April 9, 1929. H. W. STAHLHUT 1,708,854

MEANS FOR HANDLING SHEET STEEL

Filed Nov. 11, 1927 2 Sheets-Sheet

Fig. 1.

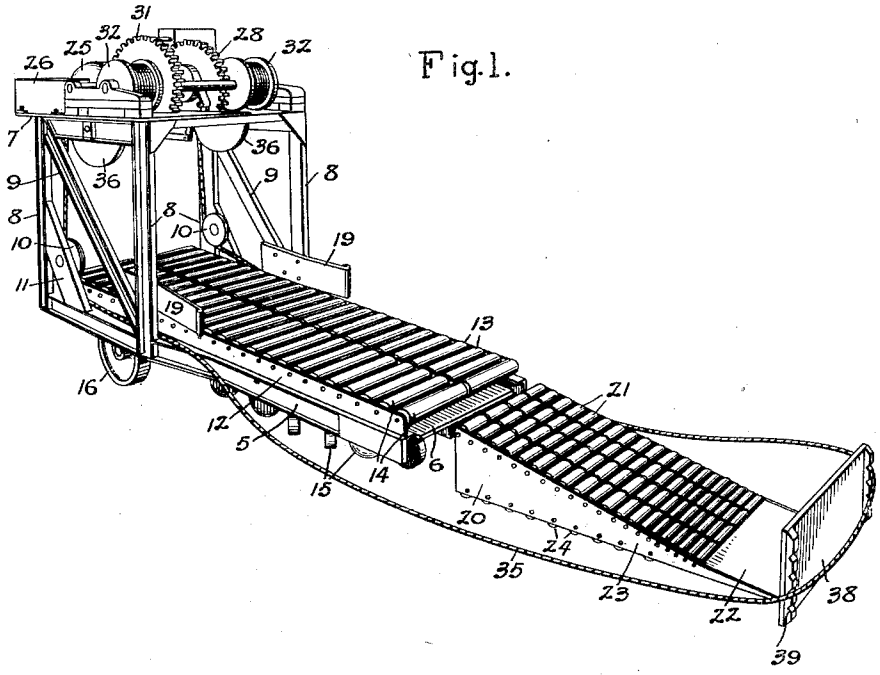
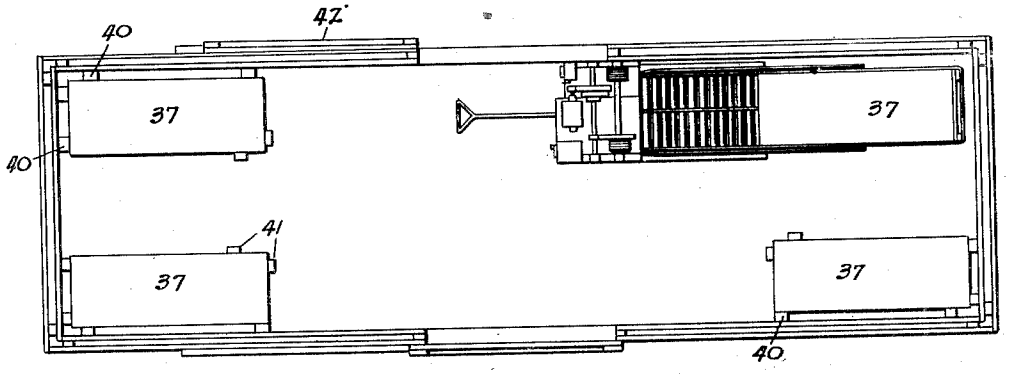


Fig. 4.



