

April 24, 1934.

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1,956,398

APPARATUS FOR HANDLING WIRE

Filed Nov. 6, 1928

2 Sheets-Sheet 1

Fig. 1.

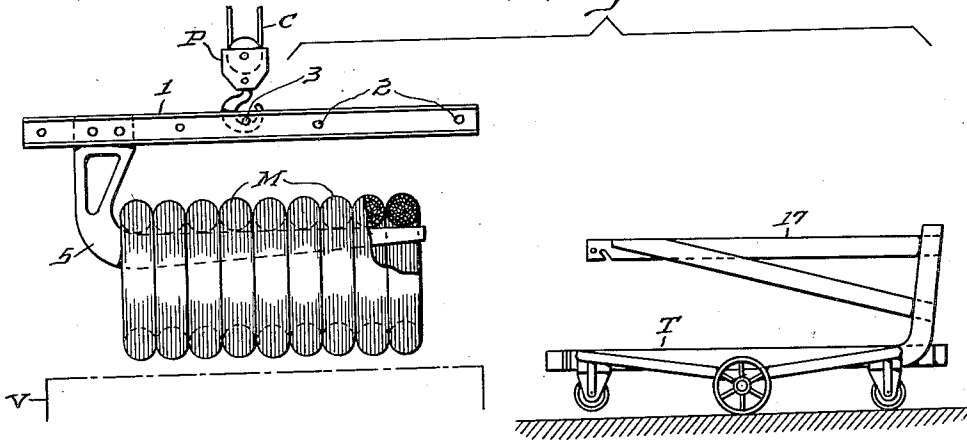


Fig. 2.

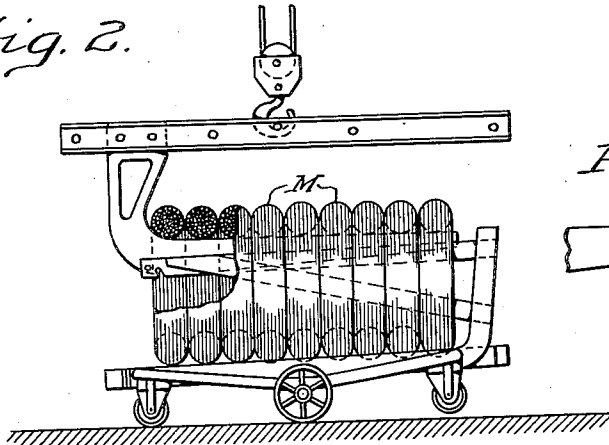


Fig. 10.

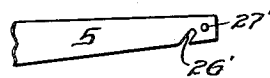
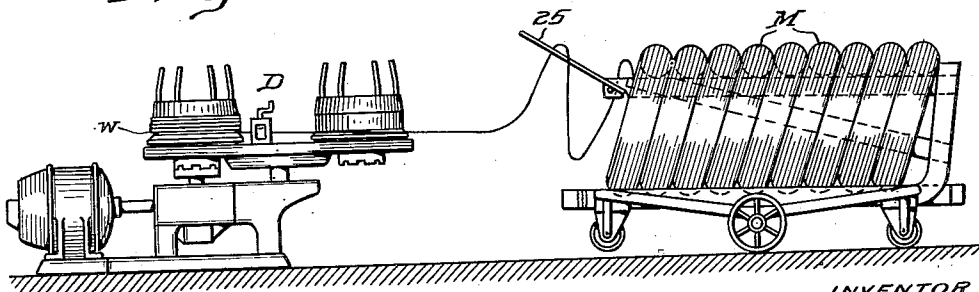


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

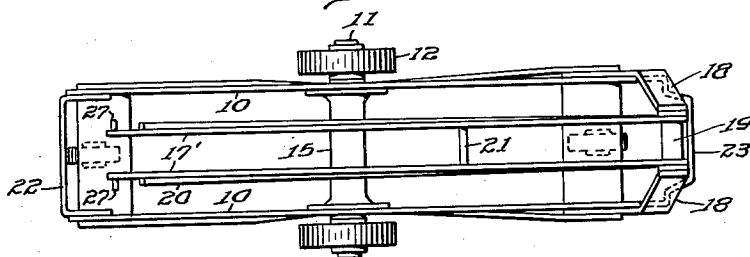


Fig. 5.

