring the truck and putting on ends and sides of wood boards.

2 Trucks combined will serve as

Universal Wagons for carrying produce.
Timber Wagons.
Long Platform Wagons for carrying cane, cotton etc.
Passenger Cars.
Goods Wagons.

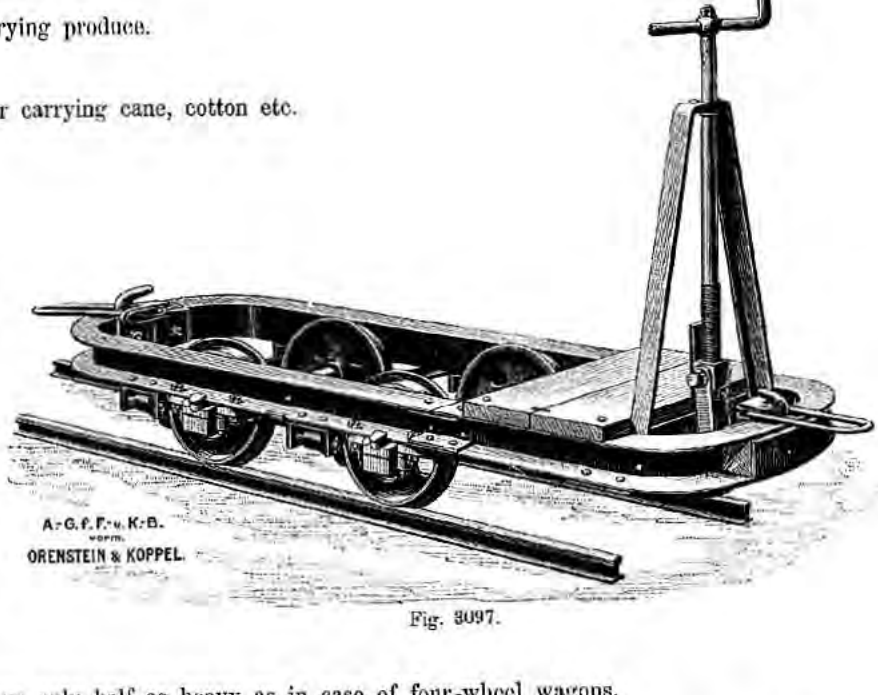


Fig. 3097.

These Double Truck or Bogie Wagons have a great carrying capacity, overcome with ease any unevenness of the track and owing to the small wheel-base of each truck will be able to go round sharp curves, the car-body working independently of the trucks.

The combination of 2 trucks to make a long car of great carrying capacity has further the advantage that they can operate on comparatively light tracks, as the weight is distributed over 8 wheels, the strain on the rails being thus only half as heavy as in case of four-wheel wagons.

If the wagons are to be fitted with brakes, buyers may use either a lever-brake or a screw-brake as is shown in Fig. 3097 above. Trucks for locomotive power and wagons working steep gradients should be furnished with screw-brakes only. Wagons fitted with a screw-brake have an extended channel steel frame, thus offering a comfortable stand for the brake-man.

II. Steel Tipping Wagons.

Steel Tipping Wagons, as illustrated and described on this and the following pages, are suitable for carrying a great variety of materials, viz: earth, clay, rubbish, produce, stones, coal, ore etc. They are built entirely of steel and tip either side. The truck is the one described on page 34, a steel standard being fixed to each end of the channel iron frame to carry the box. The wagon is so arranged that the box can be easely tipped. It is one of the prominent advantages of our construction that, when the box is being emptied, the track remains clear of the contents of the box and the wagon will not upset.

To facilitate the loading of the wagon a bar is attached to the end standards, which keeps the box in a convenient position.

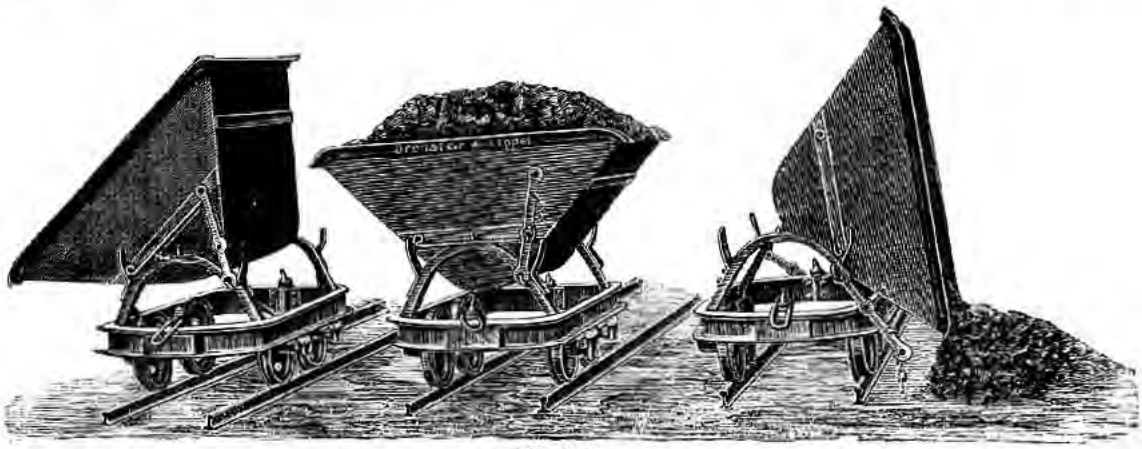


Fig. 3098.

Above woodcut illustrates the position of the box

1st. **at the beginning of loading,**
2nd. **after completion of the load,**
3rd. **when contents are discharged.**

We make these tipping wagons in various sizes and illustrate hereafter some of our standard designs and sizes.

For the removal of earth we recommend boxes of steel plate 2 mm thick, for the removal of stones and sharp-edged material boxes of steel plate 3 or more mm thick.

Our leading sizes and gauges of tipping trucks are:

1/3, 1/2 and 3/4 cbm for 500 and 600 mm gauge,
1 „ „ 600 „ 750 „ „
1 1/2 „ „ 750 „ 1000 „ „

but we shall be glad to supply and quote for any other particular designs, sizes and gauges on receiving particulars of what is required.

Single wagons are braked by means of a wood stick which is introduced into a hook fitted to side channels inside — see fig. 3100 or by a lever-brake as per fig. 3102. In trains should be used screw-brakes only.

1. Steel Tipping Wagons.

Capacity 1/3 cbm.

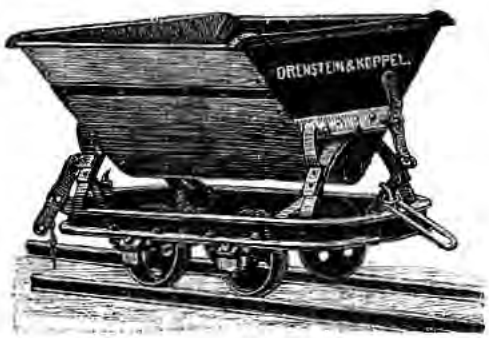


Fig. 3099.

Fig. 3100.

Fig. 3099 illustrates our standard design of 1/3 cbm capacity, which will be found convenient for manual power they can carry abt 1 ton.

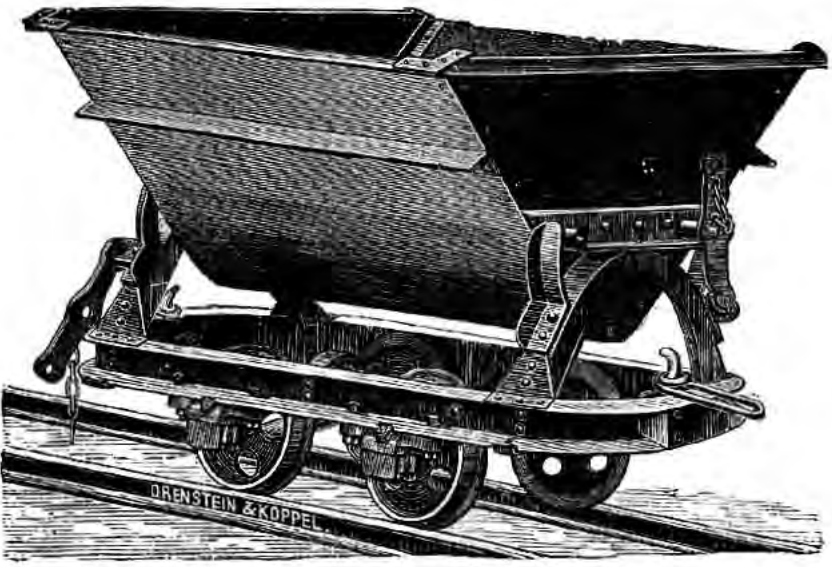


Fig. 3101.

2. Steel Tipping Wagons.

Capacity ½ cbm.

Fig. 3101 represents our ½ cbm tipping wagons, which is chiefly designed for manual and animal traction; it can carry abt 1½ tons.

The illustration below shows the wagon braked by means of a lever-brake.

Fig. 3103 illustrates a wood box wagon made from a tipping wagon after removing the steel box and putting on a wood platform, removable wood sides and ends.

To convert the wagon into a platform wagon it will only be necessary to lay a wood floor on the channel iron frame.

We construct such wood platforms, ends and sides principally for our ⅓, ½, ¾ and 1 cbm tipping wagons, but shall be glad to supply and quote also for other capacities.

Fig. 3102.

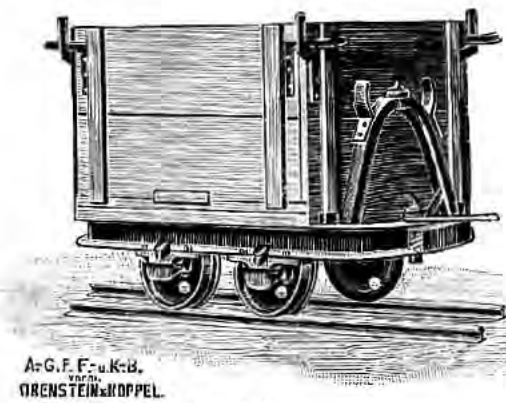


Fig. 3103.

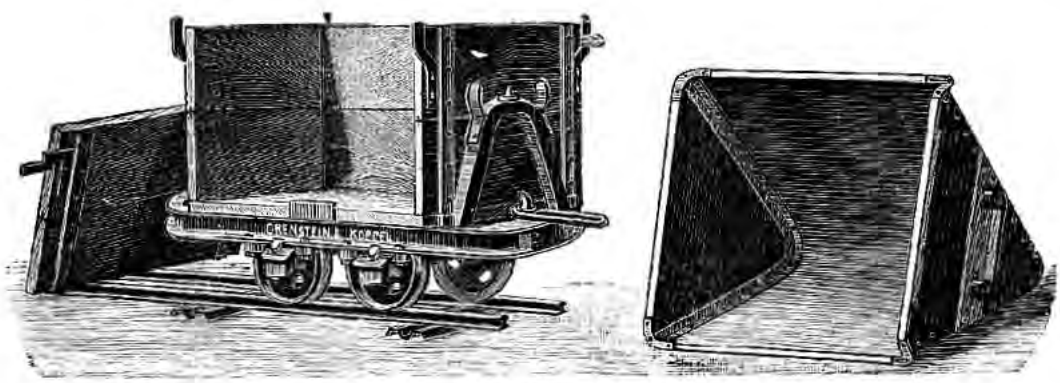


Fig. 3104.

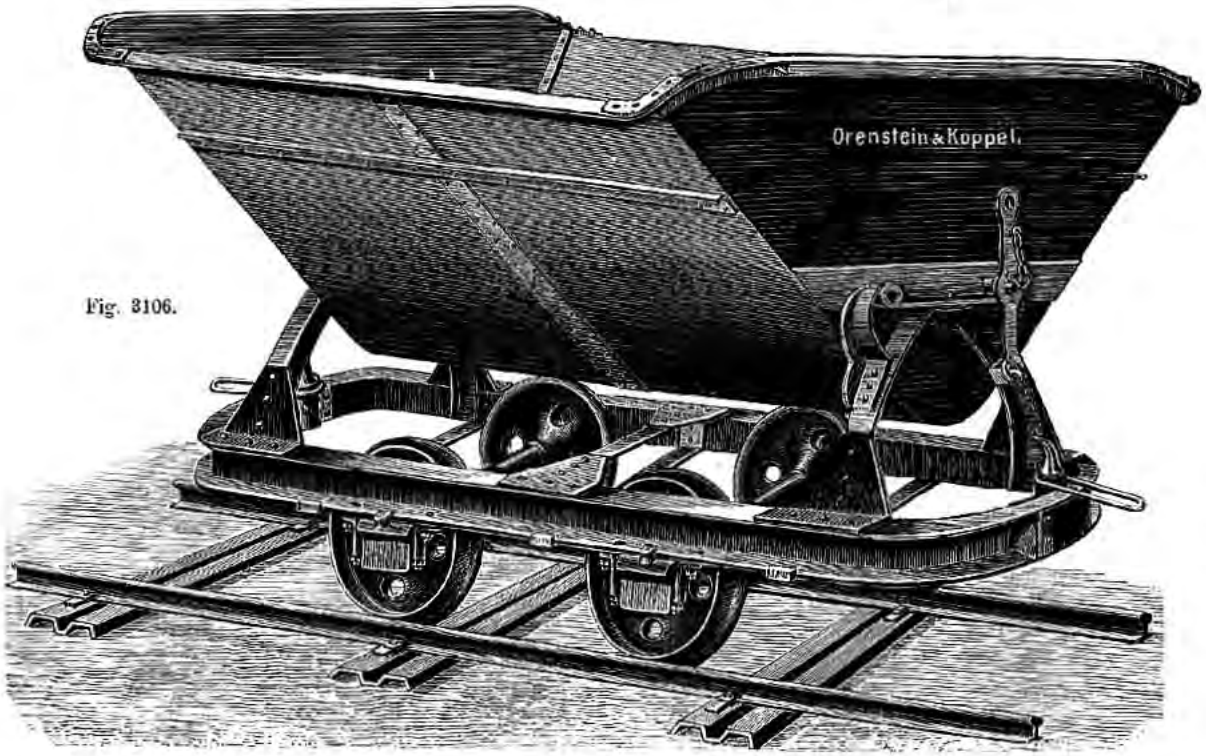


Fig. 3106.

3. Steel Tipping Wagons.

Fig. 3105 – 3107 represent our standard designs of tipping wagon of ¾ to 1½ cbm capacity, used for animal and locomotive power.

Standard Sizes:

Capacity: ¾ cbm. Bearing Strength 2000 to 2250 kilos.

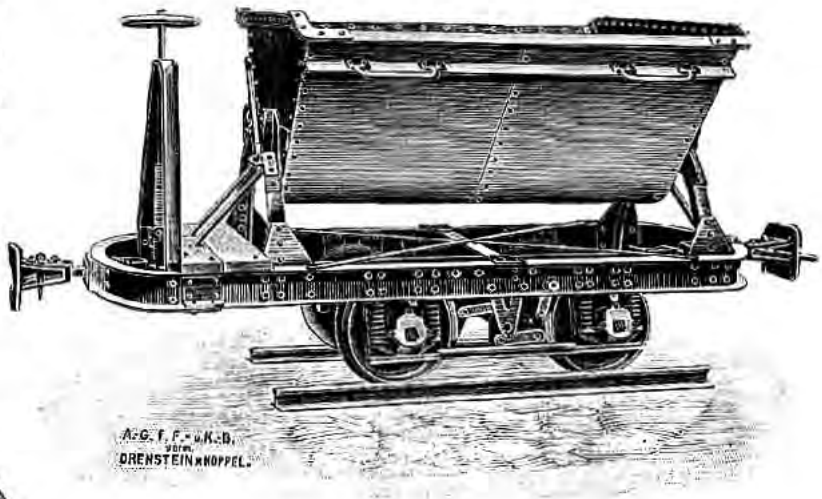


Fig. 3107.

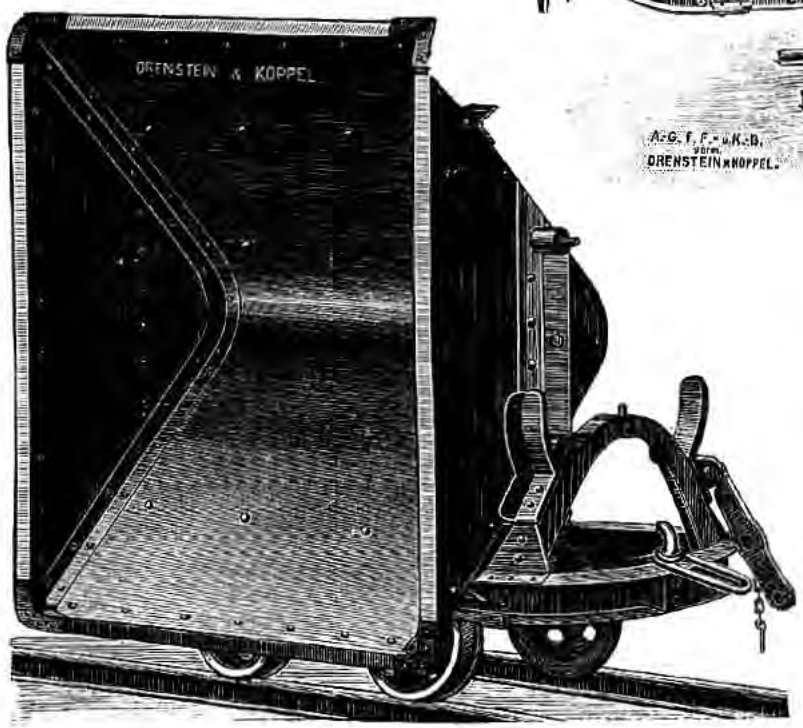


Fig. 3105.

Capacity: 1 cbm. Bearing Strength: 2250 to 3000 kilos.

Capacity: 1½ cbm. Bearing Strength: 3500 to 4500 kilos.

In cases where the larger wagons are used for locomotive power we recommend them fitted with spring draw gear, 2 spring centre buffers and spring axle-boxes.

III. Special Designs of Tipping Wagons.

Fig. 3108.

1. Steel Tipping Wagon
with Top Basket.

Fig. 3108 illustrates a combination of our standard ½ cbm tipping wagon and a top frame with wire-netting, which increases the capacity of the box to 1½ cbm. These wagons are specially designed for carrying light bulky articles such as bagasse etc.

2. Steel Tipping Wagon
with Railed Sides.

Fig. 3109 illustrates a wagon similar to our ½ and ¾ cbm tipping wagons, but with railed sides. This design will be found suitable for the removal of beet-roots, potatoes and other produce to which earth is adhering, the motion of the wagon causing a self-cleaning of the load.

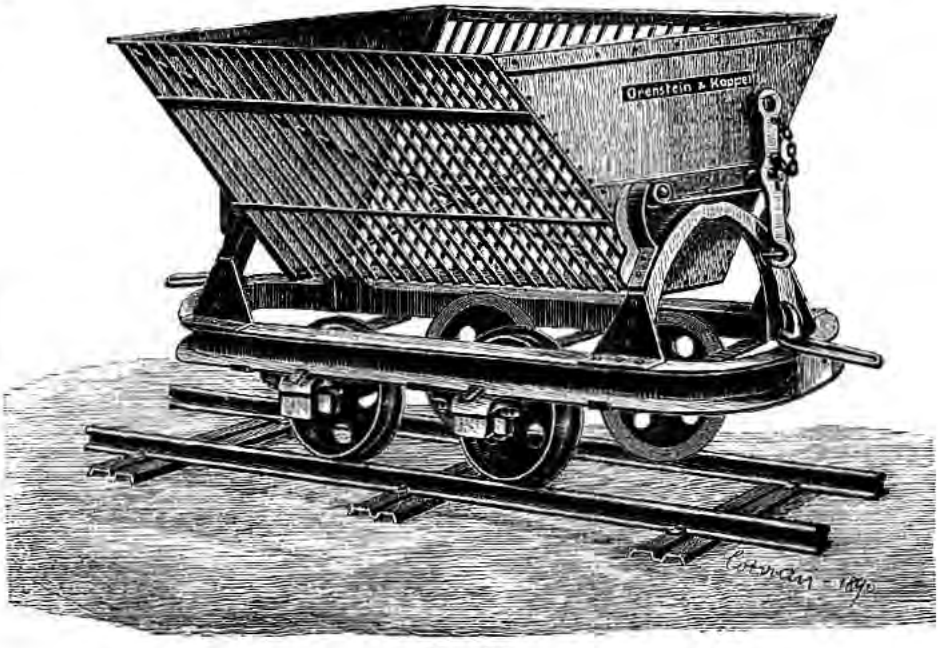


Fig. 3109.

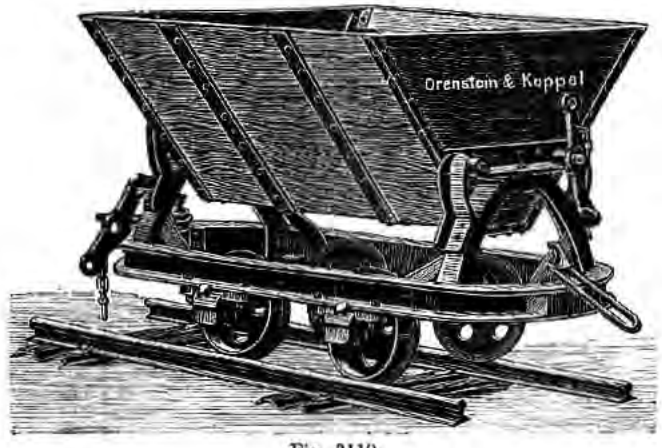


Fig. 3110.

3. Steel Tipping Wagon
with Wood Box.

Consists of the steel truck used in our standard tipping wagons and a wood box with iron fittings. This wagon is specially designed to carry heavy, sharp edged articles, such as stones, ore etc.

Standard capacities: ⅓, ½ and ¾ cbm.

IV. Steel Mining Wagons.

Fig. 3111.
U-Shape Wagon with flat iron standards.

We construct these wagons extremely strong and they are specially adapted for mining purposes, viz. for carrying ore, coal etc. and with a view to pass narrow tunnels under ground, the width of the wagons is kept as small as possible.

We illustrate and describe hereafter, together with sufficient data, our leading styles, sizes and gauges of mining wagons viz.

a) **Fig. 3111, 3113, 3115 Tipping Wagon with U-shaped box**

b) **Fig. 3112, 3114 Tipping Wagon with V-shaped box.**

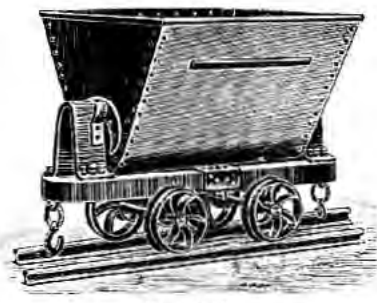


Fig. 3112.
V-Shape Wagon with flat iron standards.

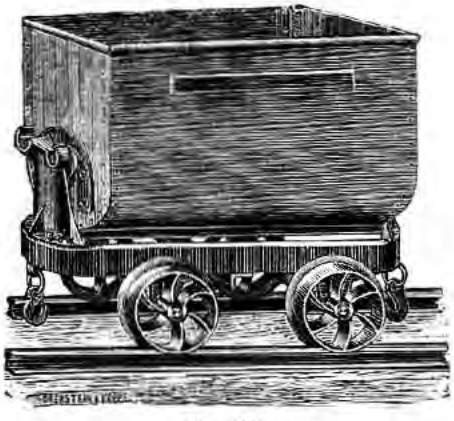


Fig. 3113.
U-Shape Wagon with cast iron standards with 2 grooves.

Both designs are fitted either with

Cast steel end-standards
with 2 or 4 grooves as per Fig. 3113 – 3115.

or with

Flat iron end-standards
as per Fig. 3111 and 3112.

Top edge of box is either of solid half rounds or of solid round iron bars bordered with the steel plate of the box.

Fig. 3114.
V-Shape Wagon with cast iron standards with 2 grooves.