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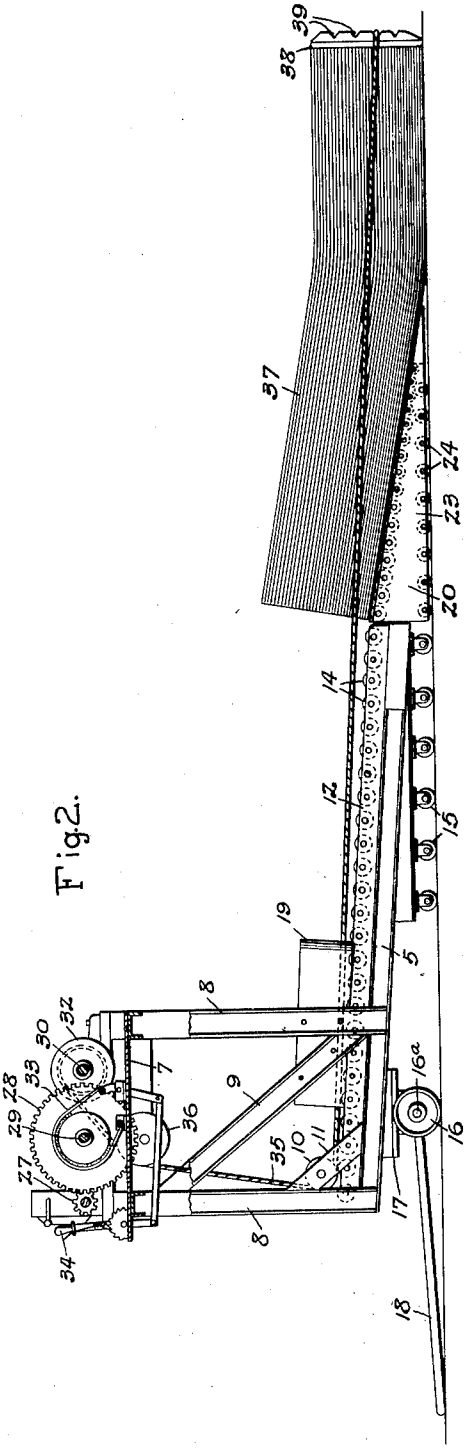


Fig.2.

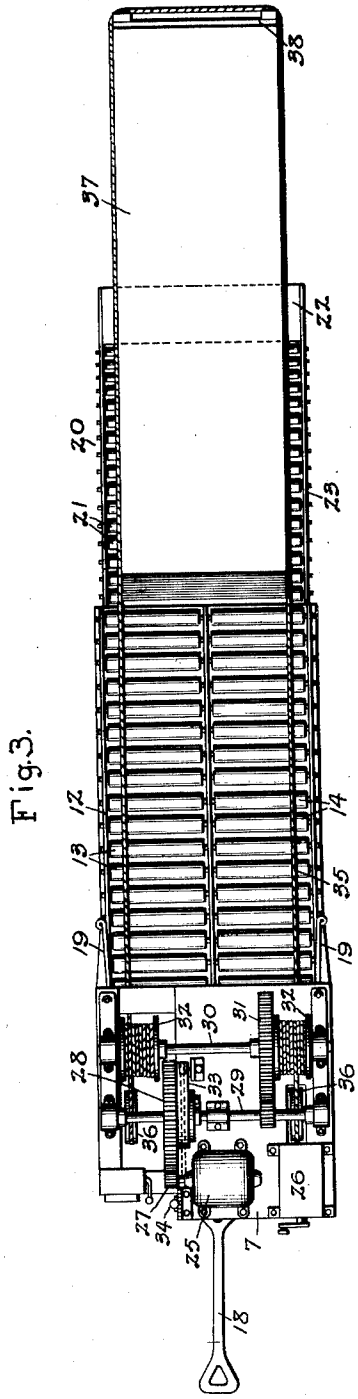


Fig.3.

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UNITED STATES PATENT OFFICE.

HENRY W. STAHLHUT, OF FORT WAYNE, INDIANA, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MEANS FOR HANDLING SHEET STEEL.

Application filed November 11, 1927. Serial No. 232,683.

At the present time large quantities of thin sheet steel are used for various purposes, especially in the manufacture of electrical apparatus, and the handling thereof, especially at the plants of the consumer has been a relatively expensive and slow operation.

Ordinarily, the steel is shipped by the manufacturer to the customer in box cars to protect it from the weather and thus prevent rusting. The customary thing is to ship about forty tons to the car, arranged in four stacks, one in each of the four corners of the car where it is securely blocked to prevent shifting en route. The stacks vary in size but a standard size is 112 inches long by 35 inches wide, by 24 inches high and weighing approximately ten tons. The sheets of steel being thin are quite flexible. Prior to my invention, the practice has been to roll a small truck into the freight car and two men standing at opposite ends of the stack transfer the sheets, a few at a time to the truck for subsequent removal to the storage warehouse. For a fully loaded car of forty tons of sheet steel it commonly takes four men working four hours to effect the unloading.

My invention has for its object the provision of a truck means whereby a complete stack of thin sheet steel or equivalent load can be placed in a freight car or removed at one operation, and this without in any way changing or modifying the type of freight car used for transportation.