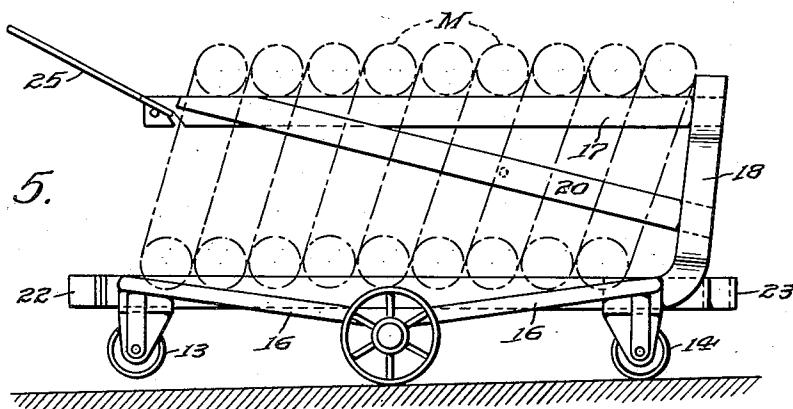


Fig. 6.

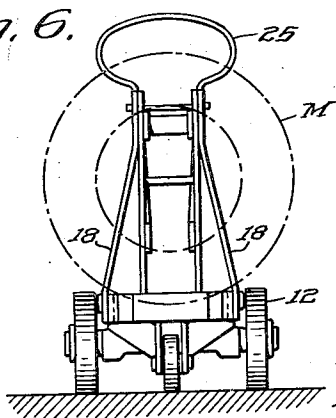


Fig. 9.

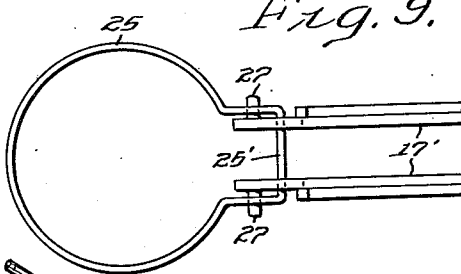
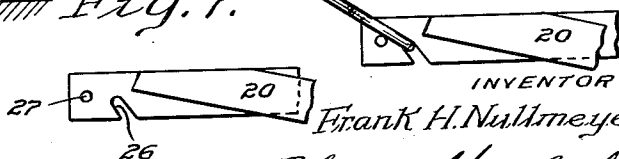


Fig. 8.

Fig. 7.



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APPARATUS FOR HANDLING WIRE

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Application November 6, 1928, Serial No. 317,551

10 Claims. (Cl. 242—54)

The present invention relates to the manufacture of wire and more particularly to a novel method of handling and positioning the coils or bundles of partially finished wire during the cleaning and pickling operations preliminary to as well as during the final drawing operation and also contemplates the provision of apparatus of novel form suitable for the performance of the said method, said apparatus being claimed herein and said method being claimed in my copending application for U. S. Letters Patent entitled "Method of handling wire", Serial No. 527,423, filed April 3, 1931, as a division hereof.

In the manufacture of wire the material from which it is to be made is preliminarily reduced to a diameter considerably in excess of that to which it is ultimately to be brought and, after said reduction, is disposed in coils or bundles of annular shape. These coils, particularly in the manufacture of ferrous wire, are then introduced to pickling vats containing solutions suitable for cleaning the metal and freeing it from scale preparatory to the drawing operation by which the material is finally reduced to the desired diameter.

As a matter of convenience it is usual to pickle a number of the coils simultaneously and to facilitate this operation it has been customary to stack a plurality of the coils in vertical position on the floor or other suitable support, to then lower thereover by means of a crane a beam having depending loops at each end through which, and through the series of coils after the loops have been aligned substantially with the axis thereof, a short supporting beam of wood or other more or less acid resistant material is passed so that when the main beam is again raised by the crane the series of coils will be lifted by the short beam whose ends are supported in the loops and may thus be carried to the pickling vat and lowered thereinto until the ends of the longer beam rest on the upper edges of the vat which is desirably somewhat narrower than the length of the beam. Upon the completion of the pickling the main beam may be again lifted by the crane so as to withdraw the coils from the vat and permit them to be lowered onto a supporting truck having uprights at its opposite ends adapted to support the coils in upright or substantially upright position. After the coils are seated on the truck the requisite vertical support for the coils is thus afforded thereby and the short beam thus relieved from their weight so that after the main beam is lowered a little farther than the point neces-

