June 10, 1930. A. H. GFRORER 1,763,351

CONVEYING APPARATUS

Filed Dec. 6, 1927 4 Sheets-Sheet 1

Fig. 1.

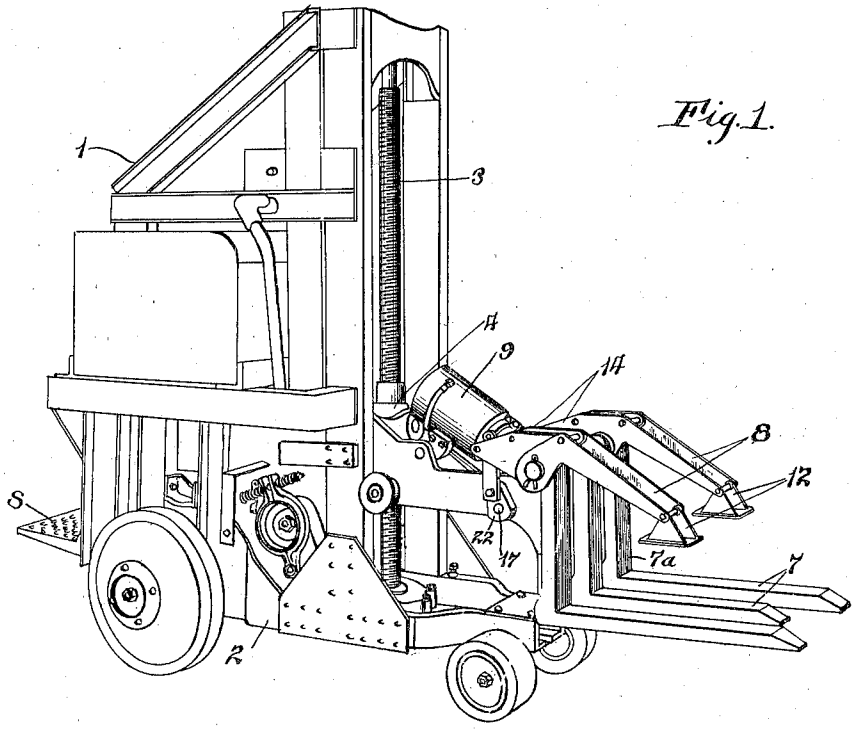
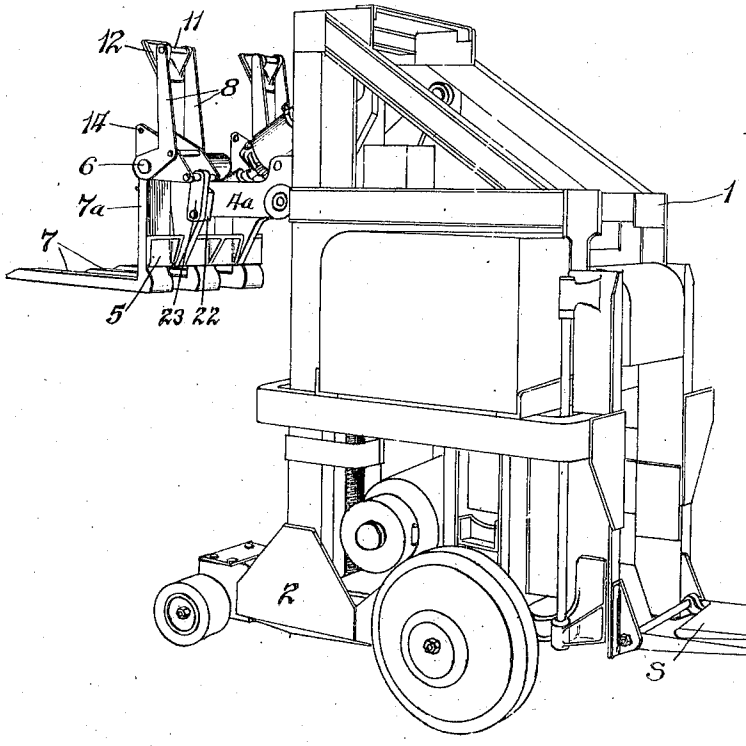


Fig. 2.