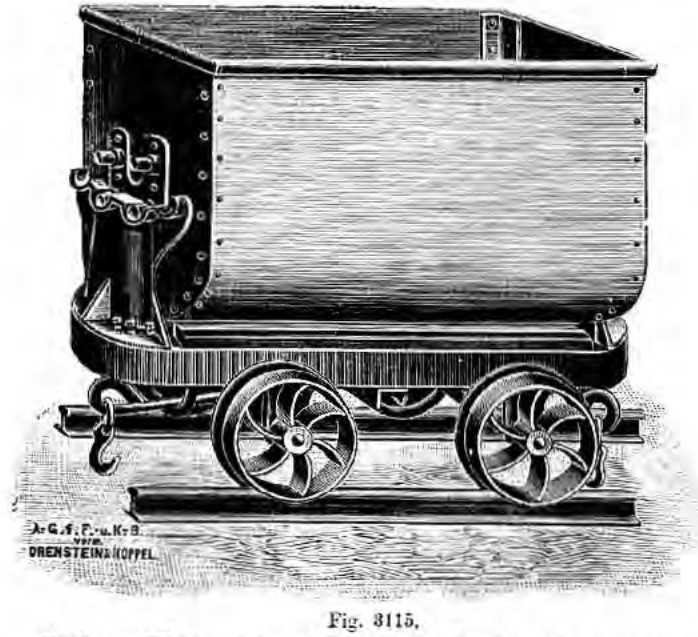


Fig. 3115.
U-Shape Wagon with cast iron standards with 4 grooves.

We usually furnish these wagons with inside axle-boxes with red brasses, buf if desired, we also supply them fitted with sets of wheels having self-lubricating bearings.

Our Standard Designs are:

1. **Capacity 10 and 16 cbft., steel plate of box 3 or 4 mm thick, gauge 18 in.**
2. **Capacity 20 cbft., steel plate of box 3 or 4 mm thick, gauge 18 or 24 in.**

The wagons are fitted either with fixed couplings as per Fig 3111 –3114 or with draw gear and 2 bars, which start from the centre of the channel frame as per Fig. 3115.

V. Steel Side- and End Tipping Wagons.

1. Steel Square Box Tipping Wagons.

Fig. 3116—3117 below illustrate a square box side tipping wagon for the removal of coal, ore etc. The wagon is fitted with a hinged side and tips after opening the locking lever, at the same time discharging contents.

We supply these wagons for $^1/_2$ and $^3/_4$ cbm capacity, 500 and 600 mm gauge, side steel plates 3 or 4 mm thick, bottom of 4 or 5 mm steel plates, bearing strength 1800 and 2000 kilos.

If desired, the wagons are furnished with 2 cars at top of each end, as shown in Fig. 3116, to haul them on an inclined plane railway.

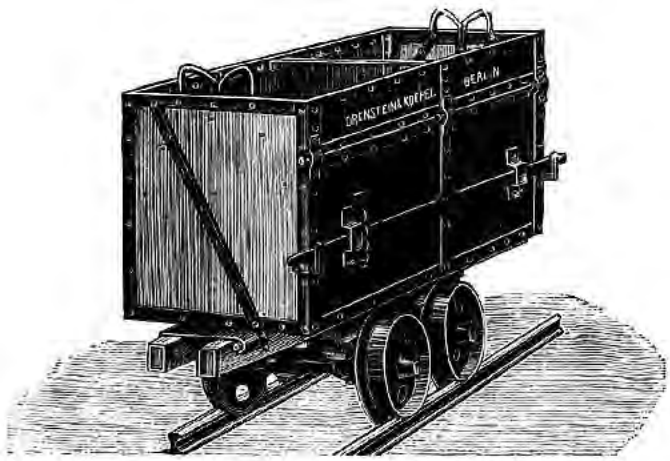


Fig. 3116.

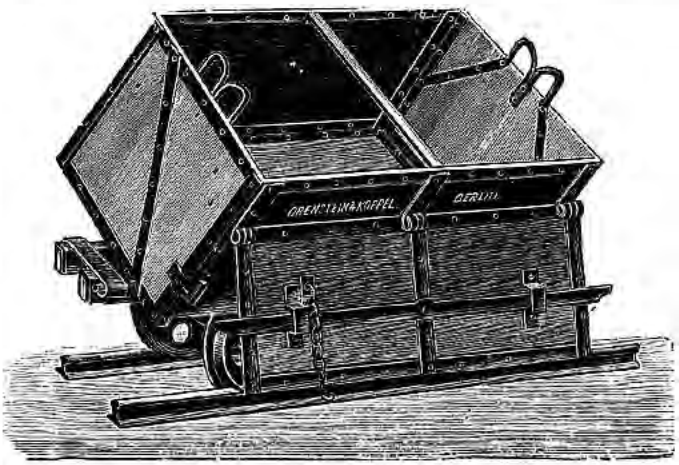


Fig. 3117.

2. Steel End Tipping Wagons.

Fig. 3118 represents a V-shape end tipping wagon in construction similar to our standard side tipping wagons.

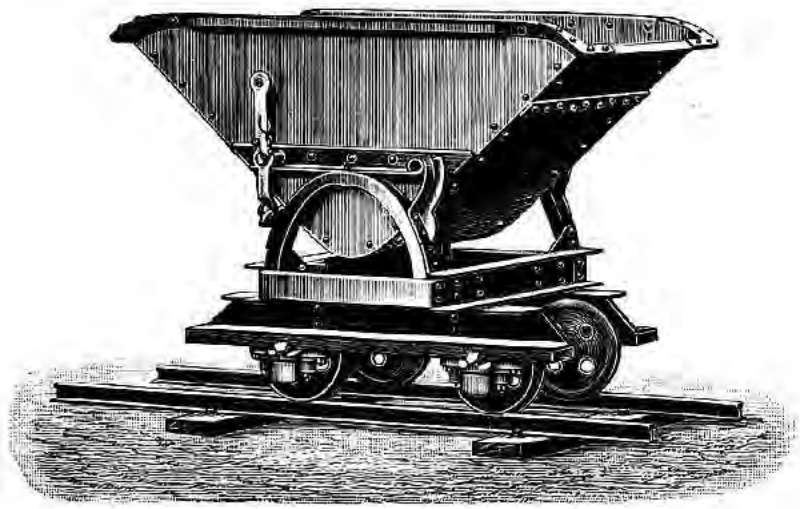


Fig. 3118.

We construct two designs of these wagons, viz

1. **with a short square under frame for manual power.**
2. **with extended underframe and round buffers for animal- and locomotive power.**

Standard Designs:

$^1/_3$, $^1/_2$, $^3/_4$ and 1 cbm capacity, 1, $1^1/_2$, 2 and $2^1/_2$ Tons bearing strength, 500, 600 and 750 mm gauge, steel plates 2 and 3 mm thick.

3. Steel Box End Tipping Wagons.

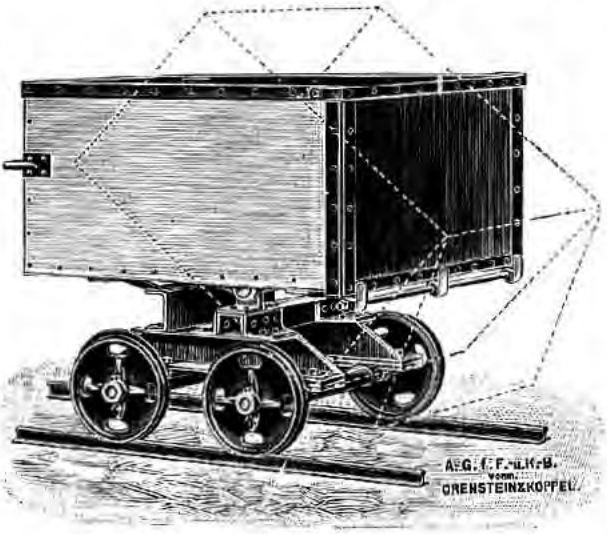


Fig. 3119.

a) Square End Tipping Wagons.

Fig. 3119 represents a square end tipping wagon with a hinged end door, which can be opened and closed by means of a lever passing through to the opposite end. The box is kept in position by a bolt and a key.

Standard Designs: $^1/_2$ and $^3/_4$ cbm capacity, 2 and 3 tons bearing strength, 500 and 600 mm gauge, side plates 2, 3 and 4 mm thick, bottom plates 3, 4 and 5 mm respectively.

b) Scoop End Tipping Wagons.

Fig. 3120 illustrates an end tipping wagon with a scoop shaped box, which is specially adapted for carrying light, not sharp-edged material. This design is similar to the one described above with the exception of the hinged door.

Standard Designs: $^1/_3$, $^1/_2$ and $^3/_4$ cbm capacity, 1, $1^1/_2$ and 2 tons bearing strength, 500 and 600 mm gauge, steel plates 2 mm thick.

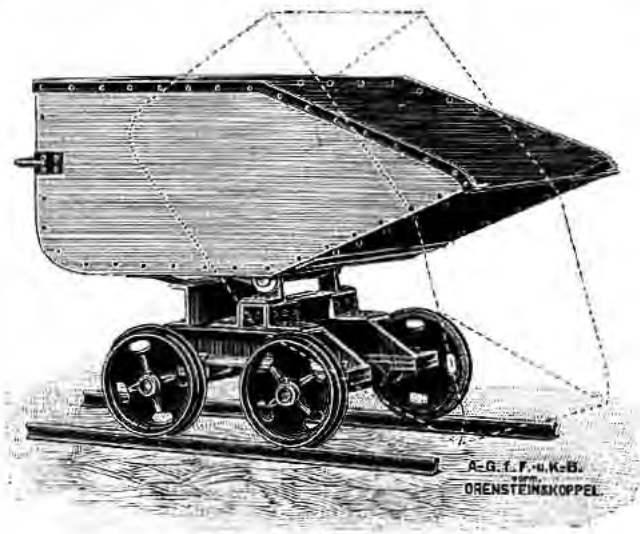


Fig. 3120.

VI. All Round Steel Tipping Wagons.

We construct all round tipping wagons either with V-shaped, square or scoop box. The box is carried on a steel frame, which is free to swivel on the wagon table round a pin, so that the wagon can be tipped to either side or end, as may be required.

1. V-Shape All Round Tipping Wagon.

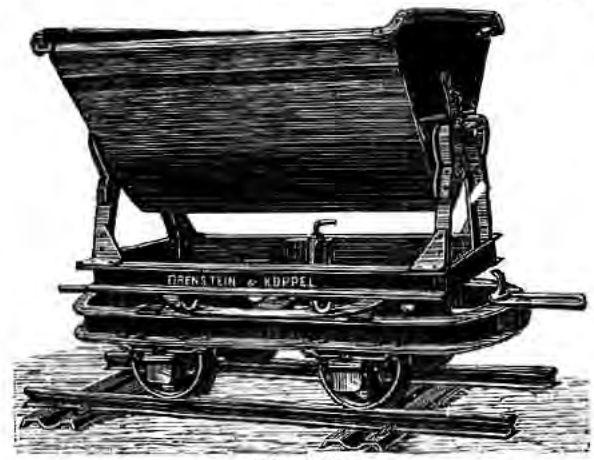


Fig. 3121.

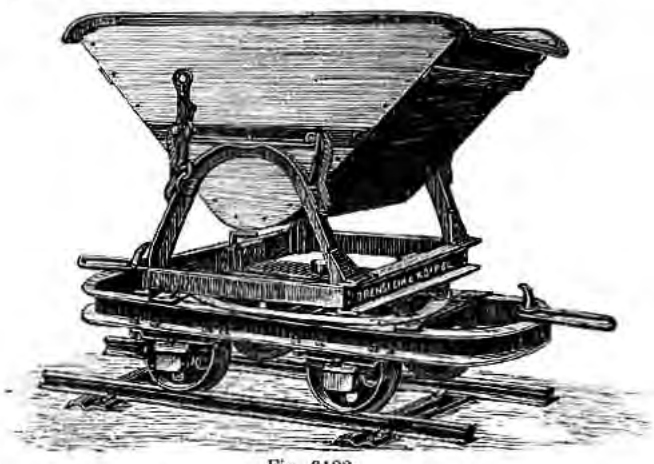


Fig. 3122.

Standard Designs are: $^1/_2$ and $^3/_4$ cbm capacity, $1^1/_2$, 2 and $2^1/_4$ tons bearing strength, 500 and 600 mm gauge.

2. Square All Round Tipping Wagon.

Fig. 3123/3124 illustrate our standard square tipping wagon with end-door to be opened by a through passing lever (Fig. 3123) or by a tappet shaft (Fig. 3124).

The door is closed very tightly by means of the tappet shaft and this wagon is therefore very suitable for carrying liquids.

Standard Sizes: 1/2, 3/4 and 1 cbm capacity, 2 and 2 1/2 tons bearing strength, 500, 600 and 750 mm gauge. Sides and ends of steel plate 2 or 3 mm thick, bottom of steel plate 3 or 4 mm thick.

These designs are principally for animal-power and can be coupled together to form a train.

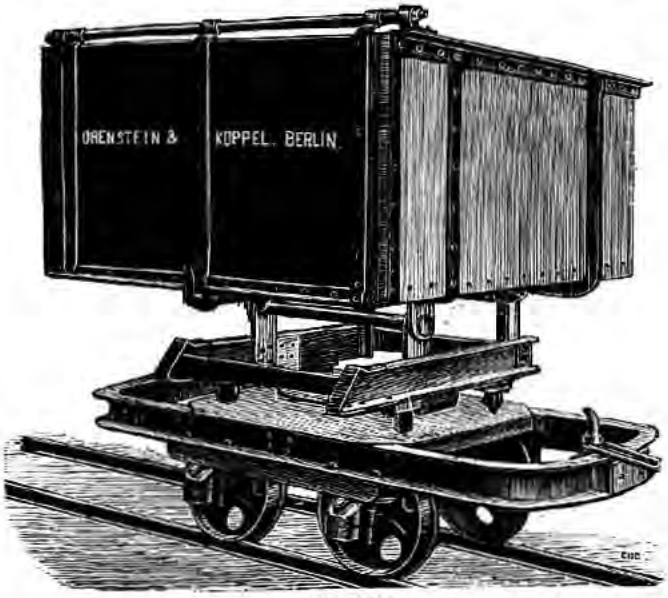


Fig. 3123.

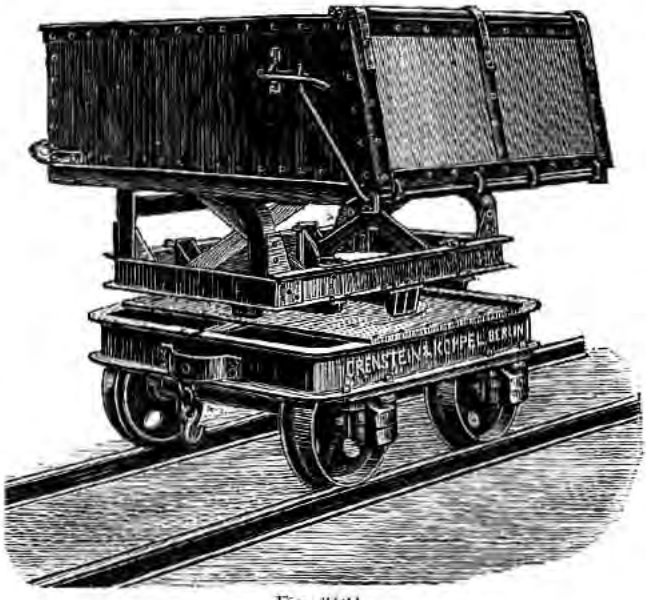


Fig. 3124.

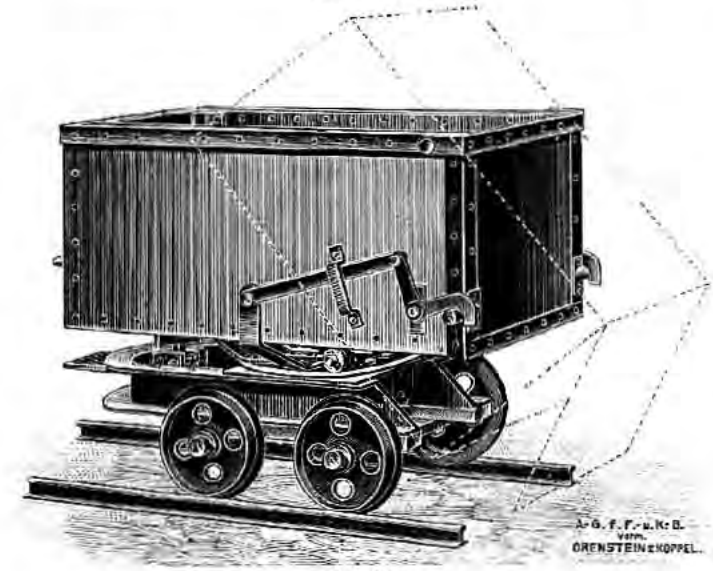


Fig. 3125.

b) All Round Tipping Wagon with automatical Door.

Fig. 3125 shows a practical automatic ore wagon: When the box is tipped until at a certain angle from the track, the end-door opens automatically, preventing a portion of the ore falling out by opening the end, which is the case with the wagon Fig. 3119 having a through-passing lever.

These ore wagons are made of 13, 14 1/2, 16, 22 1/2 and 27 cbf capacity, 1 1/2, 2, 2 1/2 and 3 tons bearing strength and 18" or 24" gauge. Side and end steel plates 2, 3 or 4 mm thick, bottom steel plates 3, 4 or 5 mm thick.

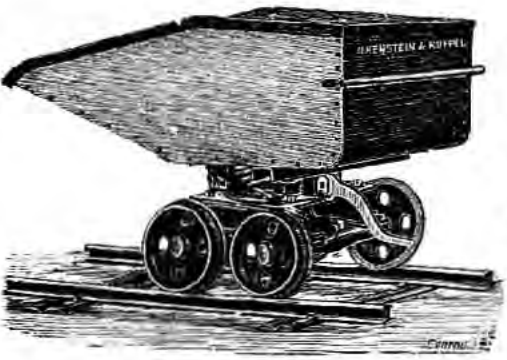


Fig. 3126.

c) Scoop All Round Tipping Wagon.

Fig. 3126/27 represent allround tipping wagons with a scoop-shaped box. Capacity 1/3, 1/2 and 3/4 cbm. Bearing strength 1, 1 1/2 and 2 tons, gauge 500 and 600 mm, Box of steel plate 2 mm thick.

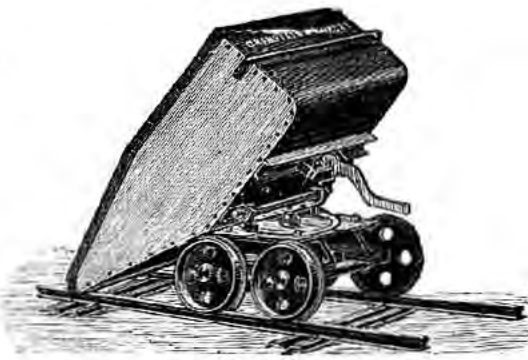


Fig. 3127.

VII. Hopper Wagons.

Fig. 3128.

Fig. 3128 shows a hopper wagon, discharging the load underneath itself by opening the bottom with the aid of a side lever. This wagon is specially suitable for carrying coal, coke etc. from a high scaffolding direct into ships or railroad cars, or for carrying coke to furnaces.

Our standard sizes are: 1/3, 1/2 and 1 cbm capacity,
1 1/2, 2, 2 1/2 and 3 tons bearing strength,
500, 600 and 750 mm gauge,
steel plate of box 3 mm thick.

We also supply wagons similar to the above, but made somewhat lighter in construction, for carrying coffee from the drying places to the cleaning machines.

Standard sizes: 1/3, 1/2 and 1 cbm capacity,
1 1/2, 2 and 2 1/2 tons bearing strength.
Box steel plate 2 mm thick.

Gable Bottom Wagons.

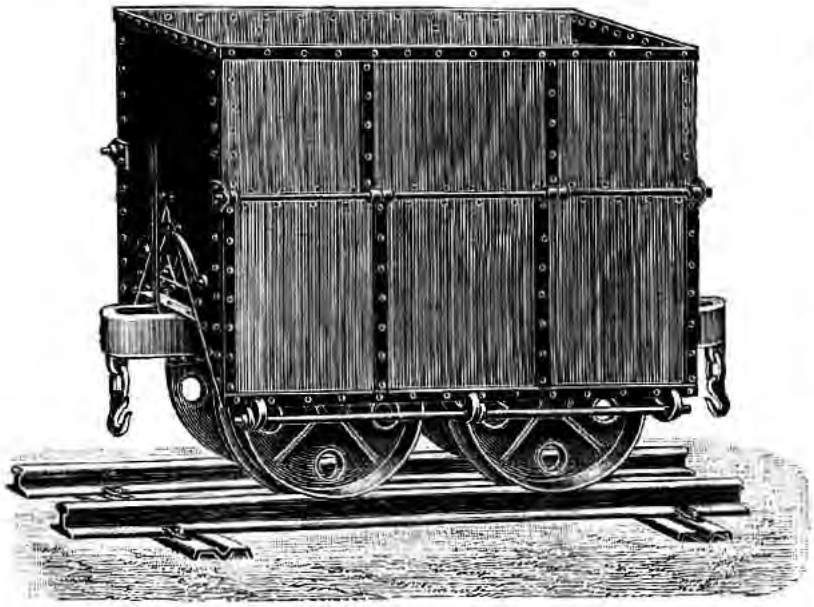


Fig. 3129

Wagons represented by Fig. 3129 have a double inclined (gable) bottom door. Both sides of the wagon are hinged at half height and can be opened or closed by means of 2 tappet shafts with 3 tappets each. The shafts are handled by a lever working in the centre at end of wagon.

After opening the sides the wagon empties contents automatically owing to the double inclined bottom.

Our standard sizes are:
20, 30 and 40 cbf engl. capacity,
2, 3 and 4 tons bearing strength,
18 or 24 in. gauge,
side steel plate 3 and 5 mm,
bottom steel plate 4 and 6 mm thick.

VIII. Mining Wagons and Tipplers.

We illustrate and describe hereafter various designs of mining wagons used in connection with tipplers.

1. End Tippler

Fig. 3130 shows an end tippler, which is used in cases where the wagons are required to be emptied at the end of a ramp. The wagon, which is made entirely of steel, has a hinged end door, which is opened by means of a through passing lever.

The tippler consists of a railway section turned up at one end and tips round a steel axle fitted with bearings. The tipplers are made to 500 and 600 mm gauge.

The wagons are supplied of the following standard sizes: 1/3, 1/2 and 3/4 cbm capacity, 500 and 600 mm gauge and of 2 constructions, viz: 1st. with steel sides 3 mm and bottom steel plates 4 mm thick, 2nd. with steel sides 4 mm and bottom steel plates 5 mm thick. Bearing strength 1 1/2, 2 and 2 1/2 tons.

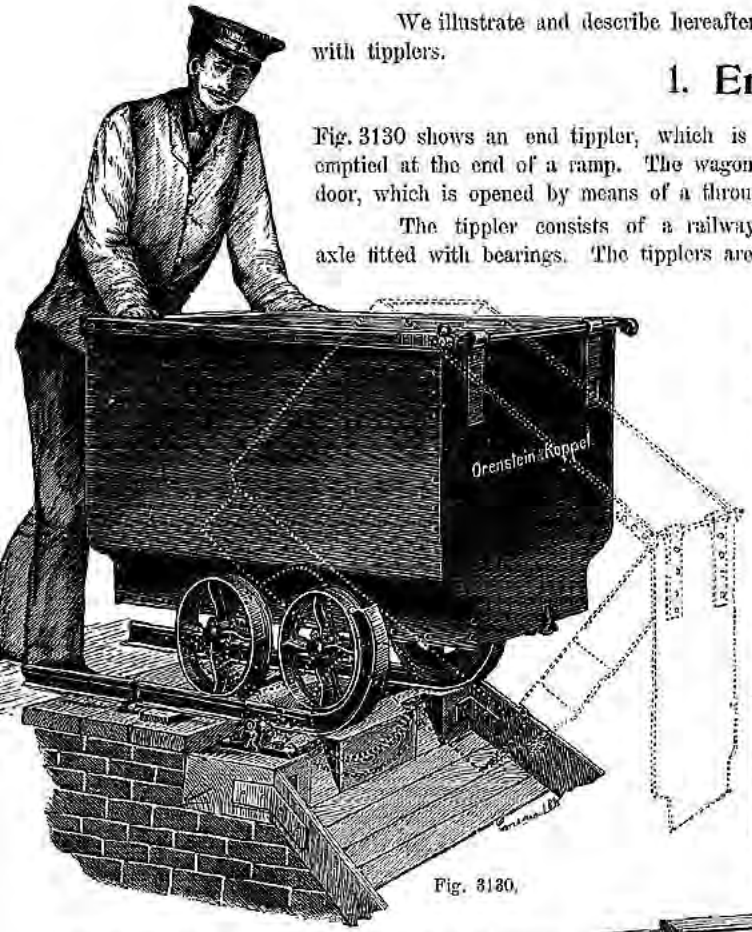


Fig. 3130.