Briefly, my invention comprises a truck having a receiving platform with a large number of rollers on its upper side, a plow or wedge also having rollers on its upper and lower sides, which is forced by the truck under the stack and a power-actuated means for pulling the stack by a relative longitudinal movement over the wedge on to the truck platform. The truck is provided with suitable wheels or castors whereby it may be easily moved about.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the drawing which is illustrative of one of the embodiments of my invention, Fig. 1 is a perspective view of a truck means embodying my invention. Fig. 2 is a view in side elevation of the same; Fig. 3 is a plan view; and Fig. 4 indicates the floor plan of a freight car with stacks of sheet steel located as is customary in the four corners thereof.

The truck is substantially rectangular and has a suitable metal frame made of channel or other suitable shape comprising side members 5 and cross members 6. At a suitable elevation above the frame is a horizontal support 7 for the power-actuated parts of the apparatus as will appear later. The support is carried by four vertical columns 8, located one at each corner and preferably welded both to the frame and support to secure strength and rigidity. In order to resist the strains incident to the loading operation, suitable braces such as 9 are also provided. As it is necessary to provide a pair of sheave pulleys 10 over which the loading cable extends, they may with advantage be carried by the members 11 which also form corner braces for the upright columns.

Located on each side of the frame and also in the middle thereof and extending parallel with the side frames are platform members 12 in which are mounted sets of metal rollers 13 and 14. The spindles of the rollers are mounted in suitable ball or roller bearings to reduce friction. The rollers are mounted close together and with members 12 form the platform for supporting the load. The arrangement of the rollers and their supports is the same or practically the same as used in conveyors for moving relatively heavy articles in factory processes. The rear portion of the truck is supported by a number of metal trailing castors 15 of ordinary construction mounted on vertical pivots which are free to turn in any direction after the fashion of trailing castors on furniture. A considerable number of these castors is provided so that the weight of the heavy load on the truck will be distributed over a considerable floor area, as shown in Figs. 1 and 2. The latter figure also shows clearly that the rear end of the platform is somewhat lower than the front end. By preference the inclination is such that as soon as the fastenings for the load are released the load will automatically move toward and off of the rear end. In any event, the inclination should be such that very little effort is required to discharge the load.

The front end of the truck is supported by a pair of wheels 16 that are mounted on an axle 16ª that extends across the front of the truck. In the center of the axle and sup-

ported by it is a suitable turntable 17 which engages a corresponding part on the underside of the truck frame, the parts of the turntable being connected by the usual king bolt. The axle also has a handle 18 by means of which it can be pulled about from place to place by a tractor or equivalent means. In the front of the truck frame and carried by the rear upright columns is a pair of vertically-disposed flat plates 19 which flare outwardly somewhat toward the rear, the purpose being to provide means for guiding the incoming end of the load of sheets and prevent lateral movement during transportation.

In the rear of the truck is a plow or wedge 20 which when in the position shown in Fig. 1, rests on the floor. This plow at the front end is of the same height as that of the rear end of the truck platform so that the stack of sheet metal forming the load can move freely from one to the other without obstruction. The opposite or rear end of the plow is made as thin as possible consistent with the work to be performed. The plow is provided with several sets of rollers 21 of which four sets are shown and supported in a manner similar to that above described. Since the plow is thin at the rear end and relatively thick at the front end it is not practical to extend the rollers to the extreme rear edge and therefore an inclined plate 22 is provided which extends some inches back from the sharpened end and is secured to the side plates 23. For the same reason the rollers progressively increase in diameter by sets from the rear toward the front, the front rollers have or may have the same diameter as the rear rollers on the truck platform. The plow may be detachably secured to the main body of the truck or it may be entirely separate therefrom, depending upon the requirements of the service to be performed. The plow also has a large number of small wheels or castors 24 on its under side so that it can be forced under the stack of steel. I have found that on account of the great weight of the stack of steel that these wheels or castors are necessary to reduce the friction as the plow is moved along the floor and under the stack. Because of the thinness of the rear end of the plow, it is necessary to so space the roller means on the upper and lower surfaces that they are in staggered relation.

Referring to Fig. 3, 25 indicates a suitable electric motor which is mounted in any desired manner on the support 7. Current is supplied to the motor by flexible cable from any suitable source of supply subject to the control of a controller 26. The controller may be of any well-known type which is capable of starting and stopping the motor and also for varying the speed. In those cases where it is desired to reverse the direction of rotation of the motor armature, the usual form of reversing switch may be provided and located within the controller casing as well understood. As the load on the motor, especially at the start, is heavy, the armature shaft is geared to the winding drums through speed reducing gearing. The motor armature has a pinion 27 which meshes with a larger gear 28 mounted on an intermediate speed shaft 29, the latter having end bearings carried by the frame of the support. A second shaft 30 is also provided which is connected to the intermediate shaft through suitable speed reducing gearing 31. On the last named shaft is mounted a pair of winding drums 32, the unwinding action of which is subject to the control of brake mechanism comprising a band brake 33 and a control lever 34. To the drums are attached the ends of a steel cable 35 which runs downwardly over sheave pulleys 36 to pulleys 10 and thence rearwardly in loop form to and over the rear of the stack 37 of sheet steel. The purpose of the pulleys 10 is to cause the cable to exert a practically horizontal and straight line pull on the load. At the rear of the stack and extending across it is a vertical steel or other plate 38 having notches 39 in its edges to receive and position the cable.