Inventor
Albert H. Gfrorer
By Pierpont & Cowles
Attorneys

June 10, 1930. A. H. GFRORER 1,763,351

CONVEYING APPARATUS

Filed Dec. 6, 1927 4 Sheets-Sheet 2

Fig. 3.

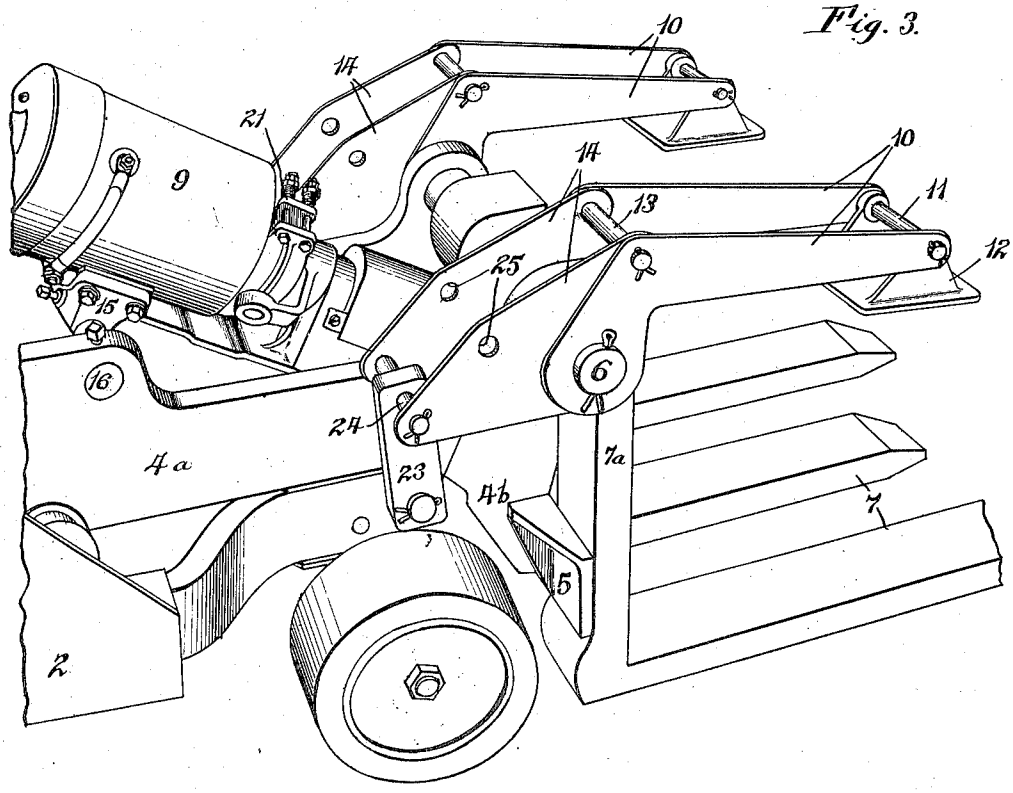
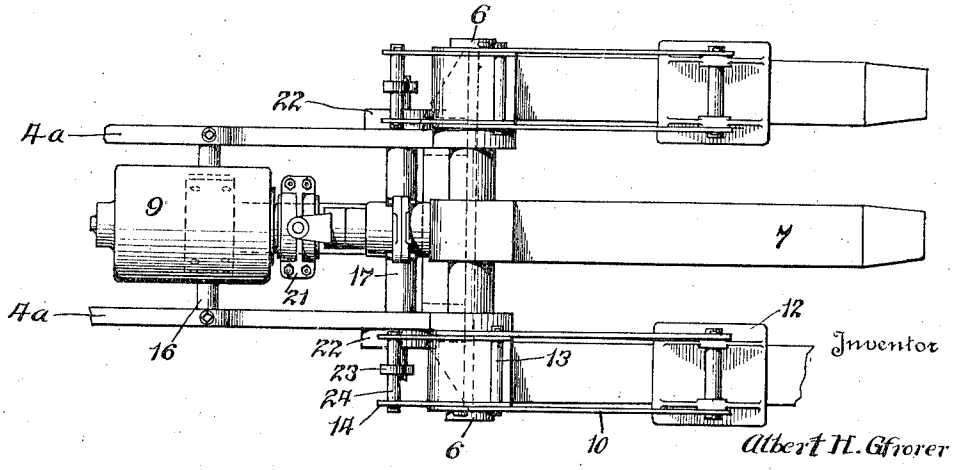