2. Upsetting Tippler

as illustrated by Fig. 3131, will be found convenient in cases where it is necessary to empty the wagons from a scaffolding underneath the tippler. The tippler consists of a railway section turned up at one end and of an iron frame fitted with trunnions; the frame, being firmly connected with the rails, holds and upsets the wagon.

The wagons used in connection with these tipplers, are different from the other mineral wagons in as much as the ends are rivetted to the sides and having a coupling gear the wagons may be hauled in trains.

We construct this design of wagon and tippler of the same capacities, gauges and bearing strengths as above, also with the same thickness of steel plates.

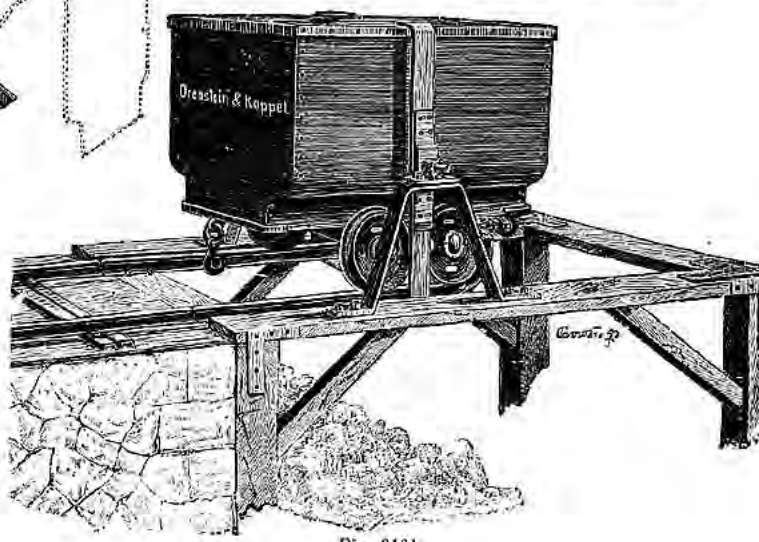


Fig. 3131.

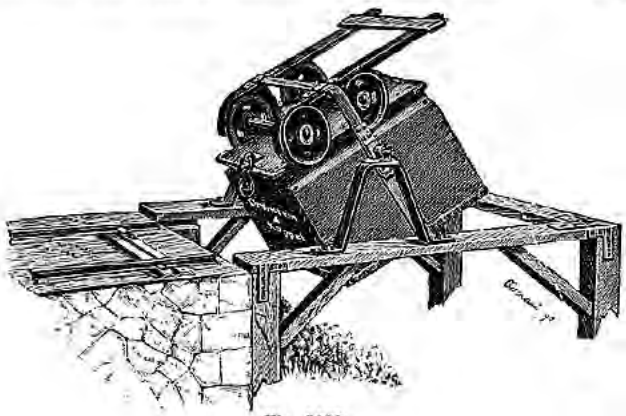


Fig. 3132.

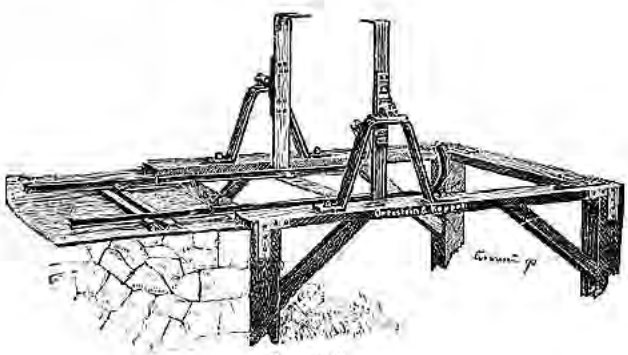


Fig. 3133.

3. Travelling Circular Tippler.

Fig. 3134 represents a portable circular tippler wich will be found useful where the wagon is to discharge contents from an elevated track direct below the wagon at various spots. This tippler consists of

1st. the travelling traverser of 2 metres gange with 4 double-flanged rollers, carrying the circular tippler.

2nd. 2 strong iron rotary rings, which are connected at foot by the rails carrying the wagon and at the top by 2 iron bars and 2 strong angle bars. These angles serve to protect the wagon from falling out when being tipped.

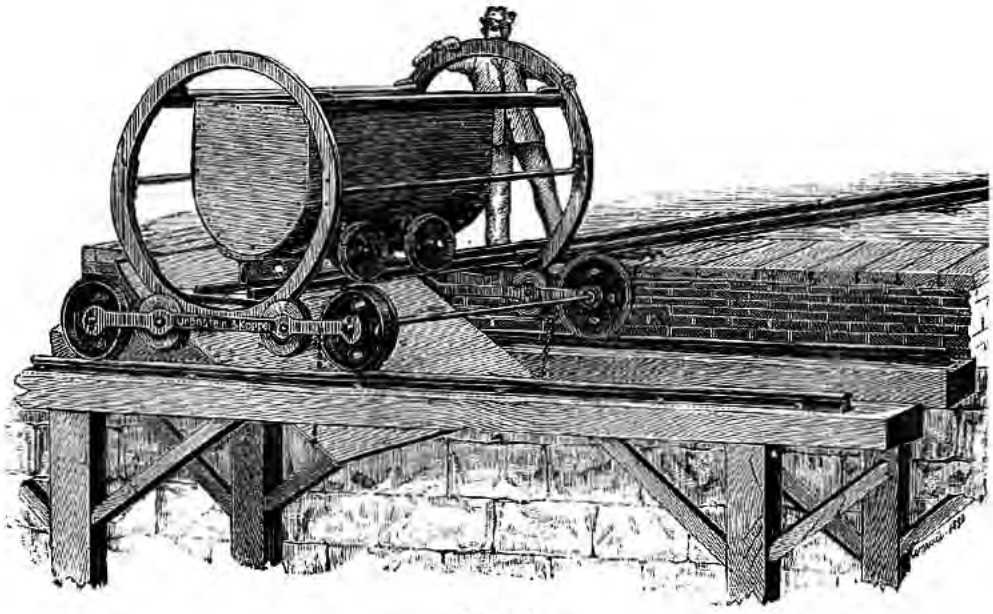


Fig. 3134.

The wagons used in connection with the above tippler are similar to fig. 3131/32 illustrated on page 45, but with curved bottom. Steel plate throughout 3 or 4 mm thick.

Standard Designs: Same as stated on page 45 fig. 3130/31.

Besides the designs No. 3130, 3131 and 3134 we supply mining hutches fig. 3135 to 3137 illustrated hereafter.

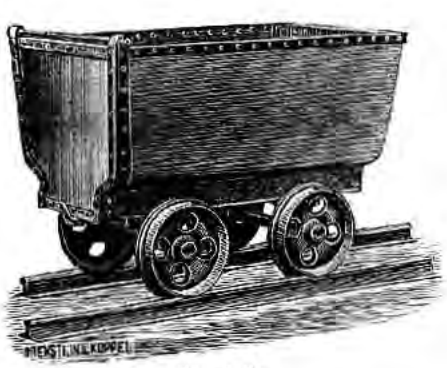


Fig. 3135.

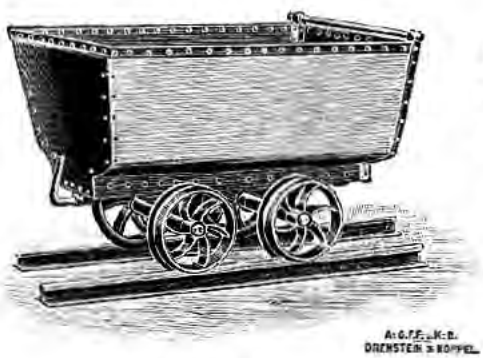


Fig. 3136.

Fig. 3137.

X. Wood Tipping Wagons.

The wagon illustrated hereafter is made of wood with the exception of wheels, axles and fittings, which are of steel, and is designed for carrying sharp-edged materials, such as stones, minerals, ores etc., both for animal and locomotive traction.

Standard Size: 1 cbm capacity, 3 tons bearing strength and 750 mm gauge.

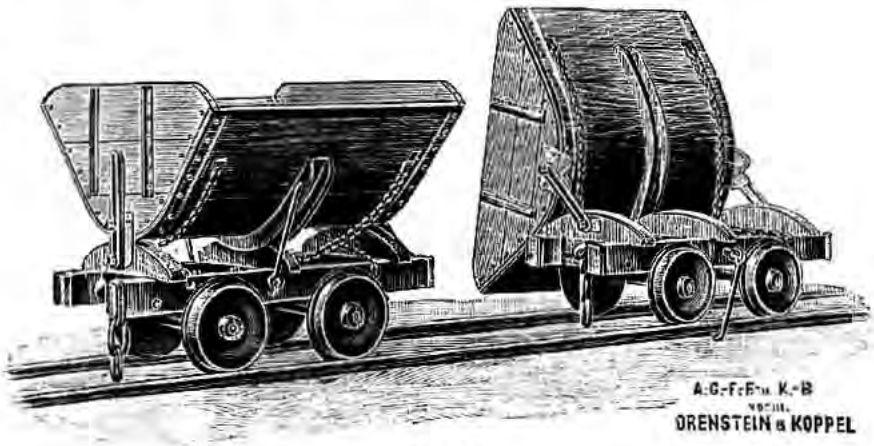


Fig. 3138.

XI. Box Tipping Wagons.

We illustrate and describe hereafter a variety of our designs of box tipping wagons, which are calculated to do good service in the conveyance of large loads of earth, stones, ores etc.

After lifting the closing-lever the box tips and the removable sides open, discharging contents clear of the track.

We make these wagons to tip one side and both sides, with wood box and wood or steel underframe.

Our Standard Sizes are:

Fig. 3139/40. With steel underframe tipping both sides, $^3/_4$, 1, $1^1/_4$, $1^1/_2$ and 2 cbm capacity, 2, 3 and 4 tons bearing strength, 600, 750 and 1000 mm gauge.

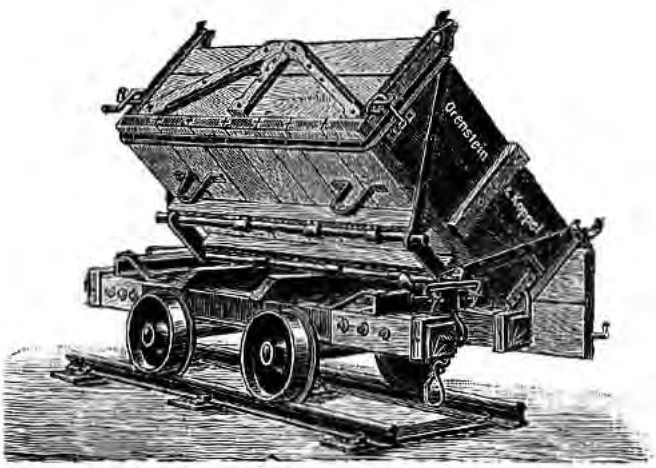


Fig. 3139.

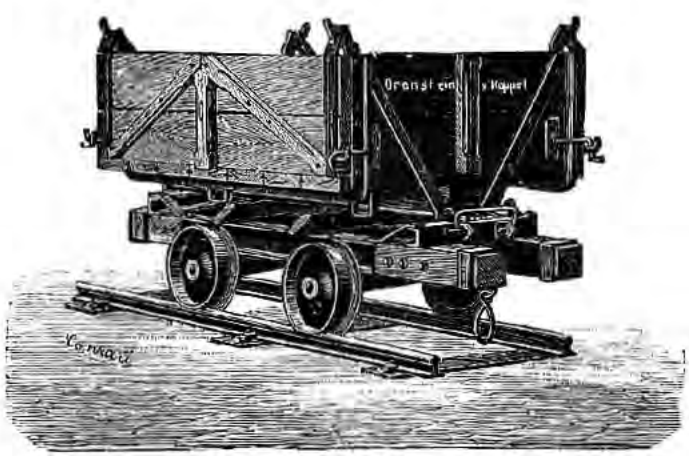


Fig. 3140.

Fig. No. 3141/42, with wood underframe, tipping one side, $^3/_4$, 1, $1^1/_4$, $1^1/_2$, 2 and 3 cbm capacity, 2, 3, 5 and $7^1/_2$ tons bearing strength, 750 and 1000 mm gauge.

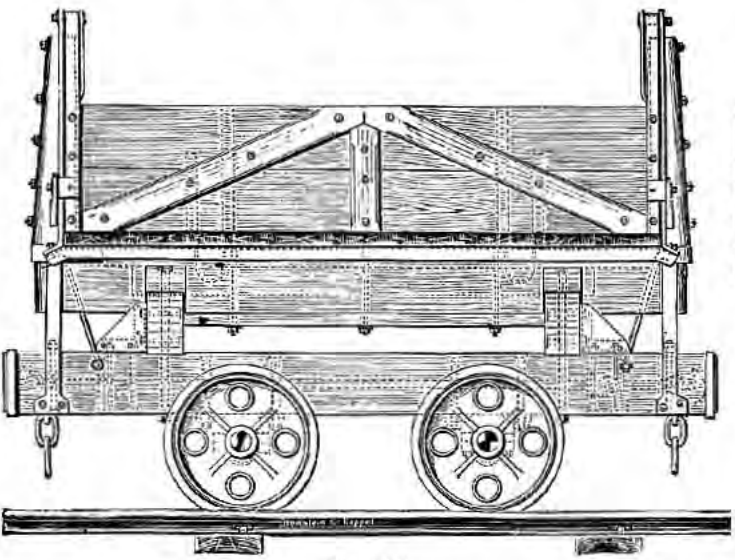


Fig. 3141.

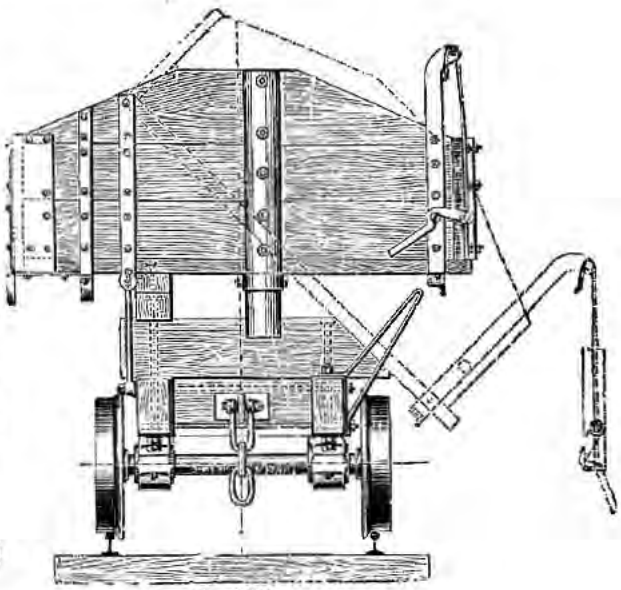


Fig. 3142.

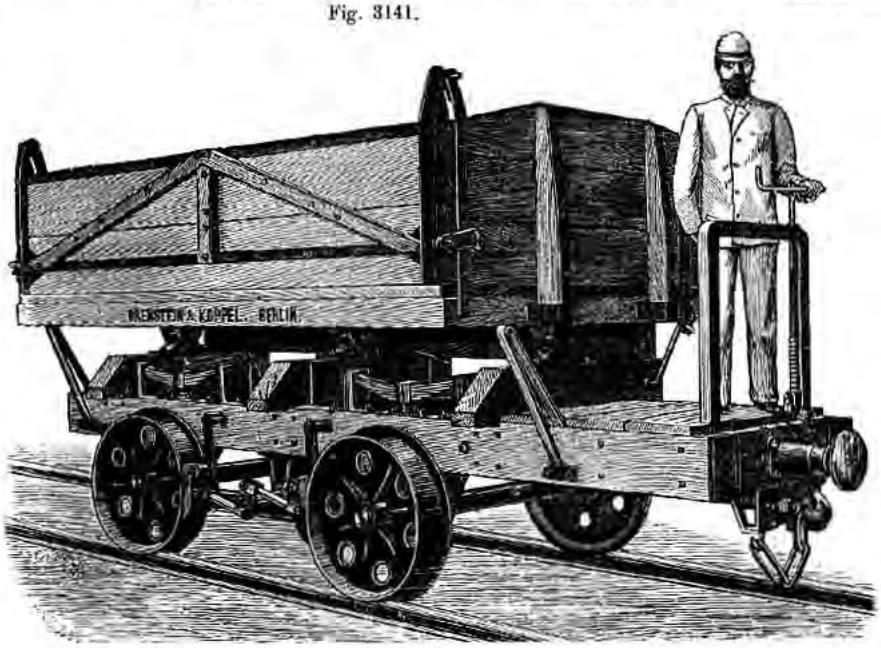


Fig. 3143.

Fig. No. 3143, with wood underframe, tipping one side 2, 3 and 4 cbm capacity, 5, $7^1/_2$ and 10 tons bearing strength, 750, 1000 and 1435 mm gauge.

Fig. No. 3144/3144a, with steel underframe, tipping both sides, 2, 3 and 4 cbm capacity, 5, $7^1/_2$ and 10 tons bearing strength, 750, 1000 and 1435 mm gauge.

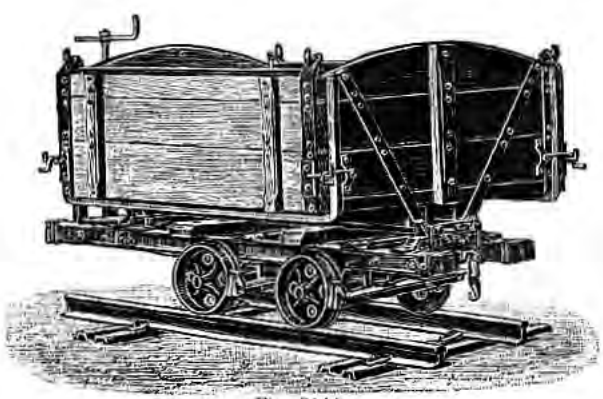


Fig. 3144.

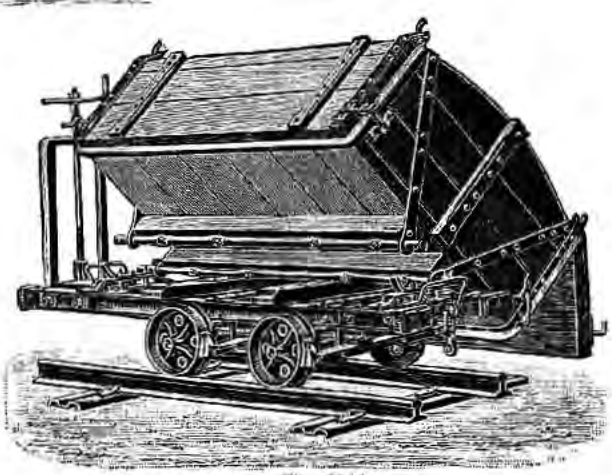


Fig. 3144a.

With a view to saving in freight we supply for export, if desired, only the iron work, both for the box and the underframe, the wood-work being provided on the other side. This way of fitting the wagons together will be found economical specially in quarters with abundance of wood.

XII. Forest and Agricultural Wagons.

1. Bogie Timber Wagons.

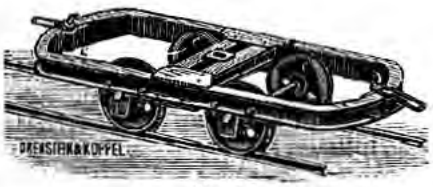


Fig. 3148.

Fig. 3149.

For forest clearing we construct a special design of timber bogies illustrated by fig. 3148—3149, which is similar to our standard truck fig. 3096 on page 34, but fitted with 2 strong cross-girders of channel steel, which are securely rivetted with steel knees to the wagon frame, on which the fork swivels round a strong centre-pin with the aid of switch pieces. To keep the timber firmly on the swivelling forks, these are fitted with spikes. The fork has 2 hinged arms, which are furnished at the top with chains and hooks.

If desired, we supply the timber bogies fitted with a safety arrangement, which works in the way that by drawing the chain at one side of the swivelling fork, the fork-arm will be removed at the opposite side of the bogie, that is to say where the timber is required to come down, thus the workman is sure not to be hurt by the falling timber.

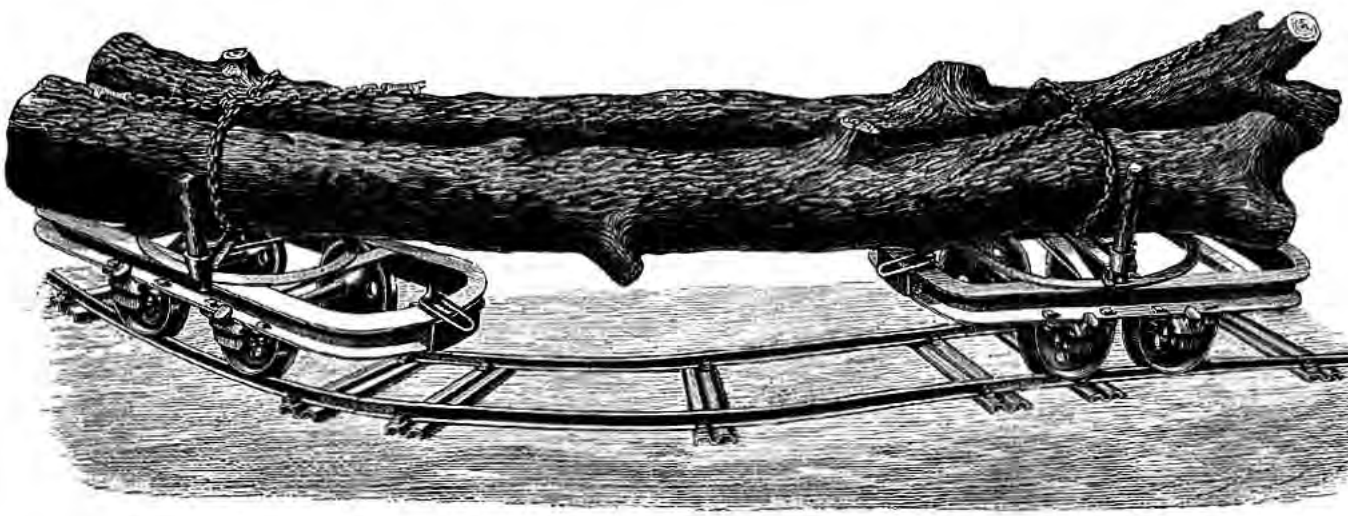


Fig. 3150.

For carrying timber 2 bogies will form a wagon by laying on them the timber without coupling the bogies together, see fig. 3150.

Standard sizes: 2 tons bearing strength per bogie or 4 tons per timber wagon. 500 and 600 mm gauge.

If desired, we construct these timber wagons for loads up to 10 tons and shall be glad to quote for same on application.

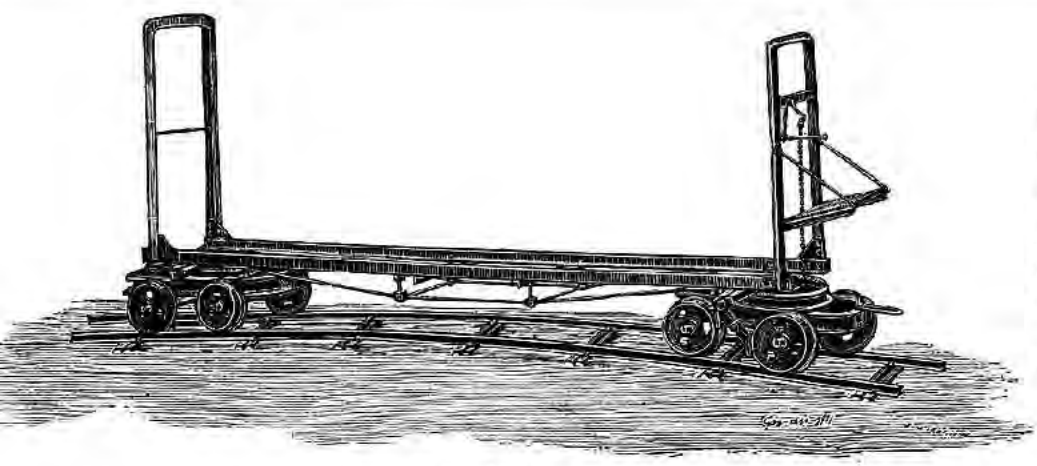


Fig. 3151.