sary to seat the coils on the truck the short beam can be readily withdrawn longitudinally from the coils and loops, thus placing the trucks and coils in condition to be run to a point adjacent the drawing dies. The operator of the latter then removes one of the coils from the truck, places it on a suitable reel adapted to permit its revolution, usually in the horizontal plane, and, after pointing the end of the wire in the coil so as to permit its insertion through the dies sufficiently to allow it to be gripped by the drawing head or equivalent device by which it is to be drawn through them, the drawing mechanism is set in motion and the drawing operation continued until all of the material in that coil is exhausted. This single draw may sufficiently reduce the diameter of the material so that an additional draw is unnecessary but, of course, as many consecutive draws as may be required can be made by returning the partially reduced material to the reel after each draw and again running it through the dies until the desired diameter is obtained. As soon as this is accomplished either by one or a plurality of draws, the operator removes another coil from the truck, places it on the reel and sharpens the end of the strand preparatory to commencing the drawing operation upon that coil and so on until all of the coils on the truck are used up. It will thus be observed that this customary procedure requires the services of at least two operatives during the pickling operation and to effect the transfer of the coils to the truck, namely, an operative to manipulate the crane and another operative to insert the short beam through the coils preparatory to their introduction to the pickling tank and also to withdraw the beam after the coils have been lowered upon the truck. Additionally, the time and manual labor required on the part of the operator of the drawing mechanism for lifting the heavy coils from the truck and consecutively transferring them to the reel is relatively great and entails on this individual an onerous duty from which he is entirely relieved in accordance with my invention as will hereinafter more fully appear.

The principal object of my invention, therefore, is to provide a method of handling the coils of material from which wire is to be ultimately formed which is more convenient, quicker and less fatiguing and dangerous to the employees than that hitherto employed and to provide such a method by means of which the services of one employee can be entirely dispensed with dur-

ing the transfer of the coils to and from the pickling vat and from thence to the vicinity of the drawing dies and, further, by means of which the operator of the latter is entirely relieved from the labor of consecutively lifting the coils of material onto the drawing reel. A further object of the invention is to provide a novel method or manner of positioning the coils of material during and as an incident to the drawing operation by means of which and as a result thereof the wear upon the dies is reduced and the dies are more efficiently lubricated than when the material is passed to the dies from a coil disposed on a rotatable reel as in the ordinary manner.

Still further objects of my invention are to provide novel apparatus adapted for the performance of the method to which reference has been made including, among other things, a novel form of coil supporting means and a novel form of truck adapted for cooperation therewith as well as means for insuring the proper passage or feed of the material from the coils to the dies during the drawing operation.

My invention further includes other objects, advantages, novel features and characteristics hereinafter more specifically pointed out or which will be apparent from the following description of my improved method of handling wire during process of manufacture and of certain forms of apparatus adapted therefor.

In the accompanying drawings Figs. 1, 2 and 3 are intended more particularly to illustrate the performance of the method by means of apparatus of the form illustrated in the succeeding figures and may to some extent be considered as diagrammatic. Thus, Fig. 1 shows a series of coils of material being removed from a pickling or cleaning vat preparatory to their transfer to a supporting truck by means of which they may be conveyed to the vicinity of the drawing dies and on which they may be supported during the drawing operation; Fig. 2 shows the coils of material in process of transfer to the truck and Fig. 3 the coils of material supported on the truck and a strand thereof passing to the drawing mechanism from the leading coil, all of these figures being substantially in side elevation. Fig. 4 is a top plan view of the truck in condition to receive the coils of material; Fig. 5 is a side elevation of the truck with the material retaining loop in place as during the drawing operation, the position of the coils when loaded upon the truck being indicated in broken lines, and Fig. 6 is a rear end elevation of the truck as shown in the preceding figure. Figs. 7, 8 and 9 are respectively fragmentary enlarged views of the free or front end of the truck beam and associated parts, Fig. 7 being a side elevation of the beam prior to the connection of the retaining loop therewith; Fig. 8 is a similar view showing the retaining loop in position and Fig. 9 a top plan view of the parts shown in Fig. 8. Fig. 10 is an enlarged fragmentary view in side elevation of the free end of the coil supporting hook arranged for reception of a retaining loop in a manner similar to the end of the truck beam for the purpose and as hereinafter described. The same symbols are used to designate the same parts in the several figures.