Fig. 4.



Inventor

Albert H. Gfrorer

By Popp and Burns.

Attorneys

June 10, 1930. A. H. GFRORER 1,763,351

CONVEYING APPARATUS

Filed Dec. 6, 1927 4 Sheets-Sheet 3

Fig. 5.

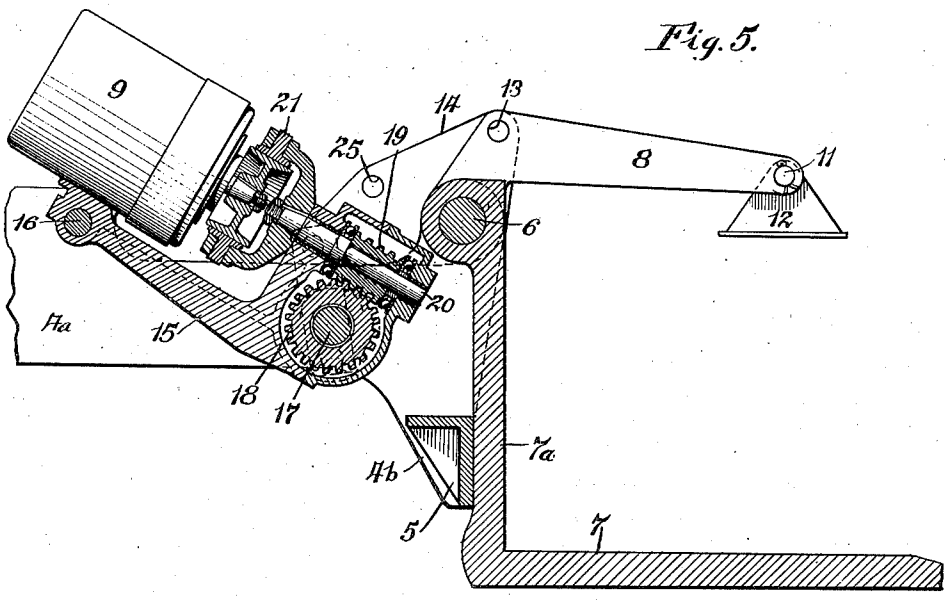
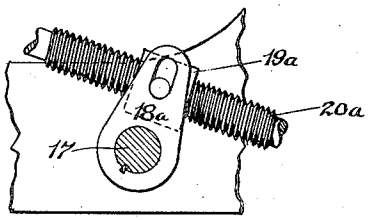


Fig. 8.



Inventor
Albert H. Gfrorer

By Popp and Powers.
Attorney

June 10, 1930. A. H. GFRORER 1,763,351

CONVEYING APPARATUS

Filed Dec. 6, 1927 4 Sheets-Sheet 4

Fig. 6.