Removing the swivelling fork and putting on the bogies a steel frame with iron uprights, as per fig. 3151, the wagon will be found suitable for carrying logs and brush wood.

Standard Sizes: 4 and 5 cbm capacity, 4 tons bearing strength.

2. Agricultural Wagons.

Fig. 3152 illustrates a wagon which is specially adapted for the conveyance of fruits, such as turnips, cabbage, potatoes etc. The wagon consists of two timber bogies without the swivelling forks and of a wood box. The sides of the box are hinged at half-height and when the upper part has fallen down at each side, as is shown by fig. 3152a, the wagon is converted into a very broad platform wagon, which will be found convenient for carrying light, bulky articles, such as hay and straw packed in bundles.

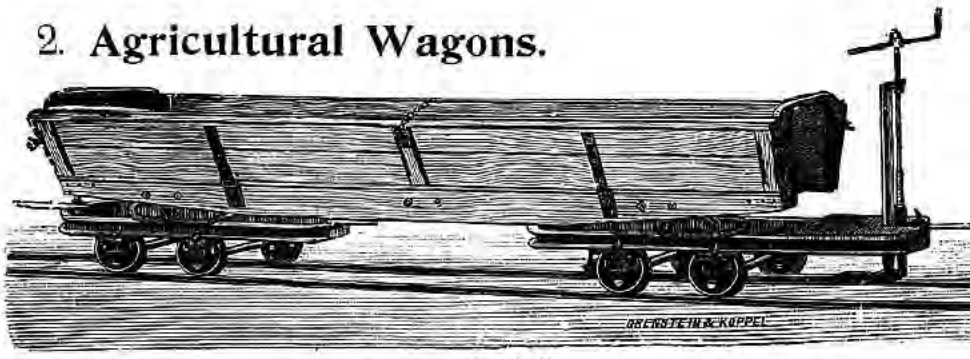


Fig. 3152.

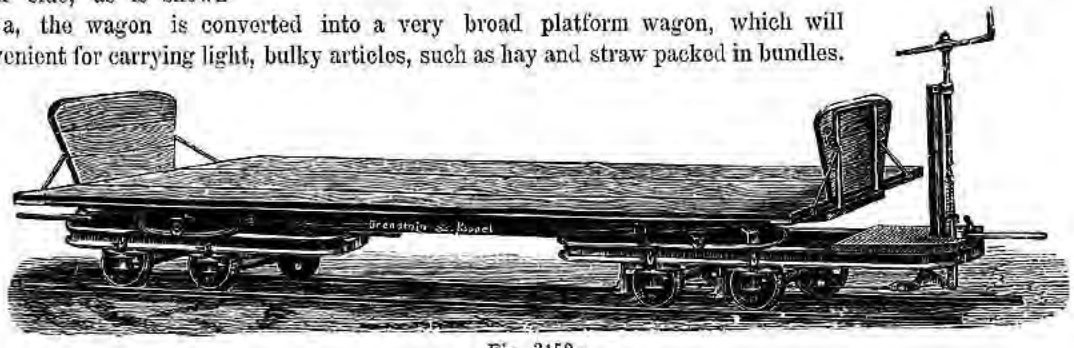


Fig. 3152a.

Fig. 3153 shows this wagon fitted with screw brake and buffers at the box instead of at the bogie-frames. We supply the bogies either with wood or steel frame, the latter being illustrated by fig. 3153.

Standard Sizes: 2, 3 and 4 cbm capacity. 2, 3 and 4 tons bearing strength, 500 and 600 mm gauge.

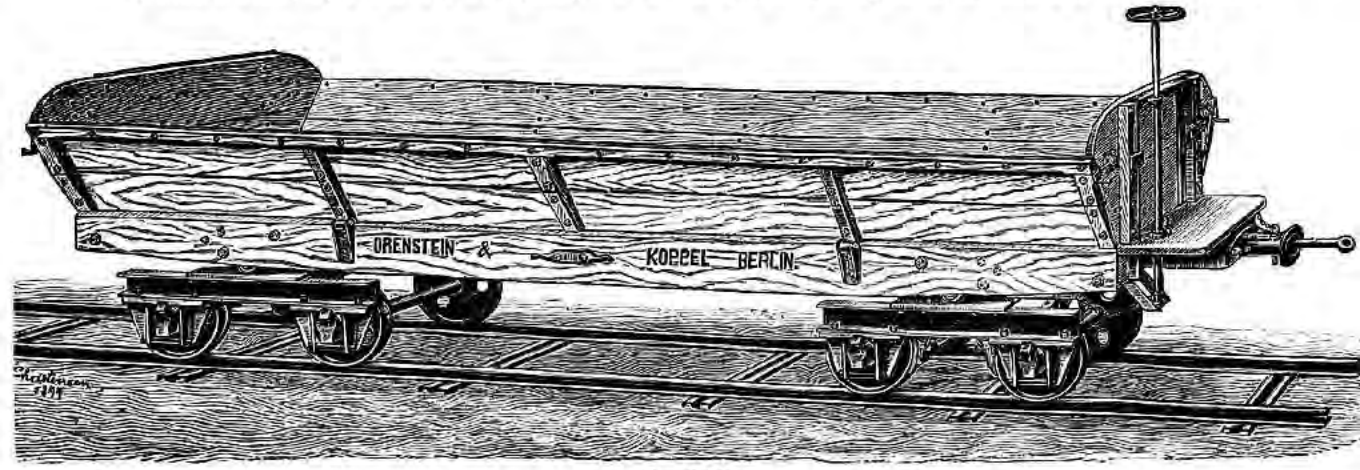


Fig. 3153.

XIII. Platform Wagons.

Platform wagons are designed for carrying bulky material, such as bales, cased goods, casks, stone blocks, engine-parts etc. etc. We illustrate and describe herafter some of our standard platform wagons.

Fig. 3154 represents a platform wagon with wood frame and wood floor, which is particularly suitable for carrying bricks in the construction of buildings. Fig. 3155/3156 illustrate the same wagon with iron uprights or fitted with deal ends.

Standard Sizes: 1200 kilos carrying capacity, 500 and 600 mm gauge.

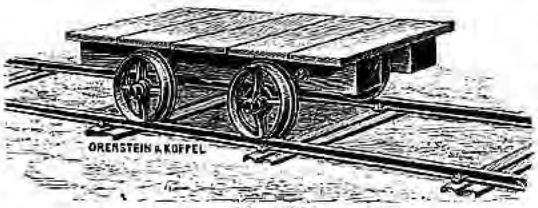


Fig. 3154.

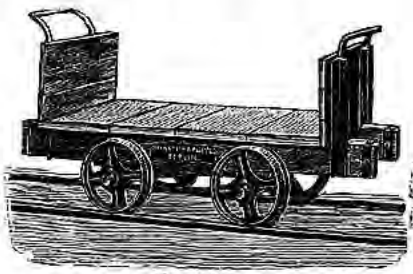


Fig. 3155.

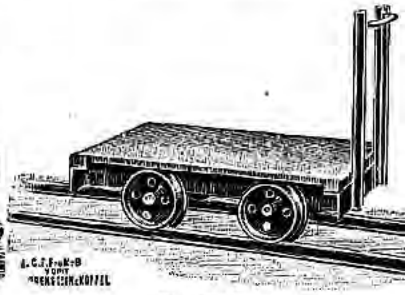


Fig. 3156.

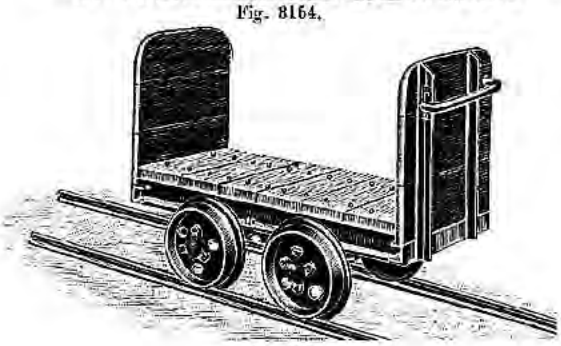


Fig. 3157.

Fig. 3157 shows a wagon similar to the above, but stronger and fitted with wood ends firmly bolted to iron uprights.

Standard Sizes: 1750 kilos carrying capacity, 500 and 600 mm gauge.

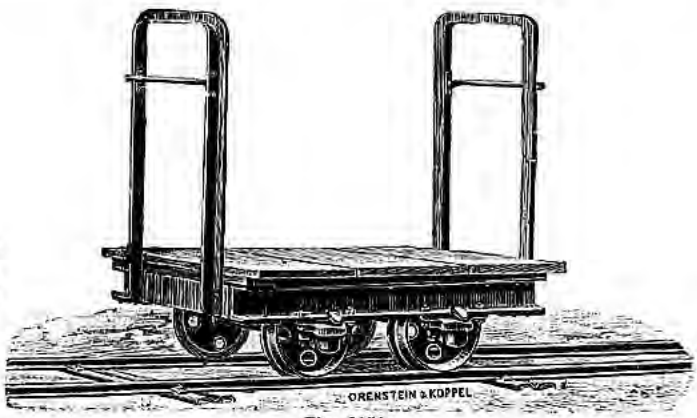


Fig. 3159.

Wagons represented by fig. 3158/60 are of stronger construction, having one or two iron uprights or steel ends and wood or steel floor, as may be required.

Standard Sizes: 2 tons carrying, capacity, 500 and 600 mm gauge.

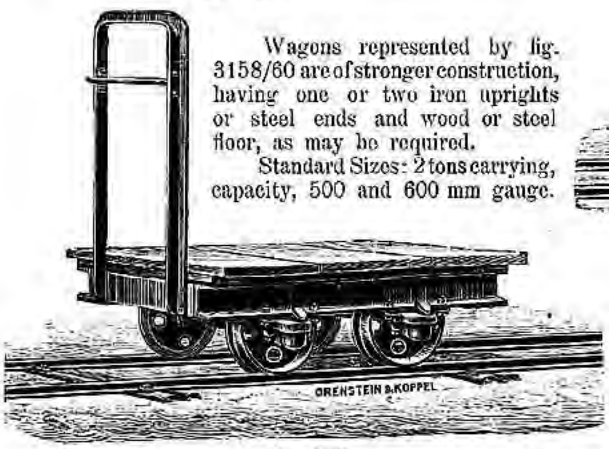


Fig. 3158.

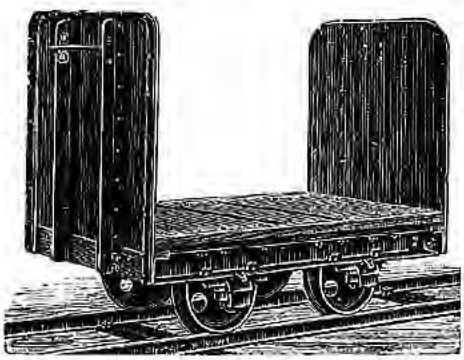


Fig. 3160.

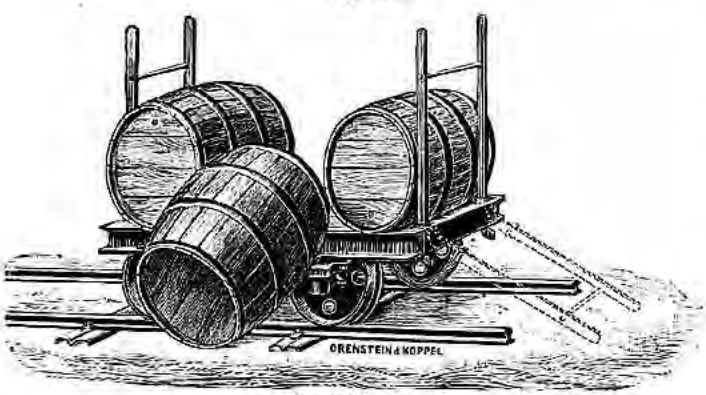


Fig. 3161.

Fig. 3161 illustrates a cask wagon with hinged uprights serving as pulling-ladders to facilitate loading and unloading. We supply this wagon fitted either with wood floor or with steel floor.

Standard Sizes: 1½ and 2 tons carrying capacity, 500 and 600 mm gauge.

Fig. 3162/63 represent platform wagons with either wood or chequered steel floor, dead centre buffers and coupling gear.

They are particularly designed for use in wharfs, warehouses etc. etc.

Standard Sizes:

1, 2, 3, 4 and 5 tons carrying capacity, 500, 600, 750 and 1000 mm gauge.

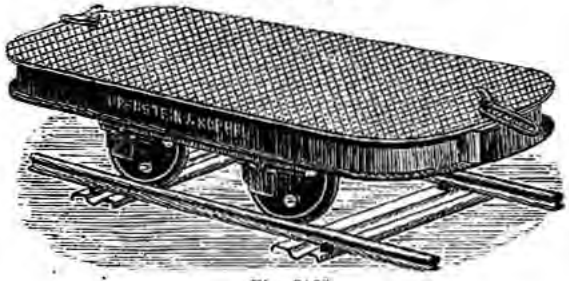


Fig. 3162.

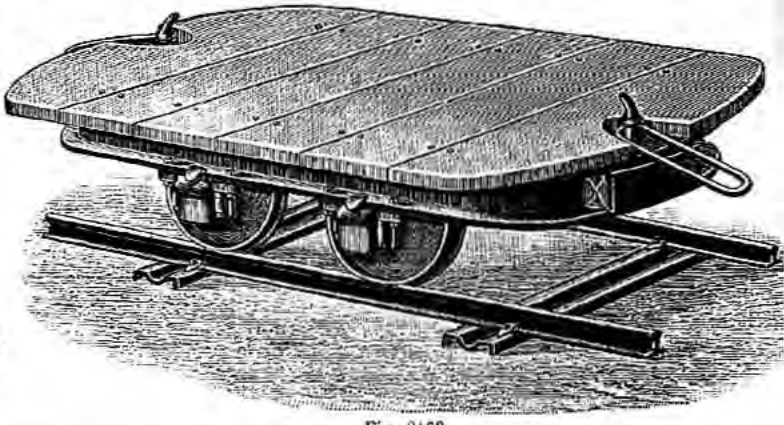


Fig. 3163.

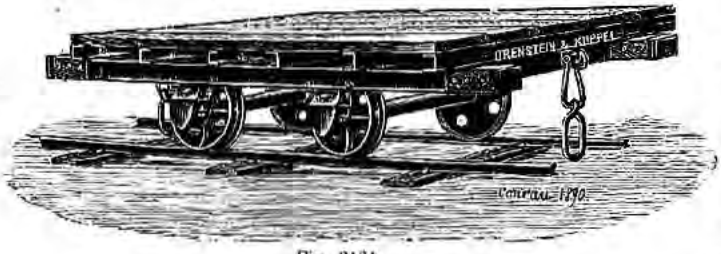


Fig. 3164.

Fig. 3164 illustrates a platform wagon with dead side buffers, which will be found useful for the removal of heavy, rough material, such as rocks, stone-blocks, bulky engine-parts etc. We furnish this wagon with spring draw gear and with wood or steel floor, as may be desired.

Standard Sizes:

3½ and 5 tons carrying capacity, 750, 1000 and 1435 mm gauge.

Fig. 3165 shows an inspector's trolly which is fitted with 4 handles for lifting the wagon out of the track when a train approaches.

Standard Sizes:

3½ and 5 tons carrying capacity, 750, 1000 and 1435 mm gauge.

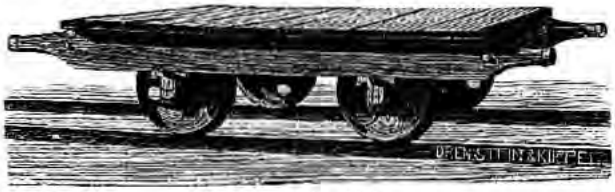


Fig. 3165.

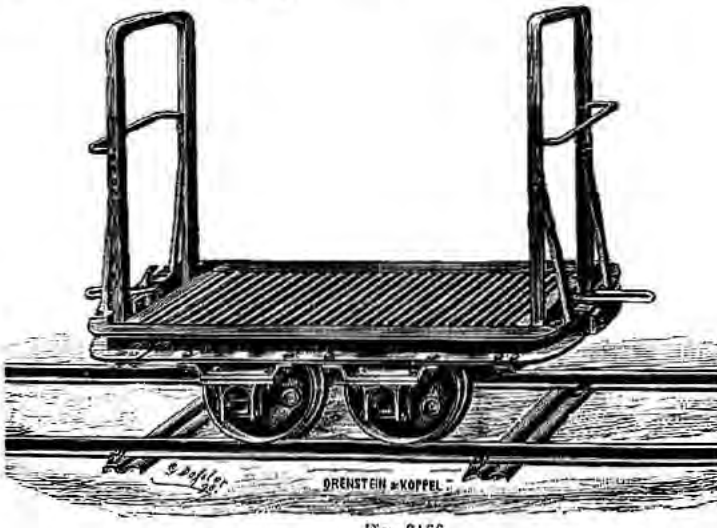


Fig. 3166.

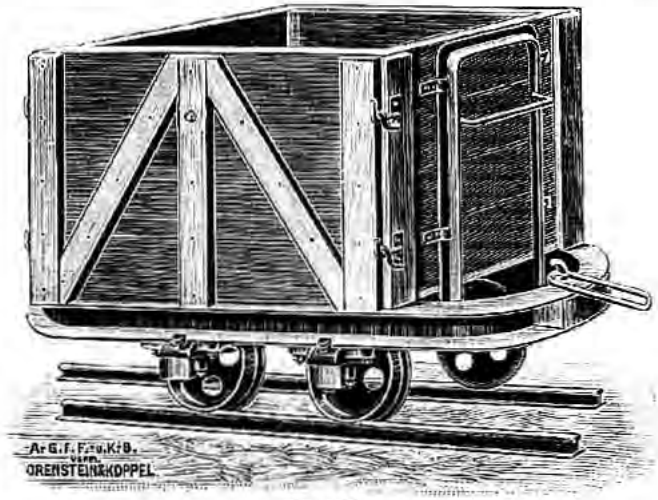


Fig. 3167.

Above fig. 3166 represents a wagon with 2 uprights. This wagon is converted into a box wagon by fitting on to the platform wood ends and sides (see fig. 3167). We furnish this wagon with either corrugated iron platform or wood platform.

If desired, we also supply for the former iron boxes of 1 cbm. capacity.

Standard Sizes:

2 tons carrying capacity, 500 and 600 mm gauge.

THE CENTRAL MINING & TRAMW...
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XIV. Wagons for Military Purposes.

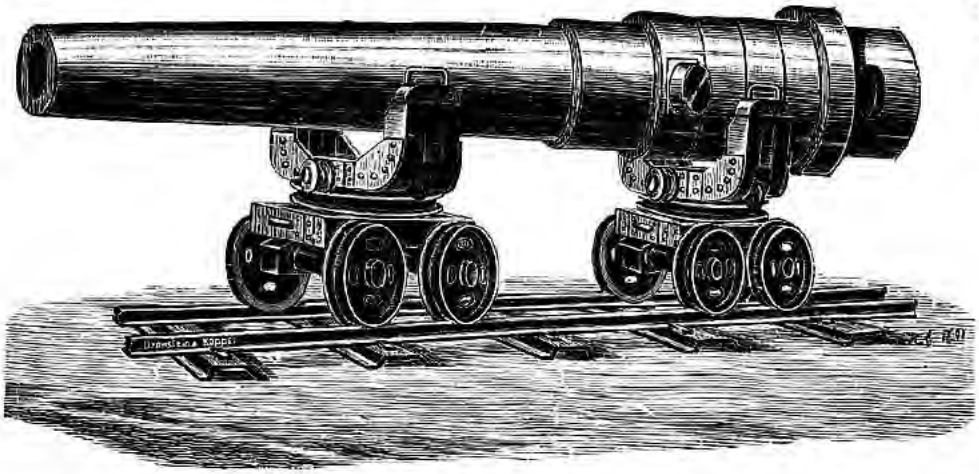


Fig. 3168.

Above cut illustrates a very strong bogie gun carriage constructed throughout of steel. The forks, which are designed to take up the gun, swivel on iron rollers round a strong centre pin. The bogies run independently of each other, thus allowing of going through sharp curves, which is a matter of importance in carrying guns inside narrow fortresses.

We construct these wagons on 8, 16 and 24 wheels for loads up to 50 tons.

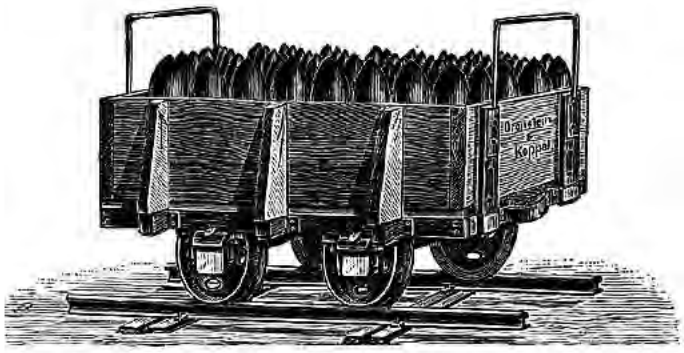


Fig. 3169.

Fig. 3169 above represents a wagon which is designed to carry ammunition. It is a strong platform wagon with removable ends and sides, the ends being fitted with iron handles.

We supply these wagons of any other particular designs in accordance with the requirements of the military authorities.

XV. Brick Rack Cars etc. etc.

We illustrate hereafter various designs of cars which are constructed for use in brickyards, cementworks, lime factories, glassworks and allied trades.

Fig. 3170/3176 represent cars which are particularly suitable for carrying green bricks.

Standard Sizes: Capacity 100, 140, 180, 220, 400 and 650 bricks. Gauge 500 and 600 mm.

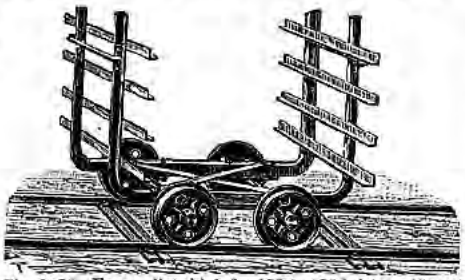


Fig. 3170. Four pallets high for 100 to 120 bricks.

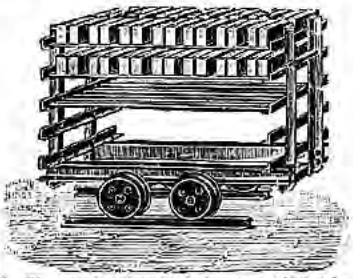


Fig. 3171. Five steel pallets high, to carry 140 bricks.

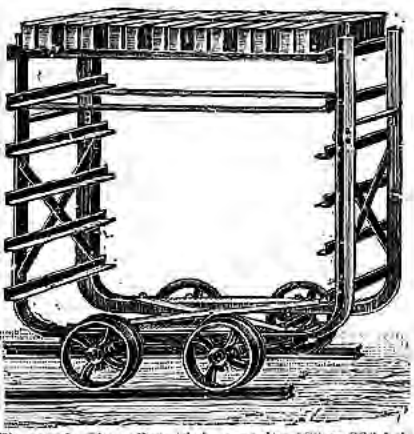


Fig. 3172. Six pallets high, capacity 180 to 220 bricks.