In the preferred performance of my improved method I dispense entirely with the customary suspending loops and short coil-supporting beam to which reference has been made and provide instead a main beam 1 desirably formed of two

channel sections placed back to back in spaced relation and rigidly secured together by rivets 2 or in any other suitable way. Midway of its length this beam may be provided with a pin 3 or other convenient element for engagement by the hook of a pulley P supported by a cable C extending to a crane (not shown) to thereby enable the beam to be readily raised, lowered and also moved about as desired. For receiving and supporting the annular coils M of the partially reduced material which is ultimately to be drawn to smaller diameter to form the wire W, I provide the beam with a hook 5 comprising a vertically depending shank portion the upper end of which is rigidly secured between the members of the beam and a generally horizontally extending tongue substantially paralleling the beam and directed toward the opposite end thereof from that adjacent which the shank of the hook is secured; this tongue is preferably of relatively small cross section so as to readily enter the openings at the centers of the coils though of course of sufficient size to adequately resist deflection under the weight of the coils when disposed thereon. It will thus be apparent that the crane operator can readily pass the tongue of the hook through a plurality of the coils of material when the latter are arranged side by side in axial alignment upon the floor or other supporting surface and by then raising the beam can transfer the weight of the coils to the hook so as to lift the coils and move them about in correspondence with the movements of the beam. Thus by suitable operation of the crane the coils may be moved over a vat V and lowered therein for pickling or cleaning, the tongue of the beam being of course immersed with the coils in the solution in the vat; consequently I prefer to make the hook of some suitable acid resistant material so that the pickling or other solutions in which it may be dipped will exert no appreciable deleterious effect thereon. At the conclusion of the pickling or cleaning operation the beam, hook and coils are raised above the vat to the position shown in Fig. 1 and the coils are now ready to be transferred to a truck of novel form to which reference will now be made.

The truck as best shown in Figs. 4, 5 and 6 comprises a substantially horizontally disposed frame having longitudinally extending laterally spaced side members 10 suitably tied together adjacent their extremities and beneath which, substantially midway between the ends of the frame, is disposed an axle 11 carrying main wheels 12; adjacent each end of the frame auxiliary wheels 13, 14 are supported in suitable brackets and preferably so arranged that when the truck is balanced on the main wheels in horizontal position both of the auxiliary wheels will be slightly off the ground. Thus the truck can be readily moved about upon the main wheels alone and after being brought to any desired position can be supported therein upon the main and either of the auxiliary wheels. To assist in securely bracing the bracket 15 in which the axle is carried, truss bars 16 may be extended therefrom to the adjacent side members of the frame.

The truck is provided with a coil-supporting beam 17 of cantilever type extending parallel to the side frame members and vertically spaced thereabove. This beam desirably comprises laterally spaced parallel members 17' the rear ends of which are secured to uprights 18 respectively projecting upwardly and inwardly from the side

frame members to which their lower ends are rigidly secured. A spacing block 19 is disposed between the rear ends of the beam members 17' and from a point adjacent the forward end of each beam member a rearwardly and downwardly inclined strut 20 is extended to the adjacent upright, the whole arrangement being such that the beam 17 is rigidly supported and thus capable of sustaining at least a considerable portion of the weight of the coils of material when disposed on the truck. One or more spacers 21 may be provided between the struts 20 and also between the beam members 17' if desired to assist in holding the parts in properly aligned position while U-shaped plates 22, 23 may be respectively secured to the side members of the truck frame between its ends to assist in maintaining the latter in proper position and also to form a point for the convenient attachment of a chain or the like which sometimes may desirably be employed for pulling the truck about.