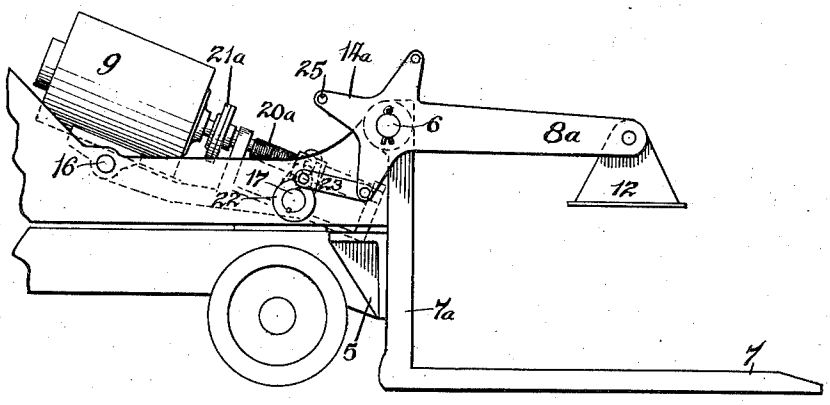
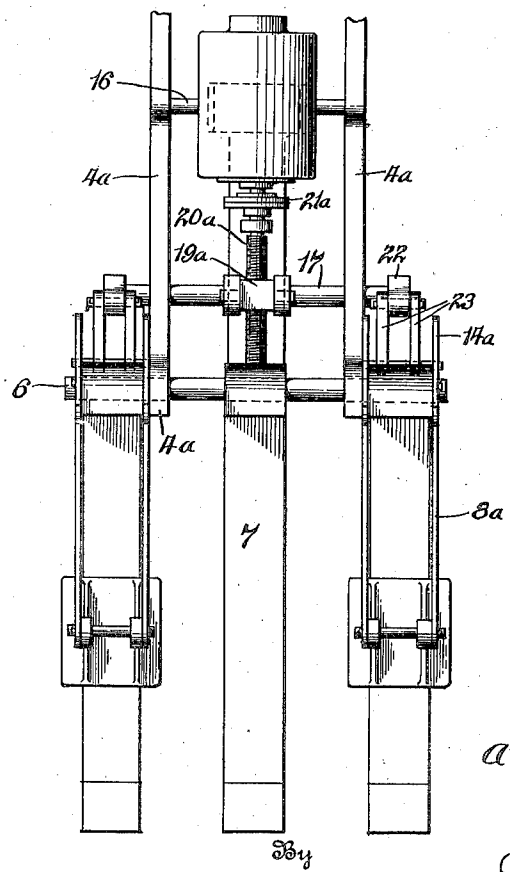


Fig. 7.



Inventor
Albert H. Gfrorer

By

Popp and Powers.
Attorney

Patented June 10, 1930 1,763,351

UNITED STATES PATENT OFFICE

ALBERT H. GFRORER, OF BUFFALO, NEW YORK, ASSIGNOR TO THE AUTOMATIC TRANSPORTATION COMPANY, INC., OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK

CONVEYING APPARATUS

Application filed December 6, 1927. Serial No. 238,091.

This invention relates to improvements in conveying apparatus and proposes certain novel load handling features which are especially intended for, although not necessarily limited to, industrial trucks of the tiering lifting type wherein the load supporting element can be raised to any desired elevation within its limits of movement.

An object of the invention is to provide a means which may be easily and quickly operated to clamp or release a load on the load supporting element.

A further object of the invention is to provide for the movement of such means to either of two positions, in one of which it cooperates with the load supporting element and in the other of which it is removed to a position where it cannot interfere with the loading or unloading of the element.

Embodiments of the invention are illustrated in the accompanying drawings, wherein:

Figure 1 is a perspective view of a load handling structure embodying my invention as applied to an industrial truck.

Figure 2 is a perspective view taken diagonally opposite to Figure 1.

Figure 3 is a perspective view of the load supporting element and clamping means.

Figure 4 is a top plan view of the load supporting element and clamping means with the base and wheels of the truck omitted for the sake of clearness.

Figure 5 is a central longitudinal sectional view of the load supporting element, clamping means and operating mechanism as shown in Figure 4 but with the operating motor shown in elevation.