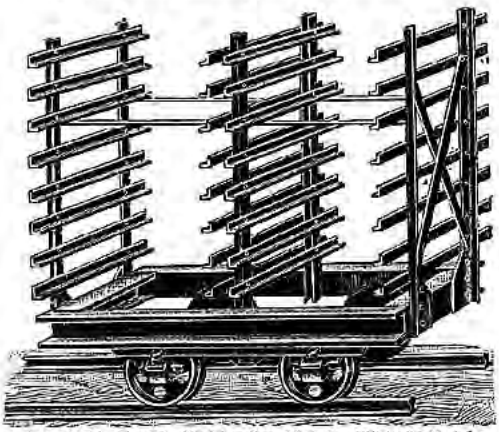


Fig. 3173. Double-Eight pallets high for 400 to 650 bricks.

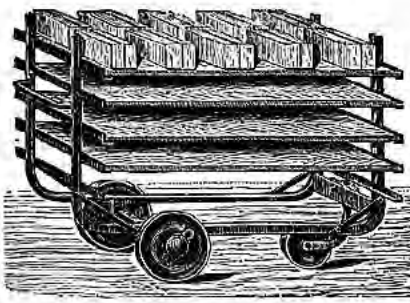
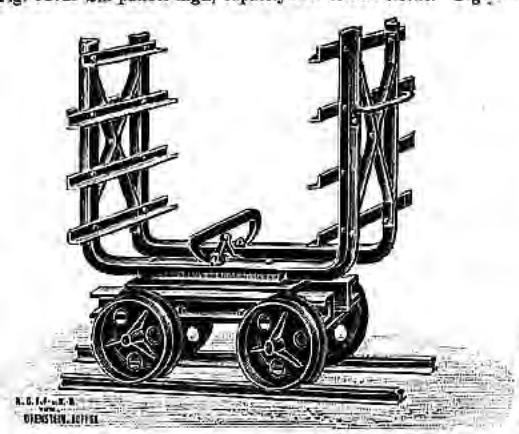


Fig. 3174. Five pallets high for 80 to 100 bricks. With plain wheels to run on brick-pavement, asphalte or deals.



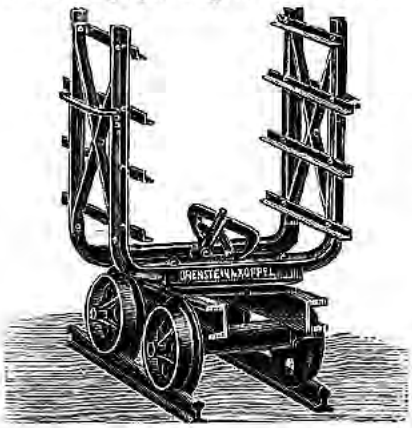


Fig. 3175/75a. Swivelling brick rack car to carry 100 to 120 bricks.

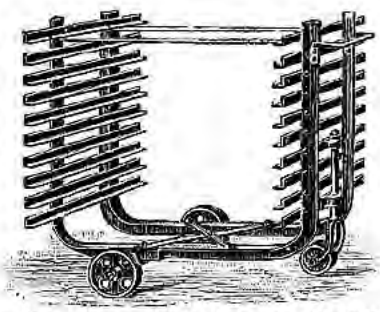


Fig. 3176. Ten pallets high to hold 180 to 200 tiles. With plain wheels to run on asphalte and deals.

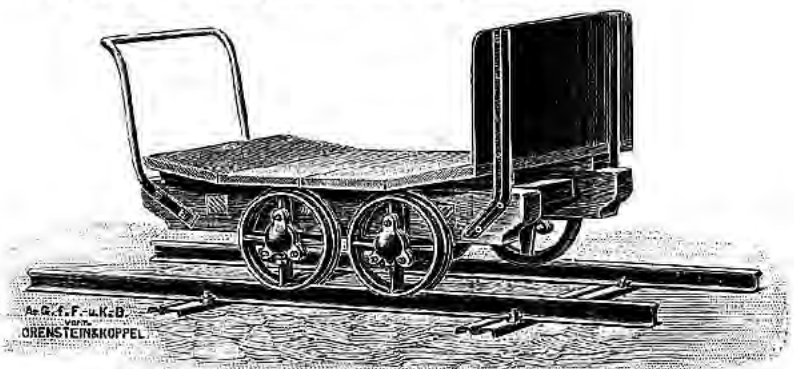


Fig. 3177. Wagon for carrying burned bricks, capacity 1500 kilos, gauge 500 and 600 mm.

Fig. 3178. Track Barrow to carry 600 to 750 kilos burned bricks. Gauge 500 mm.

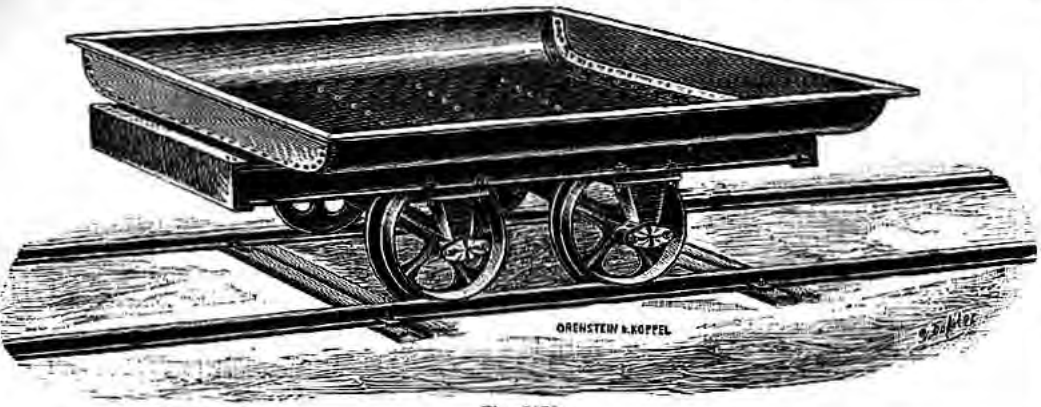


Fig. 3179.

Fig. 3179 represents a fixed trough wagon which is designed to do good service in cement-works. The wagon being exposed to a high temperature we furnish the axle-boxes with steel friction rollers which do not require greasing.

Carrying capacity $2^1/_2$ tons. Gauge 500 and 600 mm.

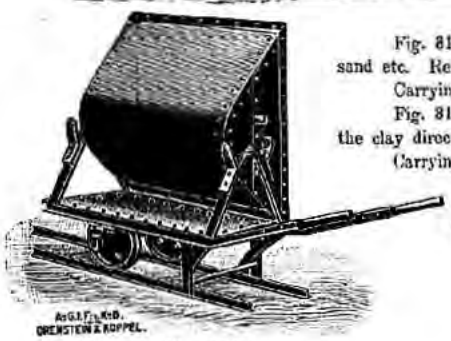


Fig. 3180.

Fig. 3180 shows a side tipping barrow with flanged wheels for carrying clay, glass-sand etc. Removing the box the wagon is converted into a platform barrow.

Carrying capacity 750 kilos, gauge 500 mm.

Fig. 3181/81a illustrate end tipping barrows with flanged wheels which serve to carry the clay direct to the moulding machines.

Carrying capacity 750 kilos, gauge 500 mm.

Fig. 3181.

Fig. 3181a

XVI. Barrows.

We supply barrows for various purposes and illustrate hereafter some of our leading designs and sizes.

Fig. 3183. **Tipping Barrow** to carry malt and grain. Tips round the axle. Standard Sizes: 200, 300 and 400 lbs. capacity.

Fig. 3184. **Coke Barrow** with Scoop Box. Standard Sizes: 200, 300 and 400 lbs. capacity.

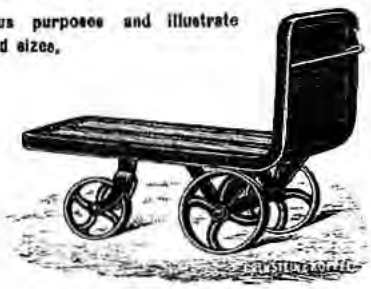


Fig. 3185. **Bale Barrow** with one or two ends. Capacity 750 kilos.

Fig. 3186. **Bag-Barrow.** Capacity 150 and 200 kilos.

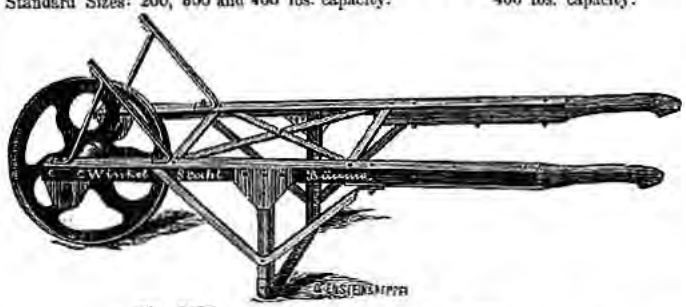


Fig. 3187.

Steel Barrow with cast steel wheel. Standard: 400 kg capacity.

Fig. 3188.

Steel Barrow with wood platform and end to carry stones etc.

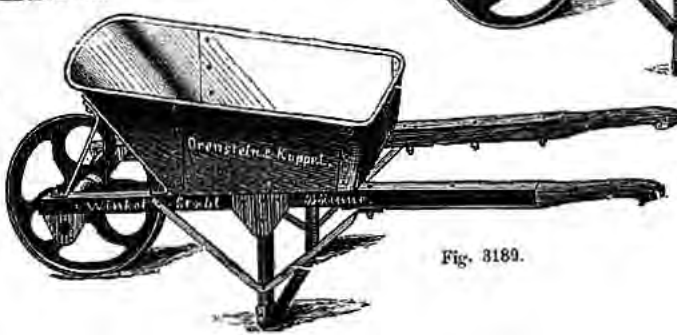


Fig. 3189.

Steel Barrow with box pressed out of steel, capacity 1 hl; to carry earth etc.

XVII. Coffee and Tobacco Wagons.

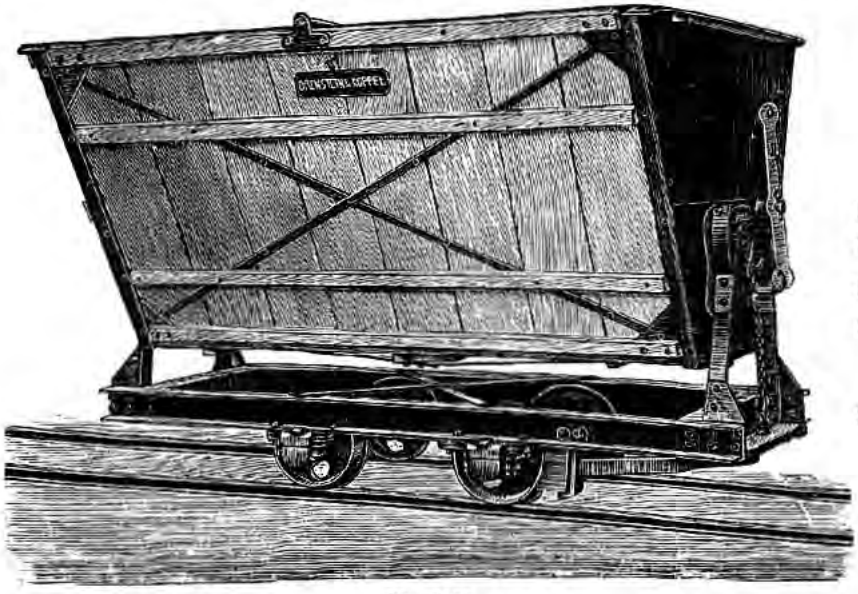


Fig. 3190.

Fig. 3190 illustrates a wagon which is particulary suitable for carrying coffee. The box has steel ends and wood sides and is fitted with hinged cover with bar and padlock to prevent robbery and exposure to the weather.

Standard Size: 3 tons bearing strength, 2 cbm capacity, 750 mm gauge.

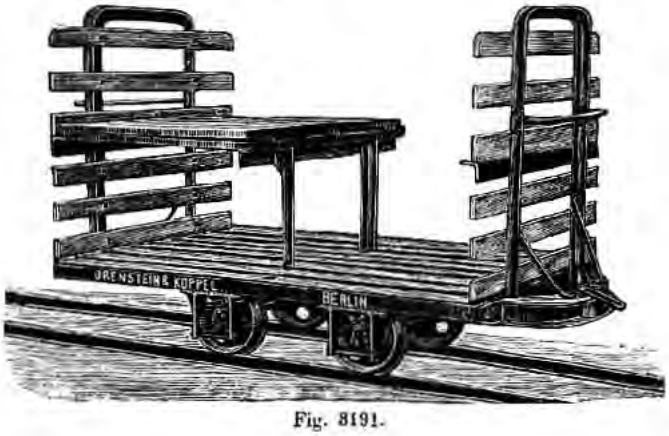


Fig. 3191.

Fig. 3191 represents a wagon for carrying fresh, green tobacco. It has two platforms of laths and space to prevent the tobacco being injured by excessive loads.

Standard Sizes: 2 tons bearing strength; 500 and 600 mm gauge.

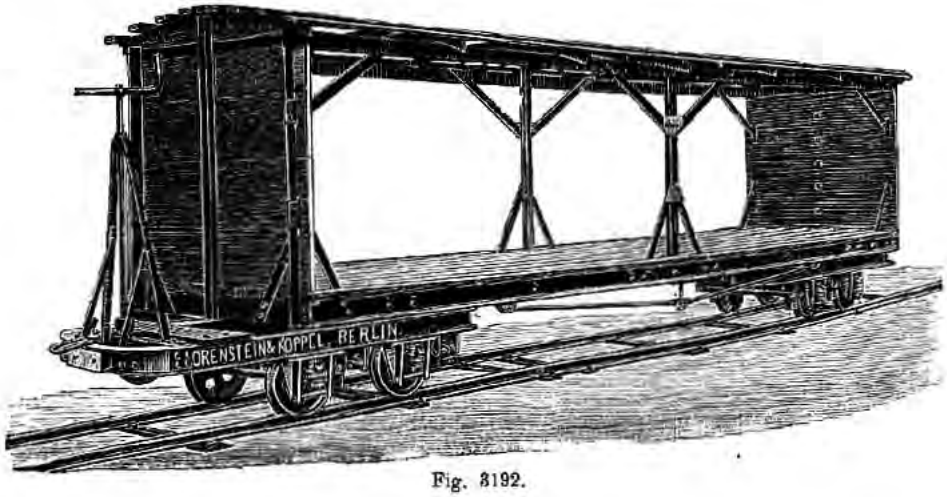


Fig. 3192.

Fig. 3192 shows a wagon which is designed for the removal of dry tobacco packed in bales. The iron construction rests on 2 bogies; the ends are of wood.

The tobacco being liable to injury by exposure to the weather, the sides are fitted with waterproof canvas curtains.

Standard Sizes: 6 tons bearing strength; 500, 600 and 750 mm gauge.

XVIII. Platform Wagons for Plantation Railways.

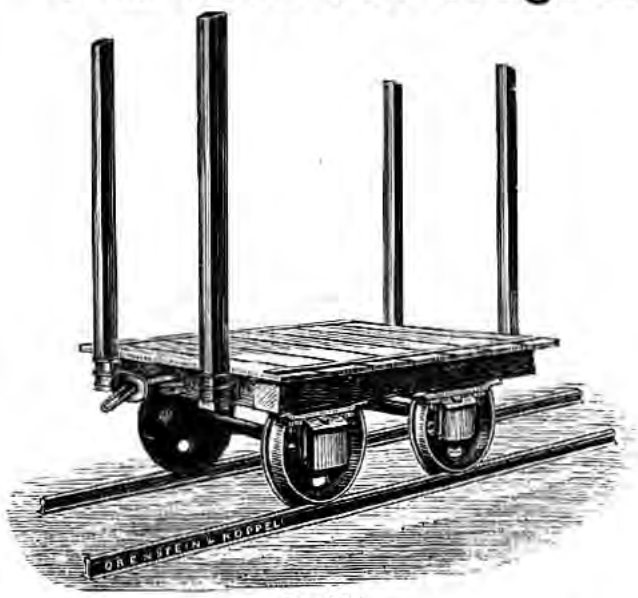


Fig. 3193.

We illustrate and describe on this and the following pages our leading designs and sizes of 4 wheel and 8 wheel sugar cane or forage-wagons, which we supply both

for animal and for locomotive-traction.

These wagons are designed to carry cane, bananas, sugar in bags, forage etc. etc.

1. Sugar-Cane Wagons for Animal Power.

Fig. 3193 represents a cane-wagon with wood frame and wood floor having iron sockets at each end or side for the insertion of wood stanchions. Some of our clients prefer making the wood parts on the spot, we only providing the iron-work, viz. sets of wheels, axle-boxes and all necessary fittings.

Standard Sizes:

Carrying capacity $^3/_4$, 1, $1^1/_2$, 2 and $2^1/_2$ tons, Gauge: 500, 600 and 750 mm.

Wagon illustrated by fig. 3194 is made entirely of steel, the platform having iron sockets at each end or side and fluted or plain steel floor, as may be required.

Standard Sizes:

$^3/_4$, 1, $1^1/_2$, 2 and $2^1/_2$ tons carrying capacity, 500, 600 and 750 mm gauge.

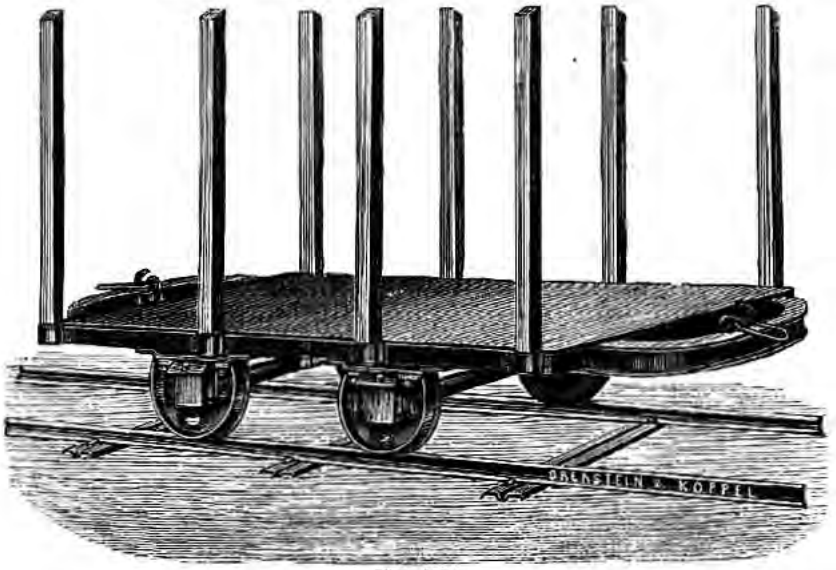


Fig. 3194.

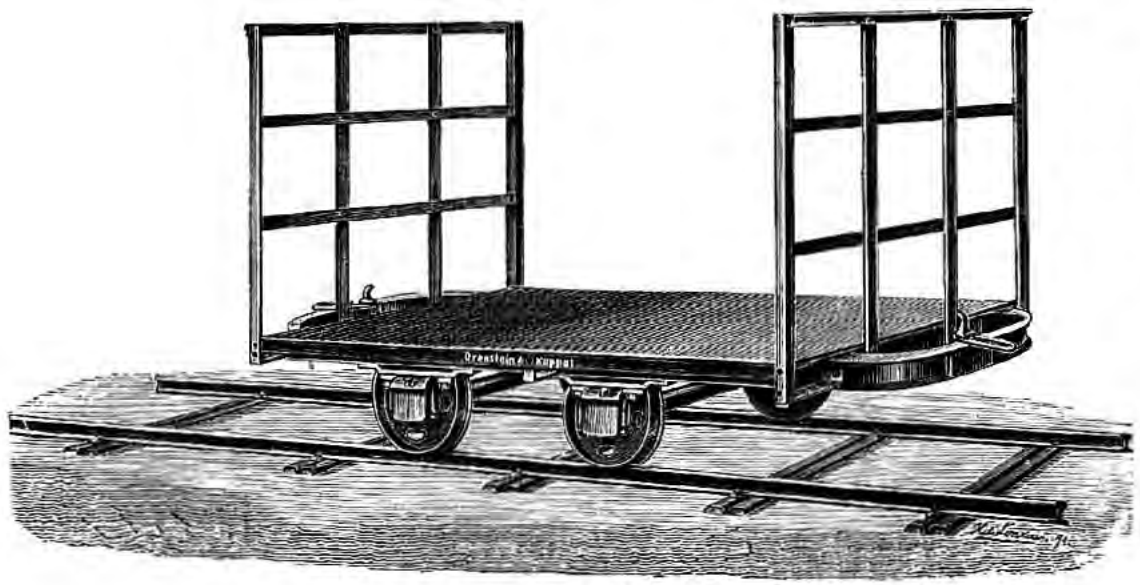


Fig. 3195.

Fig. 3195 shows a cane wagon similar to fig. 3194, but with basket ends of angle iron, so as to dispense with the iron sockets and stanchions.

Standard Sizes: $^3/_4$, 1, 2 and $2^1/_2$ tons carrying capacity, 500, 600 and 750 mm gauge.

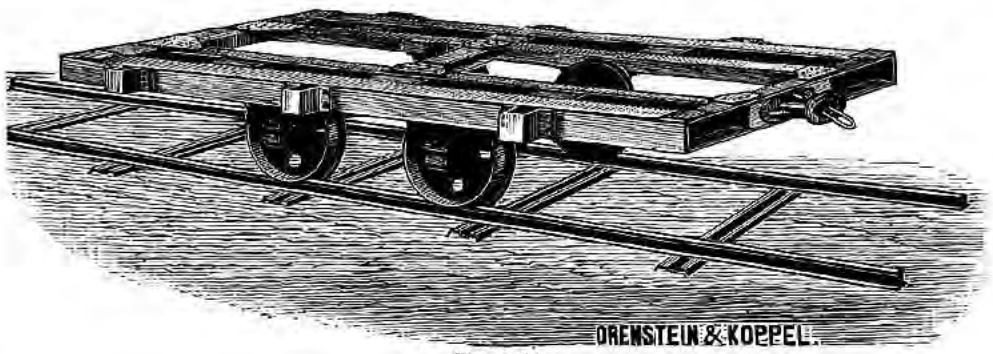


Fig. 3196.

Fig. 3196 illustrates a cane-wagon with square channel steel frame without floor, which will be found convenient where it is required to make the floor on the spot of bamboo etc.

Standard Sizes: 1½, 2½ and 3 tons, 600 and 750 mm gauge.

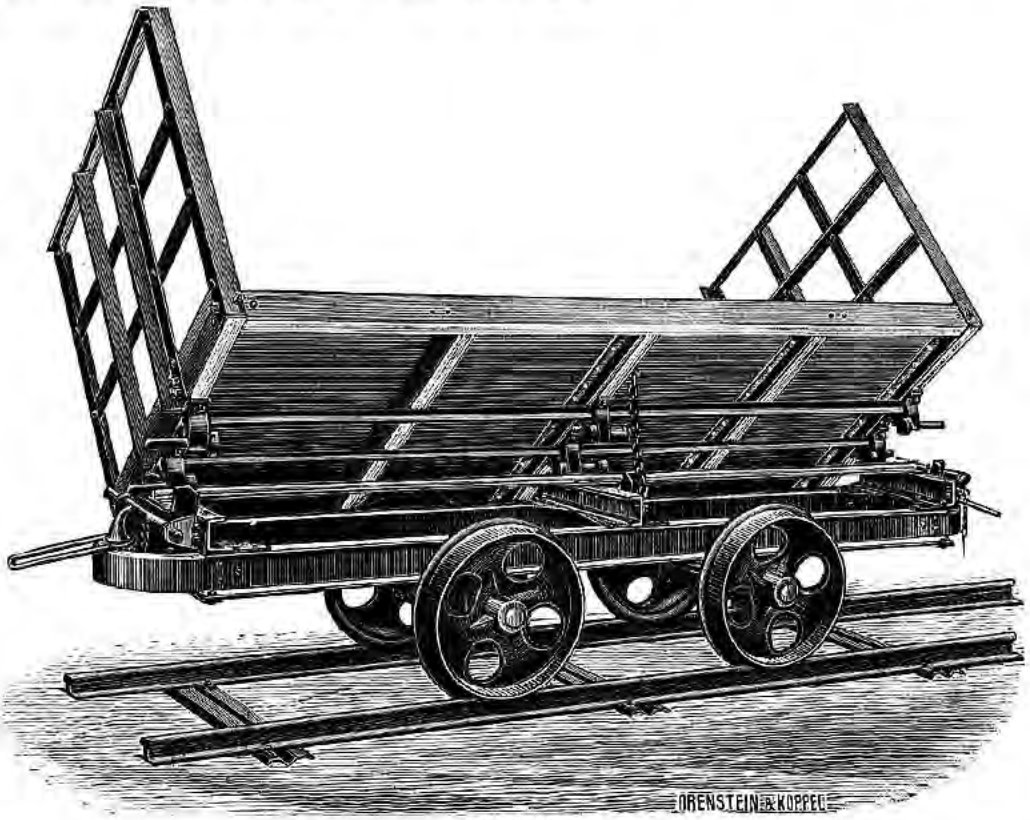


Fig. 3197.