During the drawing operation, as will hereinafter more fully appear, the coils of material are positioned on the truck preferably about as shown in Figs. 3, 5 and 6 and the strand of wire-forming material is fed to the drawing dies from the leading coil, that is, the coil nearest the front end of the truck, and consequently, nearest the free end of the beam 17. To insure an even and proper feed of the strand from the coil, to present a slight resistance to the pull of the drawing head thereon, and to assist in preventing the turns of the coil from being pulled away from the body thereof while the strand is being drawn off, I provide a retaining element preferably in the form of a ring or loop 25 of spring wire or other more or less resilient material which may be somewhat less in diameter than the openings through the coils. This ring is adapted to be readily attached to or detached from the end of the beam and for this purpose each member of the latter may be provided with an upwardly and forwardly directed slot 26 opening at its under edge and adjacent the slot but nearer the end of the member with an outwardly directed pin 27, while to form a portion suitable for cooperation with the slots and pins the body of the ring is extended outwardly at one point so as to form a generally U-shaped loop 25' the end of which may be engaged in the slots and the sides rested on the pins 27 so as to hold the retaining ring in overbalanced position on the end of the cantilever beam and projecting forwardly and angularly upward therefrom as best shown in Fig. 8. When the strand is drawn off from the leading coil over the retaining ring as hereinafter described, the latter tends to prevent the foremost convolutions of the coil from being bodily pulled away, for as the lead of the strand is in a generally upward direction from the coil and over the ring, the force of gravity acting on the convolutions supplements their natural tendency, due to the resiliency of the wire, to adhere to the balance of the coil which is disposed substantially below the ring.

Having thus explained the preferred construction of the truck and retaining ring I shall now revert to the description of the practice of my improved method of handling the coils of wire or "rods" as the partially reduced material is sometimes termed, particularly where of relatively large diameter.

It will be recalled that this description had proceeded to the point at which a plurality of the coils were suspended on the hook 5 after hav-

ing been subjected to pickling and thus placed in a condition for transfer to the vicinity of the drawing mechanism. To effect this transfer a truck T, constructed preferably as just described, is brought to the vicinity of the coils and the crane and truck then so manipulated relatively to each other that the cantilever beam of the truck is entered through the central opening in the series of coils to bring the parts to substantially the position shown in Fig. 2, and since the beam 17 is preferably formed of two laterally spaced members, the tongue of the hook can be readily pushed therebetween during this operation so as to insure the proper vertical alignment of the tongue and the beam. It will of course be appreciated that the bringing of the parts to this position can be accomplished either by holding the hook stationary and running the truck toward the shank of the hook, or by holding the truck stationary and moving the hook and coils toward the rear end thereof or by a combination of these movements during which, of course, the upper edge of the hook is maintained at a slightly greater elevation than the upper end of the beam so as to prevent the coils from engaging or resting on the latter.

When the truck, beam and coils have thus been brought substantially to the said position the hook is lowered sufficiently by suitable manipulation of the crane to transfer the weight of the coils to the beam and side members 10 of the truck after which by lowering the hook a little farther it can readily be drawn longitudinally out of the coils which are now entirely supported by the truck and preferably inclined slightly toward the rear thereof as shown in Figs. 3 and 5. The truck may now be run to the vicinity of the drawing mechanism, generally indicated as D, and which may be of any suitable construction though desirably of the type forming the subject of U. S. Letters Patent No. 1,629,524 granted to me May 24, 1927. The operator of the drawing mechanism then carries the leading end of the strand of the first coil, i. e., the coil nearest the front of the truck, through the retaining ring after securing the latter in position on the truck beam and suitably pointing the end of the strand inserts it through the drawing dies, secures it to the drawing head and then places the drawing mechanism in operation. As the drawing proceeds the strand is drawn from the leading coil over the retaining ring whereby the strand is subjected to a slight frictional resistance resulting in a corresponding tension in the strand between the ring and the drawing dies which is of advantage, while by reason of the position of the coil and manner in which the strand is drawn therefrom the latter continuously revolves on its own axis as it enters the dies, a condition which does not obtain when, as in the ordinary practice, the strand is drawn from a coil disposed on a revolving reel. It is well known that the partially reduced material, that is, the strand which has been subjected to one or more passes preliminary to the final drawing operation now being described, is generally of somewhat elliptical as distinguished from truly cylindrical cross section with the result that when it is drawn from a revolving reel and thus always enters the dies in the same relative position with respect thereto, the wear on the latter is accentuated at opposed points or areas lying adjacent the ends of the major cross sectional axis of the elliptical strand with consequent uneven wear of the dies; when, however, the strand is continuously revolving on

its own axis as it enters the dies as when it is drawn from a stationary annular coil so disposed that its axis is substantially parallel to the axis of the opening through the dies as in accordance with my method, the wear on the dies is evenly distributed throughout their operative surfaces, while, additionally, the lubricant supplied to the dies during the drawing operation is continuously distributed over and fed to said surfaces and over the strand itself more effectively than when no revolution of the latter takes place, thereby decreasing the wear on the dies and permitting their use for a greater length of time before renewal if necessary.