Figure 6 is a side elevation of a slightly modified construction.

Figure 7 is a top plan view of the same.

Figure 8 is an enlarged fragmentary view of the driving connection utilized in the modification shown in Figures 7 and 8.

The invention essentially includes a load supporting element and a clamping member which is so mounted as to be capable of relative vertical clamping movement toward or away from the load supporting element, together with means for moving the clamping member.

The invention may be applied to a truck of any suitable construction but has particular utility in connection with industrial trucks of the tiering lifting type and such a truck is, therefore, illustrated in the drawings as indicated at 1. The truck shown includes a chassis 2 and an elevating screw 3 which functions to raise and lower the frame 4 by which the load supporting and clamping means together with their associated operating parts, are carried. The frame includes a pair of forwardly extending arms 4^a, the free ends of which are formed with depending extensions 4^b which carry adjacent their lower ends a cross piece 5. The free ends of the arms 4^a are also formed with openings for the accommodation and support of a transverse bar 6, the opposite ends of which project beyond the arms 4^a.

The bar 6 provides support for the load supporting element. This element preferably comprises a plurality of forwardly projecting bars 7 which at their rear ends are formed with upright supporting extensions 7^a mounted on the bar 6. Generally not more than three bars will be necessary for this element and these may be uniformly spaced along the bar 6, one being placed midway between the arms 4^a and the other two on the outer sides of the arms. The vertical alignment of the bars 7 is maintained by the cross piece 5 which provides an abutment against which the extensions 7^a bear.

The clamping means consists generally of a pair of levers 8 preferably of bell crank form, which are pivotally mounted on the bar 6 and are adapted to be moved to and from clamping position by a motor 9 and cooperating parts. This motor is located between and supported by the arms 4^a and is suitably connected to the clamping levers preferably by separate driving connections to each lever, such connections being arranged on relatively opposite sides of the motor. The motor 9 is of the reversible type and is controlled by a suitable manual reversing switch (not shown) which is located within easy reach of the operator who stands on the usual step

S at the rear of the truck. Inasmuch as the lever and driving mechanisms of each side are identical, only one will be described, it being understood that corresponding parts of the other will be indicated by similar reference numerals.

The bell crank lever 8 is composed of two bell crank arms 10 both of which are pivotally mounted on a projecting end of the bar 6 at opposite sides of the adjacent extension 7^a. The free ends of the arms extend over the load supporting element and carry a pin 11 by which the clamping head 12 is pivotally supported. The arms 10 also carry a pin 13 by which they are connected to a pair of adjacent brackets 14 which are also pivotally mounted on the bar 6. The brackets 14 form a part of the driving connection between the clamping lever 8 and the driving motor 9.

The motor 9 is mounted on a yoke 15 which is supported at opposite ends by a transverse bar 16 and a transverse shaft 17, said bar and shaft being supported by the arms 4^a. The shaft 17 also forms a part of the driving connection and, to this end, is provided with a centrally located gear 18 which meshes with an overlying worm 19 on shaft 20, the latter being connected to the motor by a slip clutch 21. The ends of the shaft 17 project beyond the arms 4^a and the projecting portion carries a crank arm 22 securely attached thereto. The crank arm 22 is connected to the brackets 14 by means of a link 23, the opposite ends of which are pivotally secured to the arm 22 and a pin 24 respectively, said pin being carried by the free end of the brackets. Obviously the bracket may be formed with additional apertures for the accommodation of pin 24 whereby the angles of the clamping and unclamping positions of the levers may be varied.

From the foregoing, it is apparent that when the motor is operated, the shaft 17 will be rotated with resultant movement of the crank arms 22. The crank arms act through the links 23 to rock the brackets 14 and thus move the clamping levers 8 about the bar 6 as a center. In this manner the levers are moved toward or away from the load supporting elements to clamp or release a load, it being understood that the motor may be rotated slowly enough to permit the movement of the clamping levers to be arrested at will at any desired point along their maximum path of travel in case the operator does not desire the clamping levers to bear with full pressure on the load. Of course if the operation of the motor is not stopped at the time the clamping levers engage the load such levers will bear upon the load with maximum pressure permitted by the slip clutch, the function of which is to prevent binding of the parts.