Fig. 3197 represents a forage wagon with basket-ends of angle-iron, similar to the larger sizes of design fig. 3195, but fitted with inside axle-boxes and double-side tipping platform.

Standard Sizes: 1½, 2 and 2½ tons carrying capacity. 600 and 750 mm gauge.

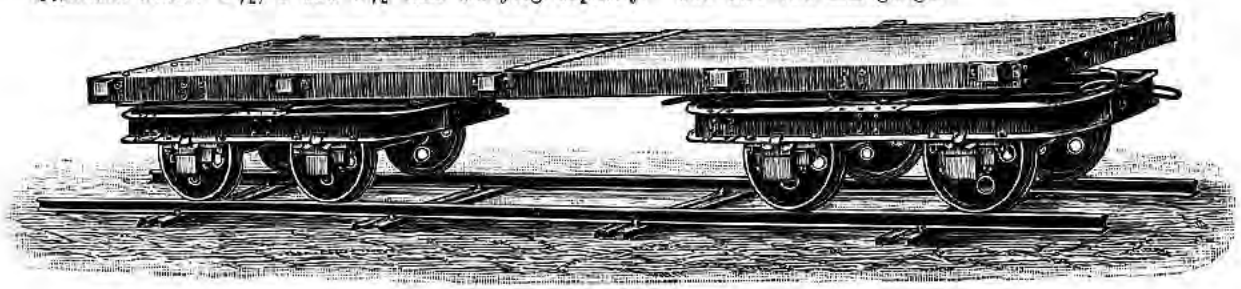


Fig. 3198.

Above woodcut represents a bogie cane-wagon throughout of steel and iron. The platform has at each side iron sockets for the insertion of wood stanchions. This wagon is particularly suitable for carrying heavy loads on light tracks, as the weight is distributed over eight wheels, and it claims further the advantage of being able to go through sharp curves, owing to the short wheel-base of each bogie.

Standard Sizes: 4 and 5 tons carrying capacity. 500, 600 and 750 mm gauge.

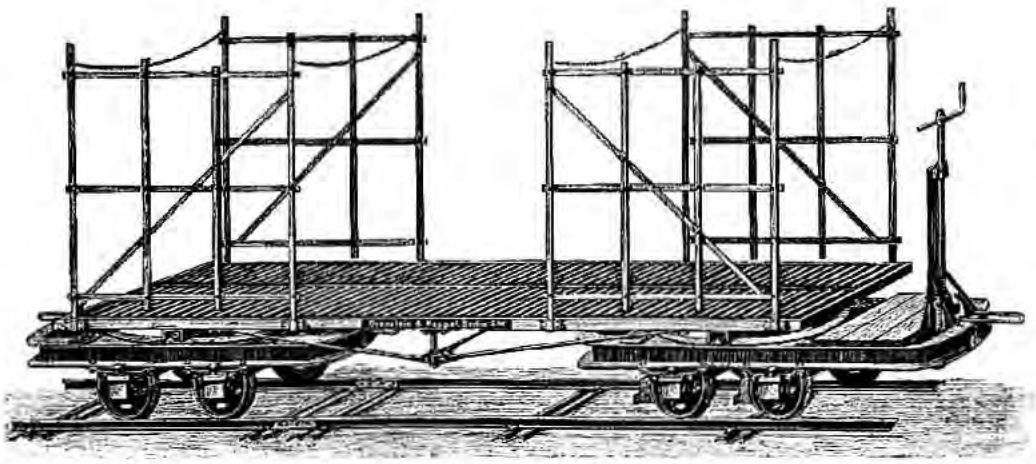


Fig. 3199.

Above design is similar to fig. 3198 described on the preceding page, but with basket sides instead of sockets and stanchions.

Standard Sizes: 4 and 5 tons carrying capacity. 500, 600 and 750 mm gauge.

All designs of cane-wagons heretofore illustrated and described will also be supplied, if desired, with pring axle-boxes and spring draw-gear for locomotive-power.

Fig. 3200.

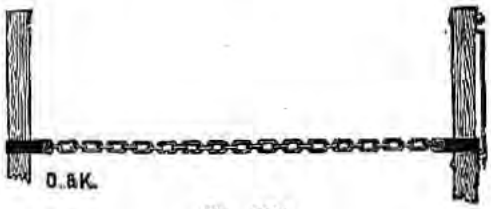


Fig. 3201.

In using wood stanchions we suggest buyers to connect the stanchions by chains. We supply chains either as per fig. 3200 or as per fig. 3201, as may be desired.

Standard Lengths to suit 1 to 2 metres width of platform.

Fig. 3202.

Above cut represents a wagon which is particularly designed to carry hot sugar, molasses etc.

Standard Sizes: $1^1/_2$ and $1^3/_4$ tons carrying capacity. 500, 600 and 750 mm gauge.

XIX. Cane-Wagons for Locomotive-Power.

Fig. 3203.

Fig. 3203 illustrates our lightest design of cane wagons with basket ends for locomotive-power. In case the wagons are required to be fitted with screw-brakes, we do not extend the under frame, but fix the brake to one of the ends, furnishing also a foot board for the brake man.

Standard Sizes: 1, 1½, 2 and 2½ tons carrying capacity. 500 and 600 mm gauge.

Fig. 3204 shows a cane-wagon with iron sockets at each side and at the brake end of the wagon.

Standard Sizes: 1½, 2½ and 3 tons, 600 and 750 mm gauge.

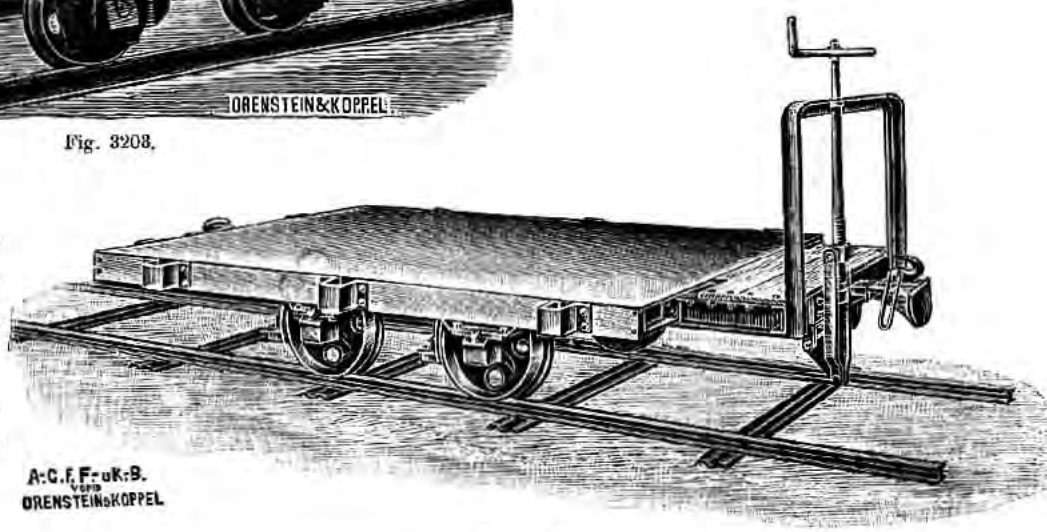


Fig. 3204.

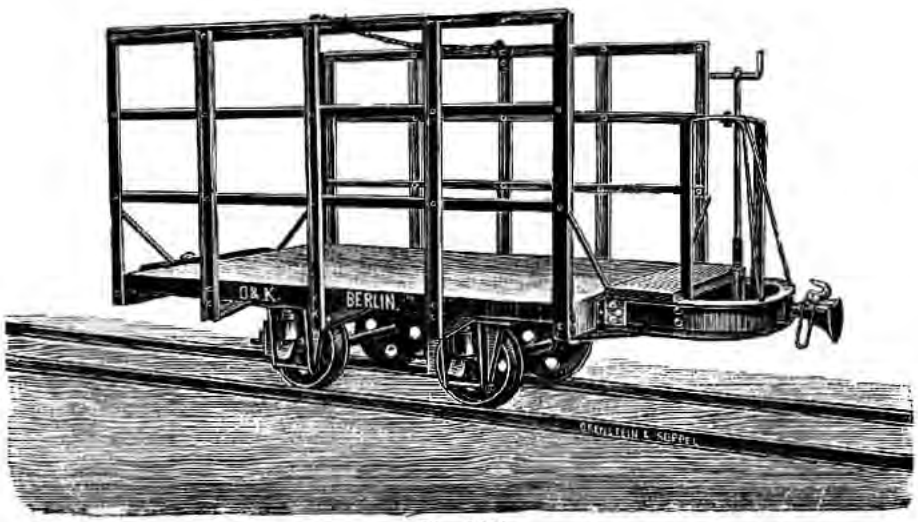


Fig. 3205.

Fig. 3205 represents a cane-wagon with basket sides of angle iron.

Standard Designs: 1½, 2 and 2½ tons carrying capacity, 600 and 750 mm gauge.

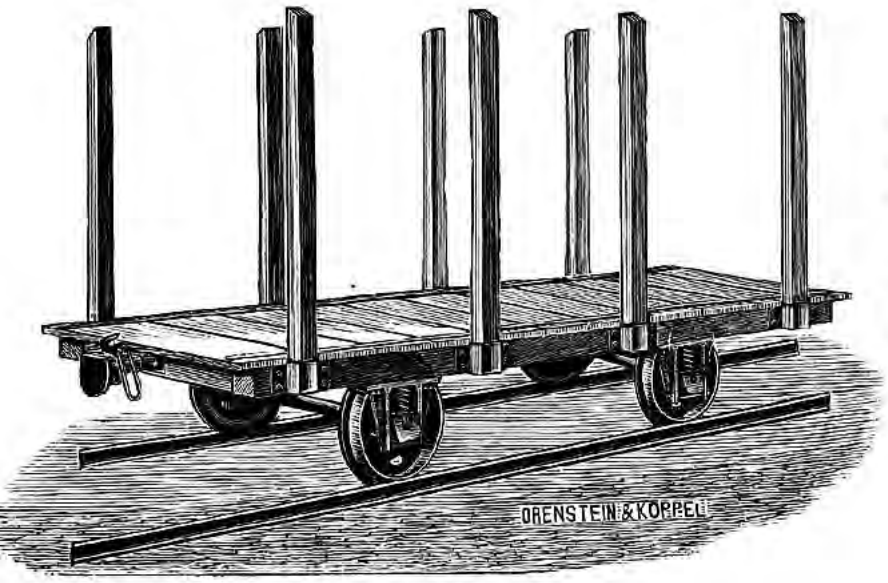


Fig 3206.

Fig. 3206 illustrates a strong wood platform wagon with side sockets, the number of which varies according to the length of the wagon.

In case it is desired to provide the wood work on the spot, we only supply sets of wheels, axle boxes and all necessary fittings.

Standard Sizes: $2^1/_2$, 3, $3^1/_2$, 4, 5 and 6 tons carrying capacity, 600, 750 and 1000 mm gauge.

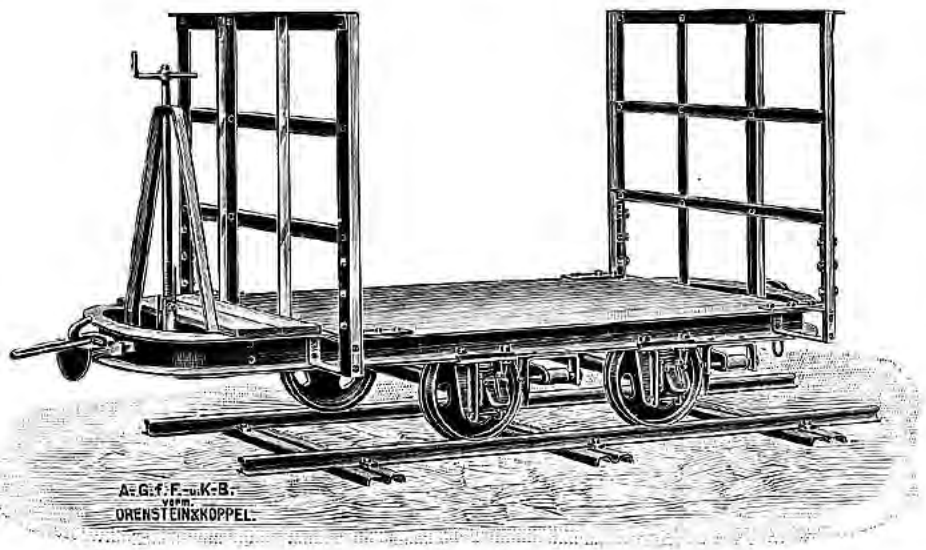


Fig. 3207.

Wagons represented by fig. 3207 — 3208 are similar to fig. 3203, but of a stronger design. We furnish the channel steel frame either with straight or with round headstocks. We recommend the square frame for the larger sizes, as the wagon is then shorter, having thus a reduced deflection in going through the curves.

Standard Sizes: $2^1/_2$, 3, $3^1/_2$ 4, 5 and 6 tons carrying capacity, 600, 750 and 1000 mm gauge.

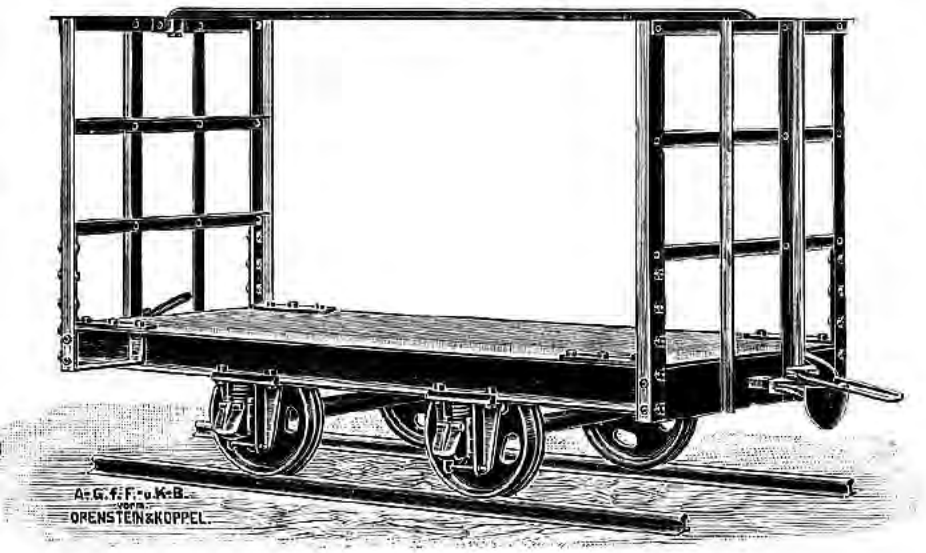


Fig. 3208.

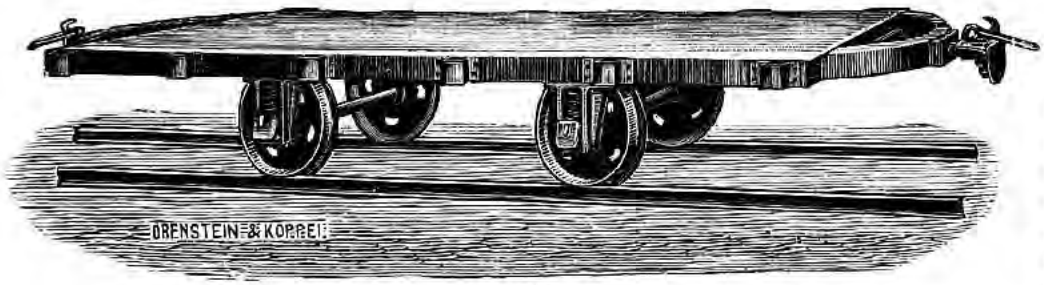


Fig. 3209.

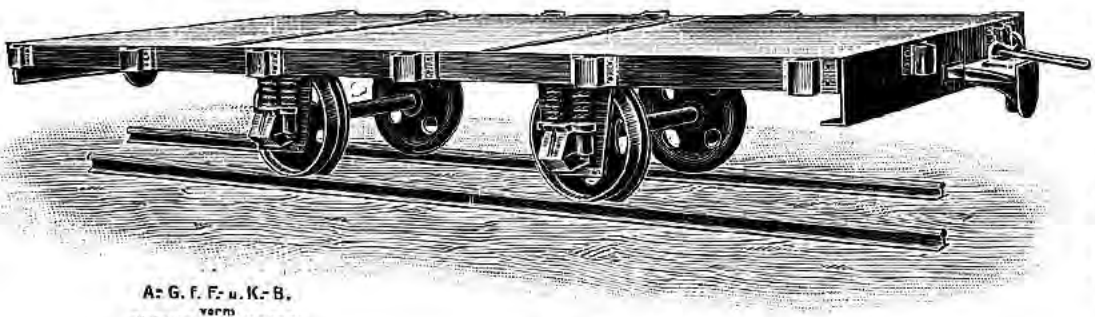


Fig. 3210.

Fig. 3209/10 show strong cane-wagons, one of which with round headstocks, the other with straight headstocks. We recommend the square frame for the larger sizes to reduce the length of the wagon, securing thus a small deflection of the wagons in going through the curves.

Standard Sizes:
2½, 3, 3½, 4, 5 and 6 tons carrying capacity. 600, 750 and 1000 mm gauge.

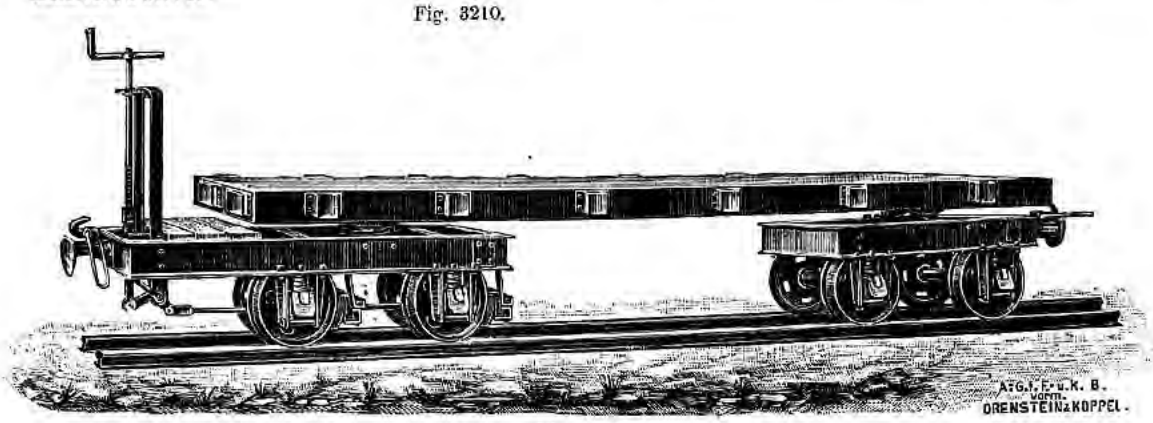


Fig. 3211.

Fig. 3211. Above woodcut illustrates a bogie cane-wagon with iron sockets at sides of the platform (in brake-vans also sockets at the end where the brake-man stands). This wagon is particularly suitable for carrying heavy loads on light tracks, as the weight is distributed over eight wheels. These bogie wagons claim further the advantage of being able to go round sharp curves on account of the small wheel-base of each bogie.

Standard Sizes: 6 and 8 tons carrying capacity. 600, 750 and 1000 mm gauge.

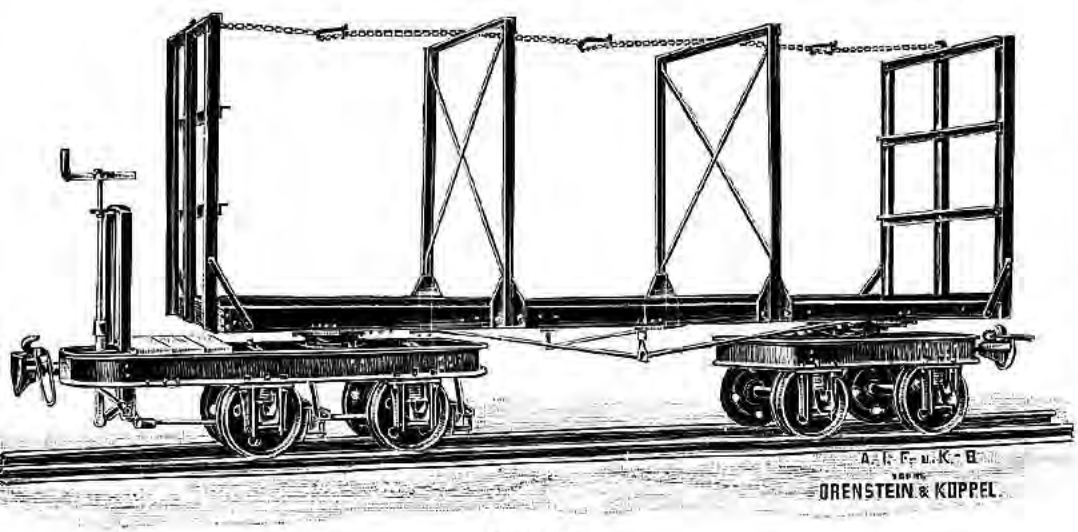


Fig. 3212.

Fig. 3212 shows a wagon of similar design, as fig. 3211, but instead of the sockets with 2 basket ends and, if desired, also with 2 centre cross-standards.

Standard Sizes:
6 and 8 tons carrying capacity. 600, 750 and 1000 mm gauge.

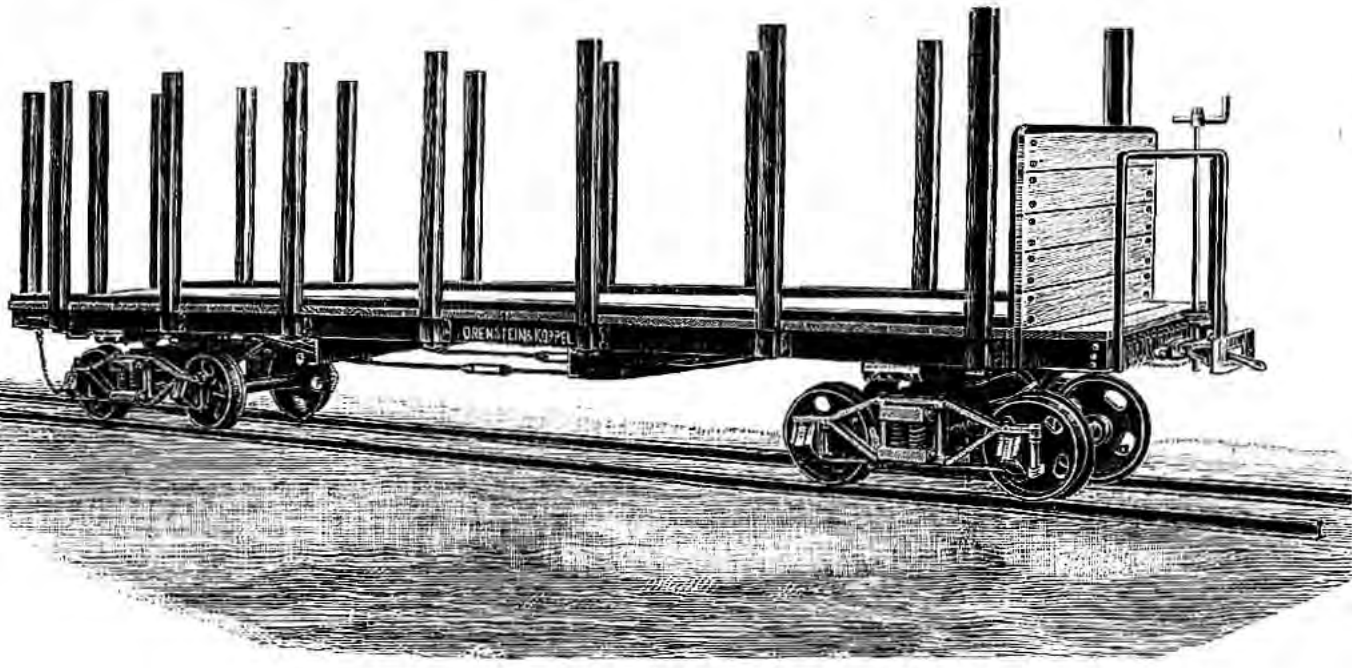


Fig. 3213.