When a plurality of coils of wire forming material are disposed side by side and substantially vertically and the strand drawn from the leading bundle substantially axially thereof as distinguished from tangentially as when the coil is on a revolving reel, the drawing operation can be continued until all of the material in the first coil has passed through the dies, after which the leading and previously pointed end of the next coil may be passed through the dies and connected to the drawing head and the material in that bundle then drawn down to the desired diameter and so on with each succeeding coil until all the coils have been drawn down separately and successively, or while the drawing of the first coil is in progress the end of that coil opposite to that which has been inserted in the drawing mechanism can be welded to the leading end of the adjacent coil and so on throughout the series of coils with the result that the drawing operation may be continued without interruption until all of the coils are used up and a continuous wire of very great length may thus be drawn if desired. Or, in the alternative, after the strands of the coils have been so welded together the drawing can be continued until a predetermined length of wire has been drawn irrespective of the amount of material required to form it; the drawing mechanism may then be stopped and after this length of wire has been cut off and removed therefrom the mechanism may again be operated until a further length has been drawn. Thus after the ends of the strands in the several coils of material are once welded together, one or more continuous lengths of wire can be drawn without the loss of time heretofore required when drawing long lengths because of the necessity of having to weld the last strand in each coil when the latter is nearly used up to the leading end of the next coil before the latter is placed on the reel. Additionally, in accordance with my method, the labor of transferring each coil to the reel is entirely avoided, no manual movement of the coils being required at any time during their progress through the pickling and drawing operations.

Under certain conditions it may be deemed more convenient to dispense entirely with the use of the truck T and merely support the coils in proper relation to the drawing mechanism D upon the hook 5. Under such circumstances the ends of the hook may be provided with a slot 26' and pins 27' as shown in Fig. 10 so as to enable the connection of the retaining ring 25 thereto preparatory to the strand being drawn off from the coils supported thereon. The use of the truck, however, will usually be found preferable under practical operative conditions for the reason, among others, that unless an adequate frame or other means for supporting the ends of the beam 1 are provided adjacent the

drawing mechanism the crane must necessarily be utilized for this purpose and thus rendered unavailable for other uses throughout the drawing operation; additionally, when the pickling is performed in one building and the drawing operation in another, as is sometimes the case, it is manifestly impossible to transfer the beam and hook to the vicinity of the drawing mechanism by the use of a crane permanently housed in the former so that the use of the truck becomes substantially obligatory under such conditions.

It will thus be apparent that my improved method of handling the coils or bundles of partially reduced wire forming material is advantageous in that, among other things, the services of an operative to manipulate some form of supporting means, such as the short beam to which reference has been made, and to insert it through and withdraw it from the coils to enable them to be transported to, lowered into and withdrawn from the pickling vat and then positioned on a truck for subsequent movement to the vicinity of the drawing mechanism is entirely avoided as in accordance with my invention the services of the crane operator alone are required; because when the coils have once been brought to the vicinity of the drawing mechanism either by means of the truck or of the hook, it is unnecessary to transfer them to a reel or other supporting device preparatory to the actual drawing operation and finally because the position in which the coils are supported and manner of effecting their support therein permits the strand to be drawn therefrom in such a way as to reduce the wear on the dies of the drawing mechanism and facilitate their lubrication. The use of my improved method therefore results, among other things, in a material saving in labor costs, in lightening the duties of the operator of the drawing mechanism, in a saving in the wear and tear on that mechanism itself, and in a material saving in the time required for carrying the coils through the various operations required as a preliminary to the final drawing operation.

It is to be understood that by the term "wire" as herein employed, I intend to designate any substantially cylindrical material of relatively small diameter, either as received from the rolling mill in which condition it is generally referred to as a "rod", or after it has been passed through a drawing die when it is generally referred to as a "wire".