In Fig. 4 is indicated the arrangement of the stacks 37 of thin steel sheets in an ordinary box car. The stacks commonly weigh ten tons apiece and are located in the corners of the car with space blocks 40 located between the sides and ends of the stacks and the similar parts of the car. The stacks are also blocked against lateral and endwise movement by suitable means 41. 42 indicates the door of the car. It will be seen, owing to the distribution of the stack within the car, that sufficient space is afforded to permit the necessary movements of the truck.

The operation of my improved construction is as follows: First the freight car is brought alongside a landing platform and a bridge located over the intervening space between the doorway and the platform. The blockings for the stacks are removed so that spaces will be left entirely around them. By means of a crow bar the front end of a stack is slightly raised and the sharpened end of the plow or wedge inserted in the space thus formed. The truck is then moved into position where its rear end squarely engages the thick end of the wedge. The back plate 38 is then put in place and the loop or U-shaped cable is slipped over rear end of the stack and lodged in suitable notches 39 in the plate. The motor is then started by the controller 26 and the winding drums wind up the cable, both drums winding up equal amounts of cable. At the start the wedge is forced under the stack, the latter remaining in its fixed position due to the fact that the friction of repose of the sheets lying on the floor of the car is greater than that exerted

by the wedge. While this is taking place the truck and wedge are moving bodily toward the rear of the stack. Finally a point is reached where friction exerted by the sheets on the floor is materially reduced and the stack begins to travel up the plow and on the rollers on the upper surface of the truck platform. While this latter is going on, the truck and plow remain stationary. After the stack is properly loaded in the truck the latter can be moved to any desired point by a tractor or other and equivalent means. As it is unnecessary to move the plow with the truck it is simpler to make it a separable piece. This arrangement also has the advantage that the plow can be placed under the front end of a second stack while the truck is moving its load to the point of discharge. The angle of inclination of the roller supporting members of the platform is such that just as soon as the cable is released the stack, due to gravity, will start moving rearward and off of the rear end of the truck. The discharge of the load is controlled by the brake mechanism 33—34 to prevent too rapid relative movements of the truck and load. Prior to releasing the load a couple of spaced cross bars are laid on the floor for the stack to rest on. The bars will hold two parts of the stack sufficiently above the floor to permit the insertion of two pairs of hooks by means of which the stack can be handled by a traveling crane. For unloading it is unnecessary to use the plow but it can be used if desired for any reason. As soon as the steel is well on the floor at the rear end, the tractor or other means pulls the platform out from under the stack, the relative difference in friction between the part on the floor and that on the truck permitting of this action.

By means of my improved construction it has been demonstrated in every day practice that two men in one hour can do what used to take four men four hours to accomplish. In other words, there is a saving equal to the difference between two man-hours and sixteen man-hours in unloading a carload of sheet steel to say nothing of the early release to the railroad of the car and getting it out of the way for another. The great saving due to my improved construction over the method heretofore used is attributable chiefly to the fact that the entire stack is loaded and unloaded as a unit by a relative sliding action of the truck and load. The sheets are flexible even when in a stack 2 ft. thick so that they easily follow the contour of the plow and truck platform. When only a few sheets are handled at a time as by the hand method, this flexibility of the sheets very greatly increases the labor of handling whereas it is of no disadvantage in the present case. It is also to be noted that the stack is moved from its position on the floor up an inclined plane to its final position on the truck by a relative longitudinal movement of the truck and load and hence the necessity for raising or tilting the load wholly or in part by a separate operation is entirely avoided. This is an important feature because it does away with many complicated and expensive parts. From the fact that the truck and load merely slide over one another it follows that the truck may be of simple and rugged construction and one which is cheap to construct.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In an apparatus of the character described, the combination of a truck frame, wheels which support the same at a fixed elevation, a platform carried thereby in such a manner as to have a permanent angle of inclination from one end toward the other and comprising a plurality of rollers and supports therefor, a plow which tapers from the lower edge of the platform to a relatively thin edge which is adapted to be inserted under a load, and means carried by the truck for first moving it and the plow toward and under the load and then moving the load up on to the platform.