Fig. 3213 illustrates a very strong bogie wagon. The platform, which is carried on two bogies of the American style, has iron sockets at each side for wood stanchions.

Standard Sizes: 6, 8, 10, 12 and 15 tons carrying capacity. 600, 750, 1000 and 1435 mm gauge.

XX. Goods Wagons.

According to the nature of the goods to be carried, we supply

1st. **Open Goods Wagons.**
2nd. **Covered Goods Wagons.**

We construct open goods wagons both for locomotive-power and for animal power, the covered goods wagons however chiefly for locomotive traction only.

1. Open Goods Wagons.

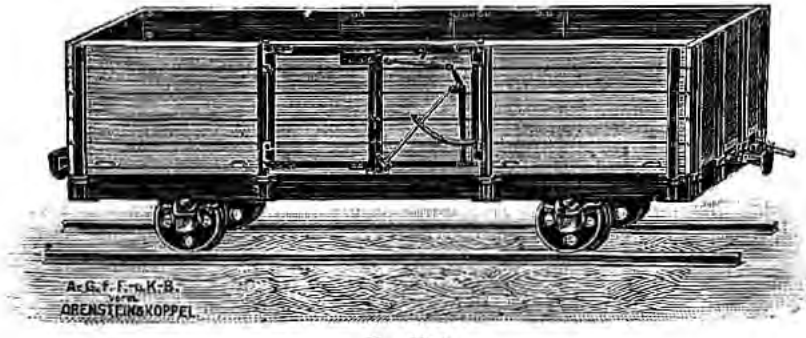


Fig. 3214.

Fig. 3214 illustrates a light design of goods wagon for animal traction.

Standard Sizes:

2, 3 and 4 tons carrying capacity.
600 and 700 mm gauge.

Fig. 3215 represents a goods wagon similar to the one described on the preceding page, but stronger in every detail and arranged for locomotive haulage.

Standard Sizes:

5, 6, 7½ and 10 tons carrying capacity.
600, 750, 1000 and 1435 mm gauge.

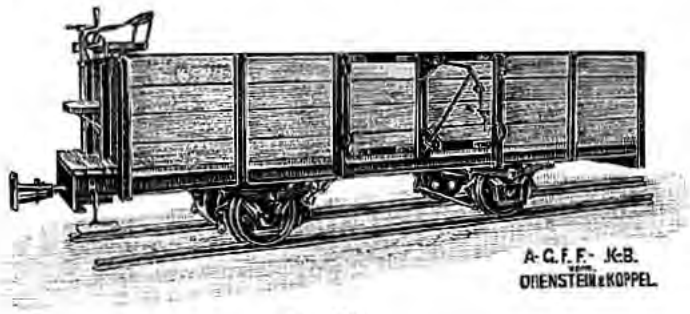


Fig. 3215.

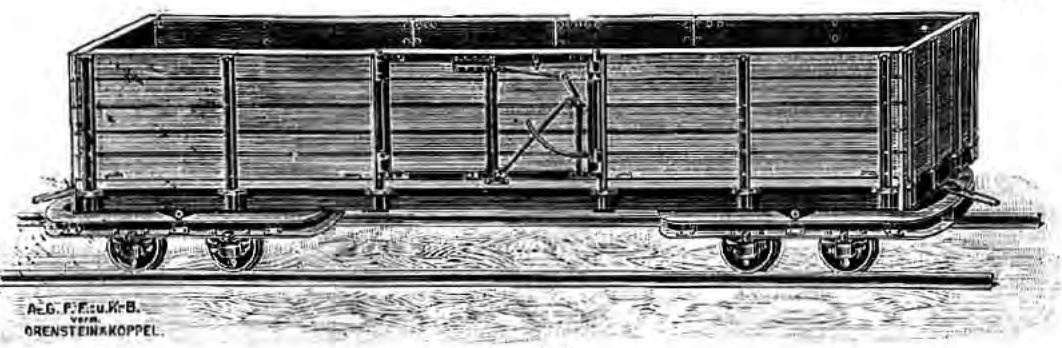


Fig. 3216.

Fig. 3216 illustrates an open goods wagon in design similar to fig. 3215, but the box mounted on 2 bogies. This wagon is arranged for animal-power.

Standard Sizes:
4 and 5 tons carrying capacity.
500 and 600 mm gauge.

This woodcut represents a design similar to fig. 3216, but stronger in every detail and constructed for locomotive haulage.

Standard Sizes:
5, 6, 7½ and 10 tons carrying capacity.
600, 750, 1000 and 1435 mm gauge.

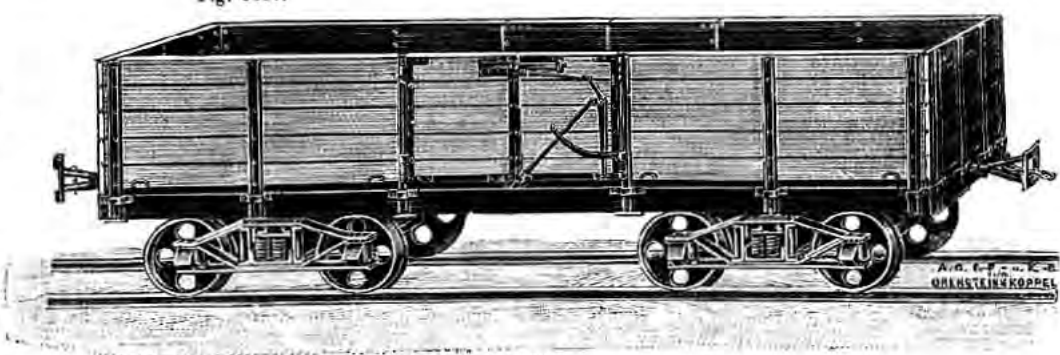


Fig. 3217.

2. Covered Goods Wagons.

Fig. 3218.

Fig. 3218 illustrates a covered goods wagon on 4 wheels. This design is arranged for locomotive power.

Standard Sizes:

5, 6, 7½ and 10 tons carrying capacity,
600, 750, 1000 and 1435 mm gauge.

Fig. 3219 shows a covered goods wagon similar to Fig. 3218, but mounted on 2 bogies. This wagon is also for steam-haulage.

Standard Sizes:

5, 6, 7½ and 10 tons carrying capacity,
600, 750, 1000 and 1435 mm gauge.

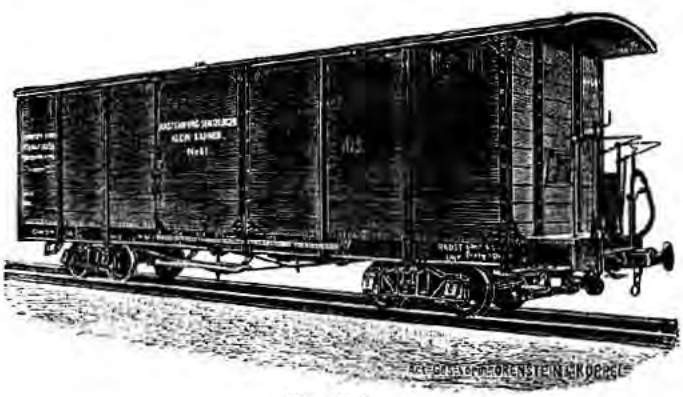


Fig. 3219.

XXI. Passenger Carriages and Tramway Cars.

We supply passenger carriages of the following designs viz:

1st. **Open Carriages** on 4 or 8 wheels
2nd. **Covered Carriages** on 4 or 8 wheels

and illustrate hereafter some of our leading designs and sizes:

THE CENTRAL MINING & TRAMWAY APPL
PROPRIETARY, LIMITED.
40 HUNTER STREET, SYDNEY.

1. Open Passenger Carriages.

We construct these carriages both for animal and for locomotive haulage with

a) **longitudinal seats**
b) **double cross seats and fixed backs**
c) **cross seats and reversible backs.**

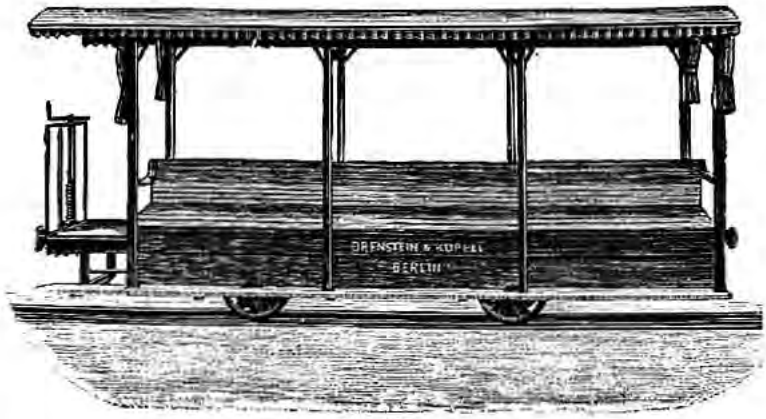


Fig. 3220.

Fig. 3220 illustrates an open passenger carriage with longitudinal seats and simple outfit. This carriage is designed for working people on plantations. We furnish the carriage either with roof as per Fig. 3220 or without roof and mounted upon 2 bogies to accomodate more passengers, see Fig. 3221 at foot.

Standard Sizes:

Carriages on 4 wheels: 10 and 18 seats, 600, 750 and 1000 mm gauge.
Carriages on 8 wheels: 30, 40 and 50 seats, 600, 750 and 1000 mm gauge.

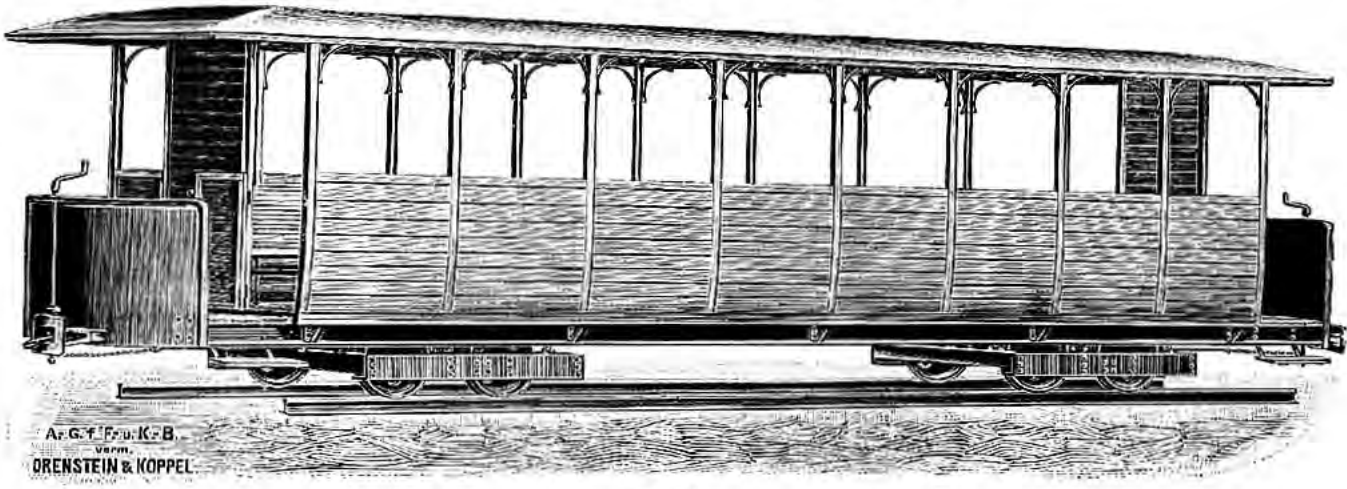


Fig. 3221.

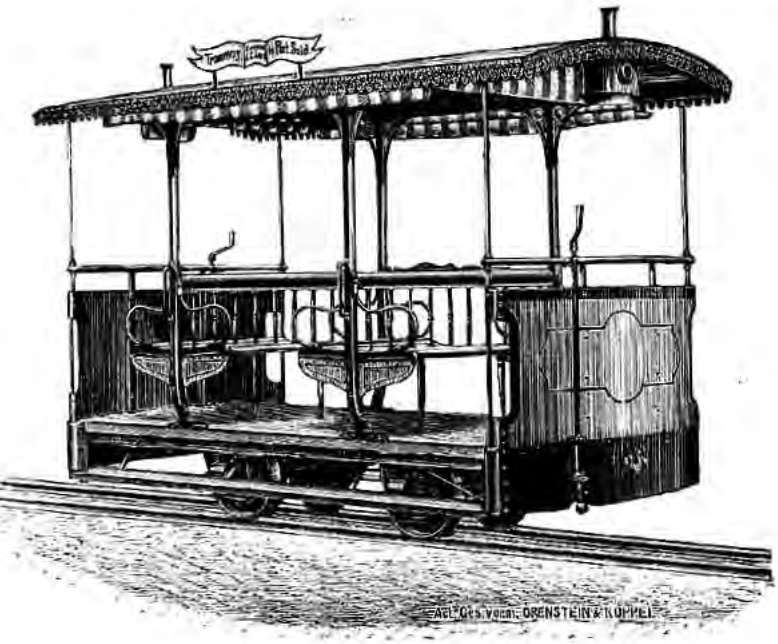


Fig. 3222.

Fig. 3222 illustrates a street tramway car with handsome outfit, double cross seats and fixed backs.

Standard Sizes: 16 and 24 seats, and 8 stands, for 600 and 750 mm gauge. 20 and 30 seats and 8 stands, for 1000 and 1435 mm gauge.

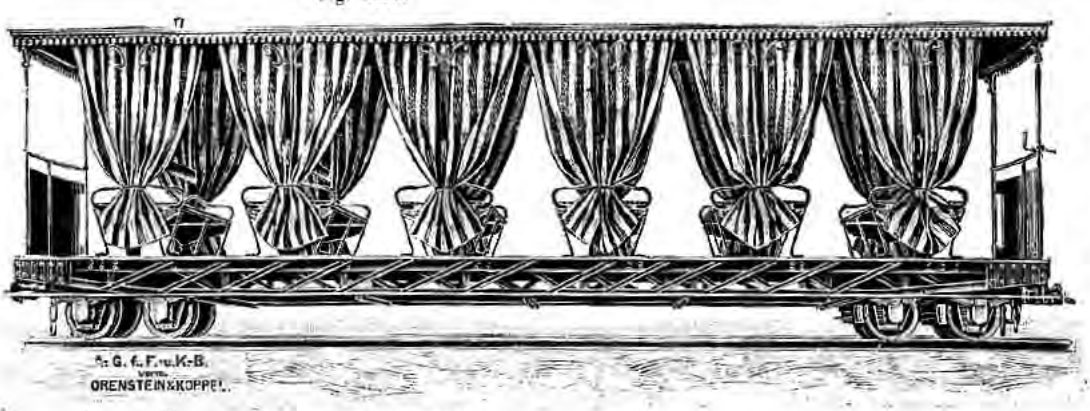


Fig. 3223.

Fig. 3223 represents a bogie tramway car for locomotive traction, having cross seats with fixed backs.

Standard Sizes: 40 and 48 seats and 8 stands, 600 and 750 mm gauge. 50 and 60 seats and 8 stands, 1000 and 1435 mm gauge.

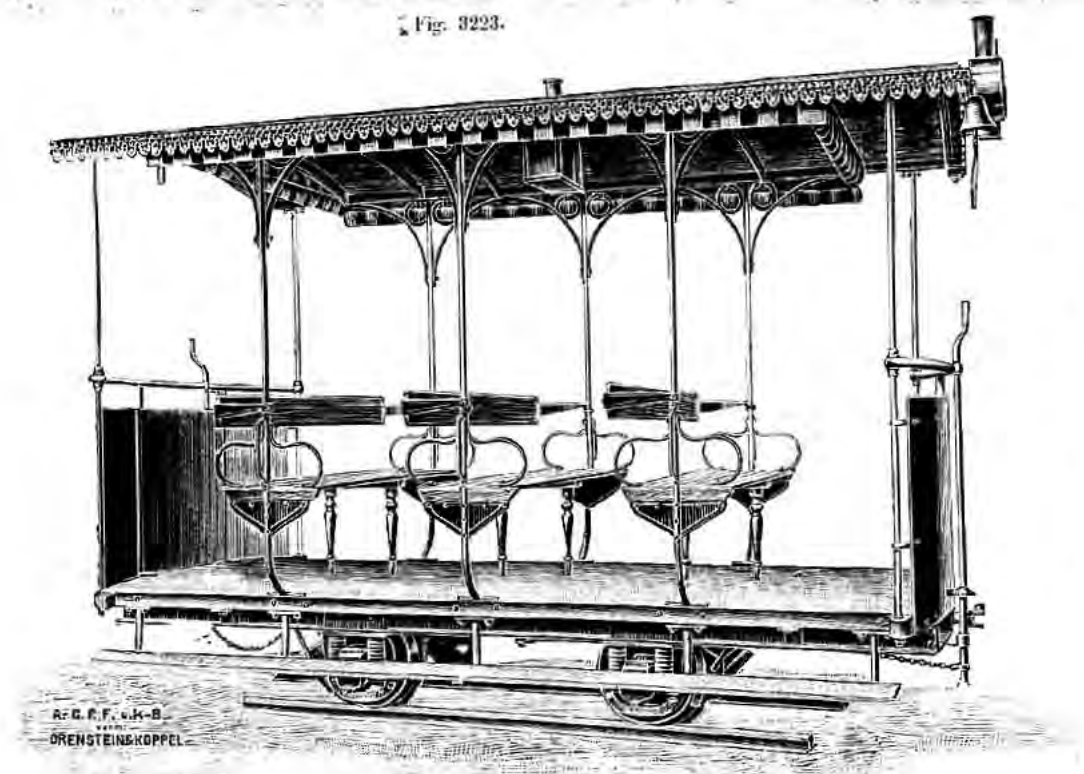


Fig. 3224.

Tramway Car represented by Fig. 3224 has cross seats with reversible backs.

Standard Sizes: 8, 12, 16, 20, 24 seats and 8 stands for 600 and 750 mm gauge.

10, 15, 20, 25, 30 seats and 8 stands for 1000 and 1435 mm gauge.

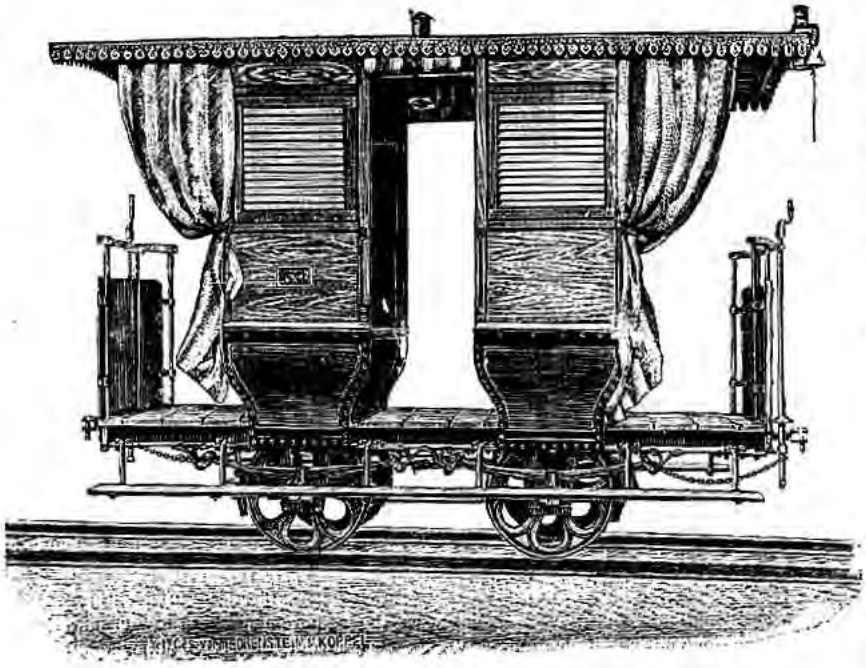


Fig. 3225.

Fig. 3225 illustrates a practical combination of a covered and of an open tramway car. This design is eminently suitable for use in tropical climates, as it gives sufficient protection against rain and sun shine, allowing also of good ventilation. In using these composition cars, the covered cars may be dispensed with as surplus stock for unfavourable weather.

Standard Sizes:

16 and 24 seats and 8 stands, 600 and 750 mm gauge.

20 and 30 seats and 8 stands, 1000 and 1435 mm gauge.

For locomotive haulage we supply above tramway cars mounted on 2 bogies.

Standard Sizes:

40 and 48 seats and 8 stands, 600 and 750 mm gauge.

50 and 60 seats and 8 stands, 1000 and 1435 mm gauge.

2. Covered Tramway Cars.

We supply covered tramway cars both for locomotive-power and for horse-traction, either on 4 or on 8 wheels (these for locomotive haulage only). We illustrate and describe hereafter our standard designs and sizes:

a) **Covered Tramway Cars on 4 wheels.** Fig. 3226 shows a covered car with platform at each end, which give access to the interior of the car-body. As may be required, we furnish longitudinal or cross seats with passage in the centre in either case. Cars for animal traction are fitted with spring draw gear and spring axle-boxes, cars for steam-haulage with the same as before and spring buffers besides. To ensure ample ventilation we provide the side openings with sliding glass-frames or venetian blinds.

Standard Designs:

With longitudinal seats:

8 and 12 seats, 8 stands, 600 mm gauge,
8, 12, 16, 20 and 24 seats, 8 stands, 750 mm gauge,
16, 20 and 24 seats, 8 stands, 1000 and 1435 mm gauge.

With cross seats:

18 and 24 seats, 600, 750, 1000 and 1435 mm gauge.

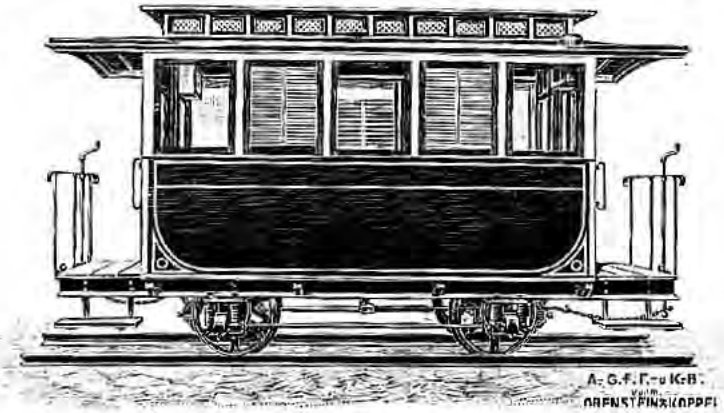


Fig. 3226.

b) **Covered Bogie Passenger Carriages,** as illustrated by Fig. 3227, are chiefly for locomotive haulage. They are designed either for IInd class passengers only (seats of laths and space, the interior simply fitted up) or for 1st class passengers only (spring caned seats, the interior elegantly fitted up), or as composition carriages viz: combined IInd and 1st class separated by a door. All carriages have W. C.

Fig. 3227.

Standard Sizes:

40 and 60 longitudinal seats,
750, 1000 and 1435 mm gauge.

31 and 49 cross seats,
750, 1000 and 1435 mm gauge.