While I have herein described and illustrated with considerable particularity certain novel means and instrumentalities adapted for the performance of my said method, I do not thereby desire or intend to specifically limit myself to any particular details in the design, construction and arrangement of the various elements thereof as minor changes can be made therein if desired without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. A truck for supporting annular coils of wire forming material or the like comprising a longitudinally extending frame having laterally separated side supporting members, wheels carried by the frame, a supporting beam vertically spaced above and over the frame and extending in parallelism therewith cooperative with said side members to receive a plurality of the coils, and supporting means for the beam disposed between

one end of the beam and the adjacent end of the frame.

2. A truck adapted for use in wire drawing operations to support a series of coils of wire forming material or the like in substantial axial alignment and comprising a frame having laterally spaced longitudinally extending side members adapted to afford support to the lower portions of the coils, wheels supported beneath the frame, a longitudinally extending beam vertically spaced above said side members and adapted to extend through the series of coils and to afford support to the upper portions thereof, and supporting means for the beam extending from the frame to but one end thereof.

3. A truck adapted for use in wire drawing operations to support a series of coils of wire forming material or the like in substantial axial alignment and comprising a frame having laterally spaced longitudinally extending side members adapted to afford support to the lower portions of the coils by engagement with the outer surfaces thereof, a longitudinally extending beam vertically spaced above and over said members and adapted to afford support to the upper portions of the coils when extended therethrough, and supporting means for the beam comprising uprights secured to one end thereof and extending to the adjacent end of the frame whereby the opposite end of the beam is left free for insertion through the series of coils.

4. A truck adapted for use in wire drawing operations to support a plurality of coils of wire or the like comprising a frame having laterally spaced side members, wheels for supporting the frame, uprights carried by the frame and a longitudinally extending cantilever beam disposed above said members and rigidly secured to said uprights at one end, said beam being adapted to afford support to the inner peripheries of the coils when rested on said side members and disposed in substantially parallel planes.

5. In apparatus for affording support to an axially aligned series of annular coils of wire forming material, a beam adapted for insertion through the series of coils to afford vertical support thereto, retaining means comprising a ring, and means for detachably securing said ring to the end of the beam after the coils are disposed thereon in such position that when the strand is drawn from the adjacent coil over the ring the leading turns in the coil are prevented from material axial separation from the rest of the coil.

6. In apparatus for affording support to an axially aligned series of annular coils of wire

forming material, a beam adapted for insertion through the series of coils to afford vertical support thereto, retaining means comprising a ring having a U-shaped extension, and means for detachably securing said ring to the beam after the coils are disposed thereon comprising a slot in the under face of the beam adapted to receive part of said U-shaped portion and oppositely directed pins adjacent the slot adapted to engage other parts thereof to thereby support the ring adjacent the end of the beam and projecting therebeyond in overbalanced position.

7. A truck for use with wire drawing apparatus and for affording support to a series of annular coils of wire, comprising a beam adapted for insertion through the series of coils cooperative with the truck body to afford support to the coils and means attachable to and detachable from the end of said beam adapted to assist in preventing the turns in adjacent coils from being separated from the body of the coil.

8. In apparatus for affording support to an axially aligned series of annular coils of wire forming material, a beam adapted for insertion through the series of coils to afford vertical support thereto, retaining means comprising a ring, and means for detachably securing said ring to the end of the beam after coils are disposed thereon, said ring having a portion extending upwardly from the beam, and at an angle thereto, in such position that when the strand is drawn from the adjacent coil, the ring prevents material axial separation of the leading turns of the coil from the rest of the coil.

9. In apparatus for affording support to an axially aligned series of annular coils of wire, a beam adapted for insertion through the series of coils to afford vertical support thereto, and retaining means adapted to be detachably secured to the beam adjacent one end thereof after the coils are disposed thereon and operative to prevent material axial separation of the leading turns of the adjacent coil from the remainder of the coil when the strand is drawn from said coil.

10. In apparatus for supporting a series of annular coils of wire forming material, a beam having a projecting end and adapted for insertion through the coils, and means attachable to and detachable from the projecting end of the beam adapted to assist in preventing the turns in the adjacent coil from being axially separated from the body of the coil when the strand of the coil is being drawn therefrom over said means.

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