Now assuming that it is desired to load the truck, the frame 4 is raised or lowered to the desired level and the load manually placed on the supporting element, or, the truck is moved to cause the supporting element to pass underneath the load, whereupon when the frame 4 is raised, the load supporting element will engage and lift the load. The operator may then operate the clamping levers to clamp the load securely against the supporting element and thus prevent its displacement during transportation. When it is desired to unload the truck, the motor is operated in the reverse direction to cause the clamping levers to move away from the load and release the same, whereupon the motor is stopped when the levers have moved to the desired position.

When from the nature or size of the load, the use of the clamping levers may not be desired or may not be possible as for example, when they might prevent or obstruct the loading of the truck, the levers may be readily swung aside and rendered inoperative for clamping purposes. This is accomplished by transferring the pin 24 to the transverse openings 25 of the bracket 14 so as to connect the link 23 to that point of the bracket. In doing this, the levers will be moved to, and held in, an upright position as shown in Figure 2 where they cannot interfere with the load.

In Figures 6, 7 and 8, I have shown an embodiment of my apparatus in which the clamping levers 8 and brackets 14 are made integral and the driving connection modified. The clamping levers are indicated at 8^a and are formed with bracket extensions 14^a. The connection of the bracket extensions to the shaft 17 is obtained in the usual manner as by pins 24, links 23 and crank arms 22. The shaft 17 is operatively connected to the motor 9 by means of arms 18^a secured to the shaft on relatively opposite sides of the motor 9, and having a closed slot formed in their outer ends for the reception of the connecting pin of a travelling nut 19^a. The nut 19^a is threaded on a shaft 20^a which is driven by the motor through slip clutch 21^a.

The operation of the modification is, of course, substantially the same as that previously described. The motor when operated will move the nut 19^a in one direction or the other, and thereby move the shaft 17 through a corresponding arc. Such movement of the shaft is imparted to the clamping levers 8^a through the lever 22 and link 23. When it is desired to place the levers 8^a to one side, the pin 13 is placed in the apertures 25 of the bracket extensions 14^a in which position, the levers will be held upright.

Having fully described my invention, I claim:

1. The combination with a conveyor of a

supporting frame carried thereby and having spaced arms, a clamping lever pivotally mounted on and supported by said arms, a motor supported by said arms and a driving connection between said motor and said clamping lever.

2. The combination with a conveyor of a supporting frame carried thereby and having spaced arms, a bar mounted on the free ends of said arms, a clamping lever pivotally mounted on said bar, a motor supported by said arms and a driving connection between said motor and said clamping lever.

3. The combination with a conveyor of a supporting frame carried thereby and having spaced arms, a clamping lever pivotally mounted on and supported by said spaced arms, a motor supported by said spaced arms and a driving connection including a slip clutch between said motor and said clamping lever.

4. The combination with a conveyor of a supporting frame carried thereby and having spaced arms, a clamping lever pivotally mounted on the free end of said arms, a motor supported by said frame, a worm, an operative connection between said worm and motor including a slip clutch, a transverse shaft mounted in said spaced arms and operatively connected to said worm, a crank arm carried by said shaft and a link pivotally connected at opposite ends to said crank arm and clamping lever.

5. The combination with a conveyor having a load supporting element of a clamping lever mounted on the conveyor and arranged for movement through a range of positions over said load supporting element in which it is adapted to clamp a load supported on said element, said lever also being arranged for movement to one side away from said element and out of clamping relation thereto, motor means for moving said lever through said range of positions and means for holding said lever out of clamping relation with said element when it has been so moved.

In testimony whereof I hereby affix my signature.

ALBERT H. GFRORER.