XXII. Locomotives.

1. General Description and Standard Specification.

Our designs and methods of construction are the results of our experience in this speciality for a number of years. The locomotives are in every detail constructed of the **best materials** known for their respective proposes, more particularly the **fire box** is made of **copper sheets** of superior quality and the flues or boiler-tubes of the best charcoal-iron. In case only sulphurous or nitrous feed-water can be obtained, it will be advisable to furnish the flues with copper ferrules at the fire-box end, which are extra. Axles, tires, springs, driving and connecting rod, piston and valve rods, eccentric rods, and crank pins, are made of best steel, which is carefully selected and closely examined before being passed for use. **All working parts liable to much wear or injury,** such as crank pins, links, cross head filling pieces, guide bars and gear-bolts are **case-hardened; hardened steel pins** and thimbles; the oil-cups are forged on to driving and connecting rods. In selecting the materials to be used in process of construction we chiefly adhere to the standard specification as required by the Prussian State Railways.

The locomotives are in every detail accurately and conveniently built to gauge and template and handsomely finished; the machinery and all working levers are accessible, so that the engineer has a full control over them.

The locomotives have horizontal boilers of an **extensive heating surface to secure a great hauling capacity** and an efficient service. They are fitted with a **large, roomy dome,** which gives a continuous dry steam, and this is a most valuable feature in our locomotives, as it saves much fuel.

The boilers sustain the **high standard working pressure of 12 Kilos per square centimetre (12 atmospheres)** or 170 lbs. per square inch and before being completed, are carefully tested in compliance with the requirements of the German Boiler Revision Law; an official certificate will be given with each locomotive, if desired. We may point out, that the boiler steel plates and shell are of extreme thickness and **Fire-box of very best thick copper plates.** To feed the boiler there are 2 injectors of the latest design with relief valve; one injector only will do to replace the evaporated water. If desired, we shall fit the boiler with one injector and **one pump.** The boilers have further all the necessary safety-valves, blast-pipe and spring steam gauge.

The **motion work** is usually placed **outside** the frame, thus fully accessible. The cylinders are securely bolted to the frame. The wheels are, as a rule, arranged outside the frame, but if necessary, we also supply engines with wheels inside the frame.

The wheels have **very thick and broad tires of best steel,** which, after being worn out, may be turned in the lathe several times. The **axle-journals,** crank pins and coupling pins are of good proportion, and a heating is practically excluded. The **crosshead bearings** are **adjustable** and the **bearings** made of best **phosphor-bronze** with **white metal brasses.**

The **engines** have a reverse gear, which allows a heavy expansion. In general we use our **patented reverse gear** working without any links, see illustrations on the next page. This system claims further the advantage of requiring only a few link-bolts, thus confining repairs to a minimum. **Sufficient oiling** has been cared for. Cylinders and valve-chest are fitted with **oil-cups of the latest designs.**

The **brake** is very powerful and works instantly; we usually furnish a lever-brake (Exter System), but, if desired, we fit the engines also with a screw-brake. In case of very long runs and steep gradients we furnish, if required, a steam-brake or a compressed air-brake, which are extra.

The **frame work** is usually of such a construction, as will allow the **water tank** of being placed inside frame and below the boiler, which secures a perfect stability of the engine, as the center of weight is very low. The **coal bunkers** are placed at each side of the cab.

As a rule the engines are suspended at three points by means of **driving and transverse springs,** and therefore they run with safety even on imperfect tracks. The locomotives are carefully equalized between front and rear **wheels,** so that the weight on the rails is equally distributed and the wear and tear of the track therefore reduced to a minimum. If the circumstances require substantial water and fuel provisions to be carried on the engine, it would be advisable to take a separate tender.

The locomotives are fitted at each end with an **angle-iron beam,** which will clear the track, or, if desired, we shall furnish at an extra charge a pilot (cow-catcher), such as is used in America.

Notice. In using the tables of dimensions and capacities which we usually furnish with our estimates on locomotives, it must be borne in mind, that the gross loads stated will only be hauled in case: 1st. **the track is correctly laid and in good condition,** 2nd. **the cars do not cause unusual friction, viz: they are to run on a gradient of 1 in 200 without being pushed or pulled,** 3rd. **the weight on the car wheels** is more or less the same as that on the engine-wheels, as in using light cars, there will be necessary more wheels, increasing thus the friction considerably, and consequently reducing the capacity of the engine. In computing the capacities of our locomotives, we have reckoned with the weights on the locomotive-wheels as stated on the said tables for 4 wheel coupled engines, 4th. and finally, the gross loads stated will be hauled **only on straight track, as curves** in consequence of their resistance will reduce the hauling capacity in proportion to their radius. If the track of short curves is properly widened, the outer rail elevated and the speed reduced, the engine will haul almost the same gross loads as on straigth track, but if there are very long and sharp curves, the gross load hauled is much less than on straight track, viz: up to 30% less, if circumstances are very unfavorable.

2. Equipment.

Our locomotives are furnished with a covered cab and have a special room containing:

Headlight	Scraper	A Set of Wrenches	Steel Hammer	Chipping Chisel
Coal Shovel	Oil-Can (5 lbs)	English Wrench	Drift	Nippers
Poker	Greasing Can	Screw Driver	Cross Cut Chisel	2 Hand-Lamps.

If required, the locomotives are fitted with an Automatical Signal Alarm Apparatus, System Latowsky, which is charged extra.

3. Standard Designs of Locomotives.

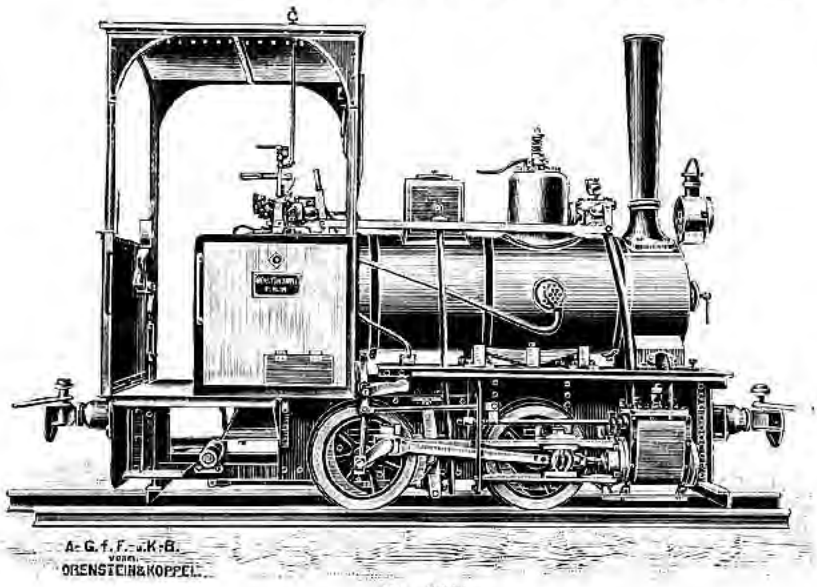


Fig. 3228.

a) Four-Wheel Coupled Locomotives.

Fig. 3228 illustrates our standard design of locomotives. This engine has four-wheels coupled.

b) Six-Wheel Coupled Locomotives.

Fig. 3229 represents a locomotive which is particularly suitable for performing long runs and operating on light rails with a reduced number of sleepers. This engine is very easy on the track, as the weight is distributed over six wheels.

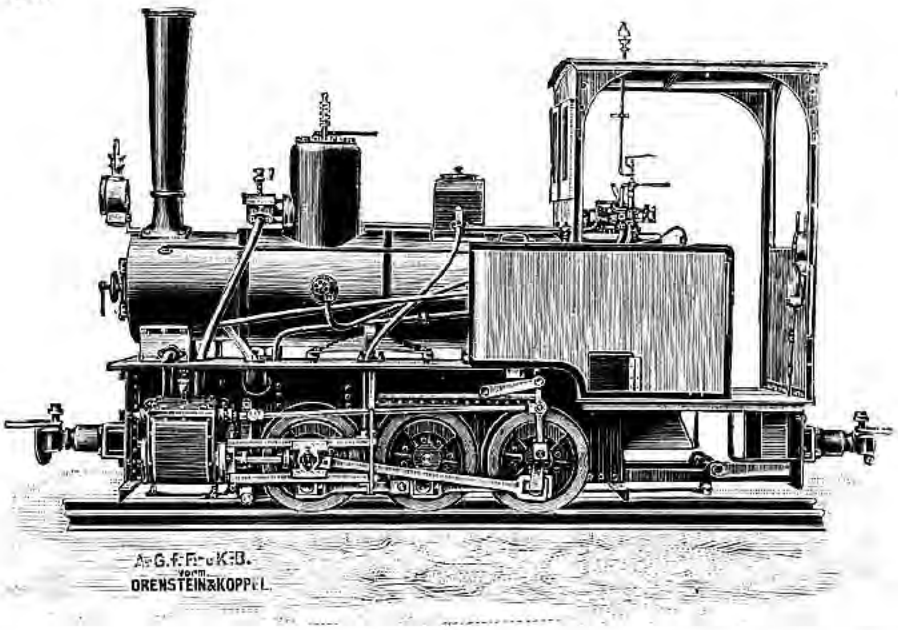


Fig. 3229.

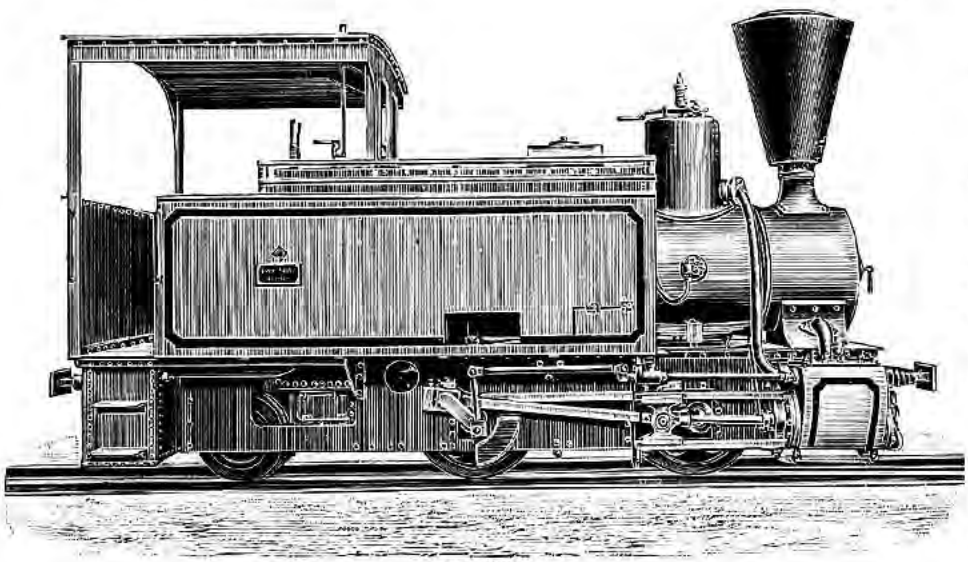


Fig. 3230.

c) Four-Wheel Coupled Locomotive with Two-Wheel Trailing Bogie.

These engines claim the advantage of being able to pass round sharp curves and to operate on light tracks. They are particularly designed to run long distances with no watering or fuel stations, as they have large bunkers and tanks.

For detailed description of our standard designs buyers are referred to our special catalogue containing tables of dimensions and capacities, which we send free on application.

XXIII. Railway Velocipedes.

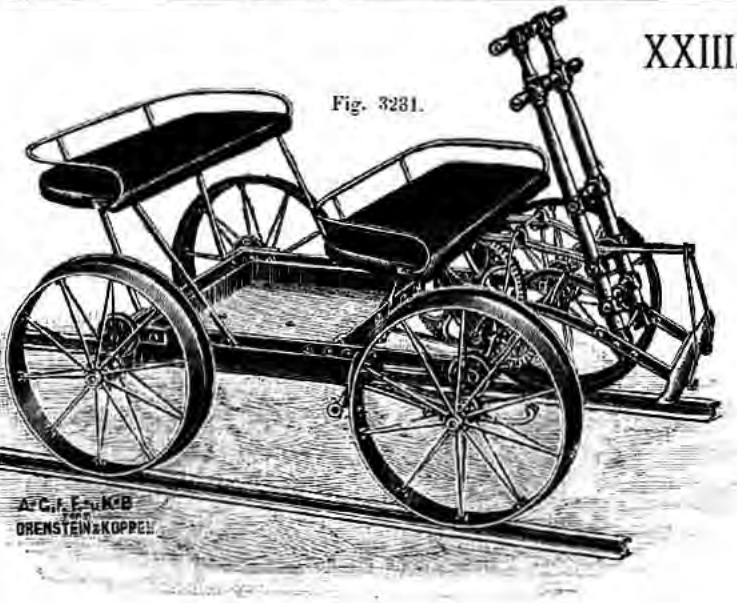


Fig. 3231.

In constructing our railway velocipedes, we have been striving to combine strength with the least possible weight. Fig. 3231 illustrates a machine which is worked by treadles and levers. It is designed to carry four engineers, and may be built to 600, 750, 1000 and 1435 mm gauge of track. The motion is very easy, so that the working of the velocipede will not fatigue the passengers, and long distances can be covered within a short time. A tool box is fitted in the centre, as shown.

XXIV. Implements, Tools and Machinery for Plate-Laying.

Fig. 3232. Hatchet with hardened cap.

Fig. 3234. Axe.

Fig. 3246. Point.

Fig. 3244. Chipping Chisel.

Fig. 3245. Cross-cutting Chisel.

Fig. 3239. Forge Hammer.

Fig. 3240. Forge Hammer.

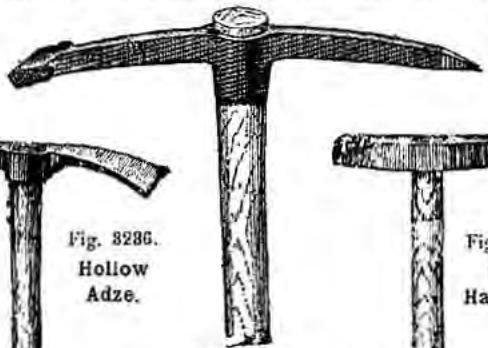


Fig. 3237. Boxing and Pointed Pick.

Fig. 3238. Hammer-hatchet.

Fig. 3236. Hollow Adze.

Fig. 3238. Nail Hammer.

Fig. 3242. Set Hammer.

Fig. 3241. Set Hammer.

Fig. 3235. Axe.

Fig. 3243. Set Hammer.

Fig. 3250. Flat and Pointed Pick.

Fig. 3251. Flat Pick.

Fig. 3252. Boxing Pick.

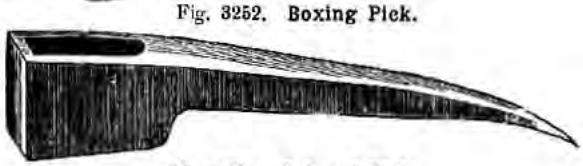


Fig. 3253. Pointed Pick.

Fig. 3254. Double Pointed Pick.

Fig. 3249a. Spades.

Fig. 3247. Coal Shovels.

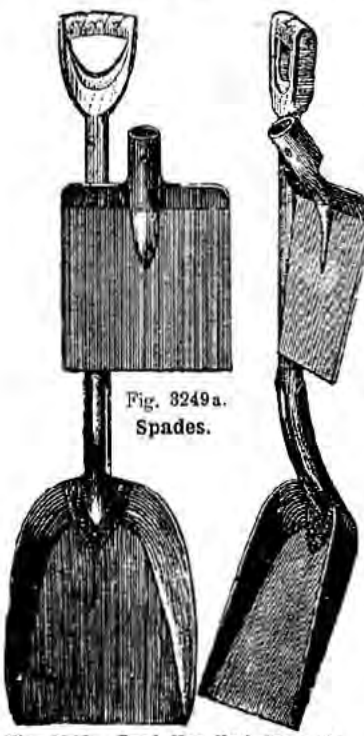


Fig. 3248. Coal Handled Shovels.

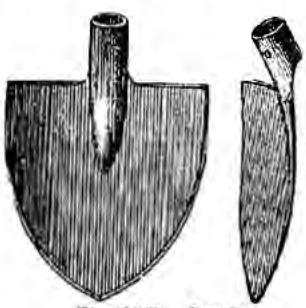
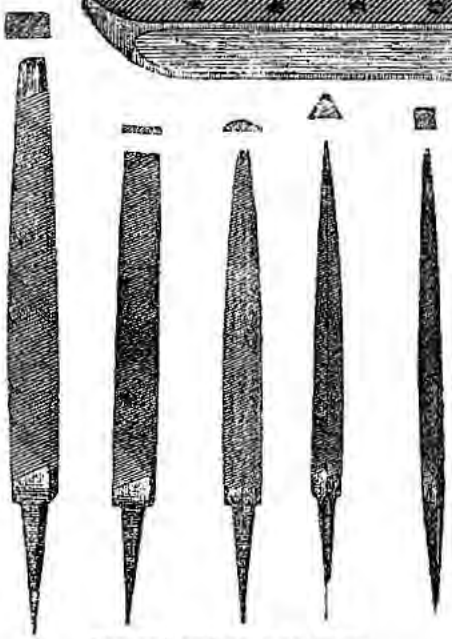


Fig. 3249. Spades.

Fig. 3255. Gauge.

Fig. 3256. Crow Bar.

Fig. 3257. Heaver.



Bastard and Smooth Files.

Fig. 3261. Hand file (flat). Fig. 3262. flat Fig. 3263. half round Fig. 3264. triangular Fig. 3265. square.

Fig. 3259. Nail Claw.

Fig. 3260. Water Level.

Fig. 3270. Engl. Screw Wrench.

Fig. 3266. Anvil steeled.

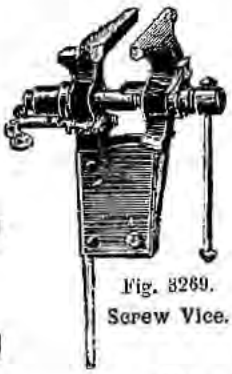


Fig. 3269. Screw Vice.

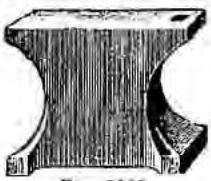


Fig. 3267. Rising Anvils.

Fig. 3268. Anvil steeled.

Fig. 3271. Pincers.

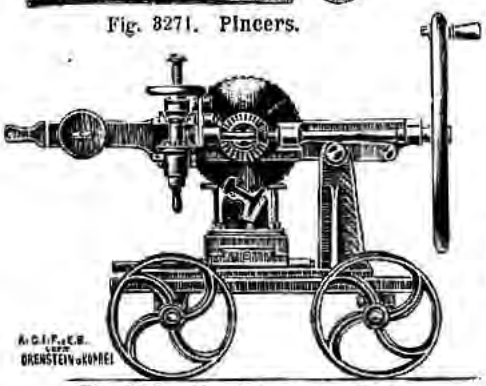


Fig. 3272. Hand Saw on wheels.

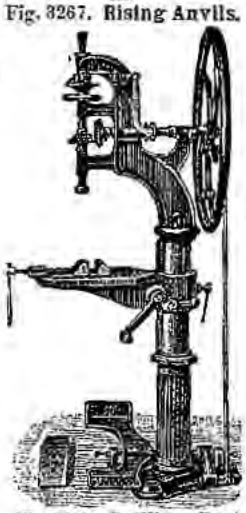


Fig. 3273. Drilling Post.

Fig. 3274. Punch.

Fig. 3275. Screw Jack.

Fig. 3278. Double wrot iron Wrench.

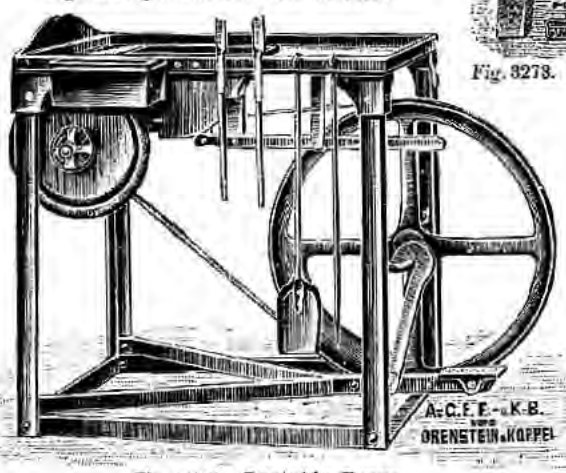


Fig. 3280. Portable Forge.

Fig. 3276. Ratchet Drill.

Fig. 3277. Rail-Bender or Jim-Crow.

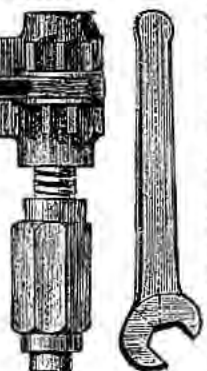


Fig. 3279. Single wrot iron Wrench.

Fig. 3281.

We further make a speciality of the construction of:

1. Aerial Wire-Rope Tramways.

Ask for special catalogue.

2. Self-Acting Inclined Plane- and Hauling-Railways.

Ask for special catalogue.

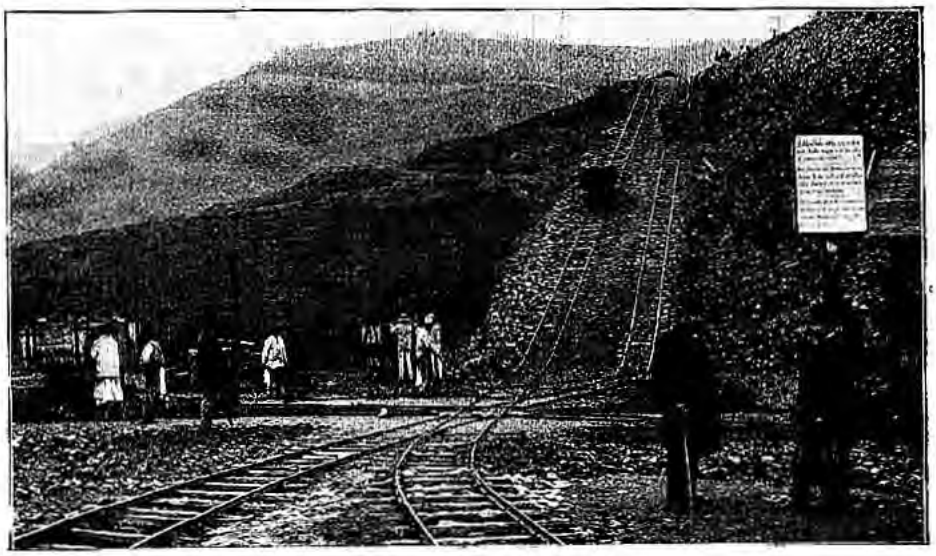


Fig. 3282.

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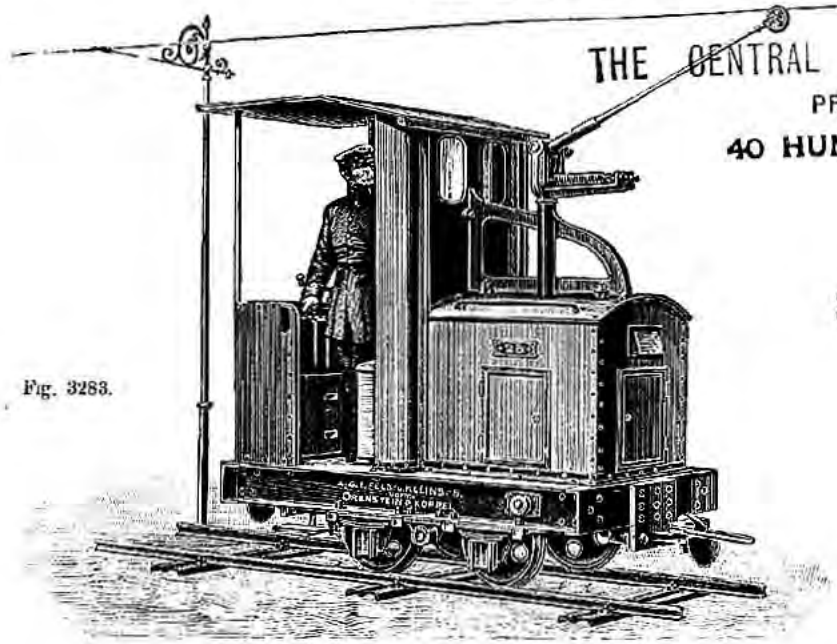

Fig. 3283.

3. Electric Railways.

Ask for special catalogue.

4. Portable Bridges.

Special Catalogue will be sent free on application.