2. In an apparatus of the character described, the combination of a truck frame, wheels which support the same at a fixed elevation, a platform carried thereby which has a permanent angle of inclination toward one end from the other, rollers for the platform, a plow which tapers from the lowest edge of the platform to a relatively thin edge which is adapted to be inserted under one end of a load, a cable which is adapted to engage the rear of the load, and a winding drum on the truck for winding up the cable and causing the platform and plow to move under the load for a limited distance and then for the load to move over the plow and on to the platform.

3. In an apparatus of the character described, the combination of a truck frame, wheels which support the same at a fixed elevation, a platform on the truck which is fixed at a predetermined angle of inclination from one end toward the other, a plow which tapers from the lowest edge of the platform to a relatively thin edge which is adapted to be inserted under one end of a load, rollers carried by the upper surface of both the platform and plow, a cable which is adapted to engage the rear end of the load, a winding drum for the cable which causes relative longitudinal movements of the platform, plow and load until the load rests fully on the platform, and means for rotating the winding drum.

4. In an apparatus of the character described, the combination of a truck, wheels which support the same at a fixed elevation, a platform which is carried by the truck in such manner as to be permanently and downwardly inclined toward the rear, rollers for the platform, a plow located at the rear end of the truck which tapers from the rear of the

platform to a relatively sharp edge which is adapted to be inserted under the load, roller means for the upper and lower sides of the plow, a winding drum carried by the truck, a cable adapted to enclose the load and which is wound on the drum, a motor for driving the drum, and brake mechanism for controlling unwinding movements of the cable drum when the load is being discharged.

5. In an apparatus of the character described, the combination of a wheeled truck, an inclined platform carried thereby, a tapered plow, the thick end of which registers with the lowest end of the platform, rollers for the top surfaces of the platform and plow, an elevated support located at one end of the truck, a motor and a pair of winding drums carried by the support, speed-reducing gearing between the motor and drums, a cable which is adapted to enclose the load and engage the rear end thereof, the ends of the cable being wound on the drums, and pulleys below the drums for guiding the cable so that the latter exerts a substantially straight line pull on the load.

6. In an apparatus of the character described, the combination of a truck frame having a plurality of trailing castors for supporting its rear end, an axle and wheels for supporting the front end, a rearwardly-inclined platform carried by the frame, a plow the front end of which registers with the rear end of the frame, and which tapers to a relatively thin edge at the rear, rollers for the platform and plow, a cable adapted to enclose the rear and two sides of the load, a pair of winding drums for the cable which have the same winding speed and which operate simultaneously on both ends of the cable, driving means for the drums, and brake mechanism for controlling the speed of the drums when the load is sliding rearwardly off of the platform and plow.

7. In an apparatus of the character described, the combination of a truck frame having a plurality of supporting wheel elements, an inclined platform for the frame which comprises a large number of transversely extending parallel rollers, a tapered plow, the thick end of which engages the lower end of the platform, roller means for the plow, an elevated support carried by the truck frame, a motor, cable winding drums and speed reducing gearing between the motor and drums, all of which are carried by the support, a single brake mechanism which controls the unwinding action of both of the drums, and a cable adapted to partly enclose the load, the ends of which are separately connected to the drums to ensure a uniform pull on the load without the cable slipping endwise.

8. In an apparatus of the character described, the combination of a truck, wheels at the rear end of the truck for supporting it, steering wheel means at the front end, said wheels supporting the truck at a fixed elevation at all times, a platform and rollers mounted in fixed position on the truck, the platform with its rollers sloping downwardly toward one end at such an angle that the load supported by the rollers will move by gravity toward the low end, a plow adapted to be forced under the load for a limited distance, and a means for pulling the load over the plow on to the platform rollers and holding the same in place.

9. A truck for handling a load of long bundles of thin sheet steel comprising a truck frame, wheels for supporting the frame at a fixed elevation, a platform having numerous transversely extending load supporting rollers mounted thereon, said platform and its rollers sloping downwardly toward one end of the truck and at such an angle that the load tends at all times to move off of the platform, a plow having a thick end of approximately the same height as the lowest roller and a thin end adapted to be forced under the load, a cable adapted to engage the rear end of the load, and a drum for winding the cable to move the load over the plow on to the platform and unwinding it to permit the load to slide by gravity off of the lower end of the platform.

In witness whereof, I have hereunto set my hand this 7th day of Nov., 1927.

HENRY W. STAHLHUT.