Nov. 24, 1931. W. G. WEHR 1,833,545

PIPE GRAB

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Fig. 1.

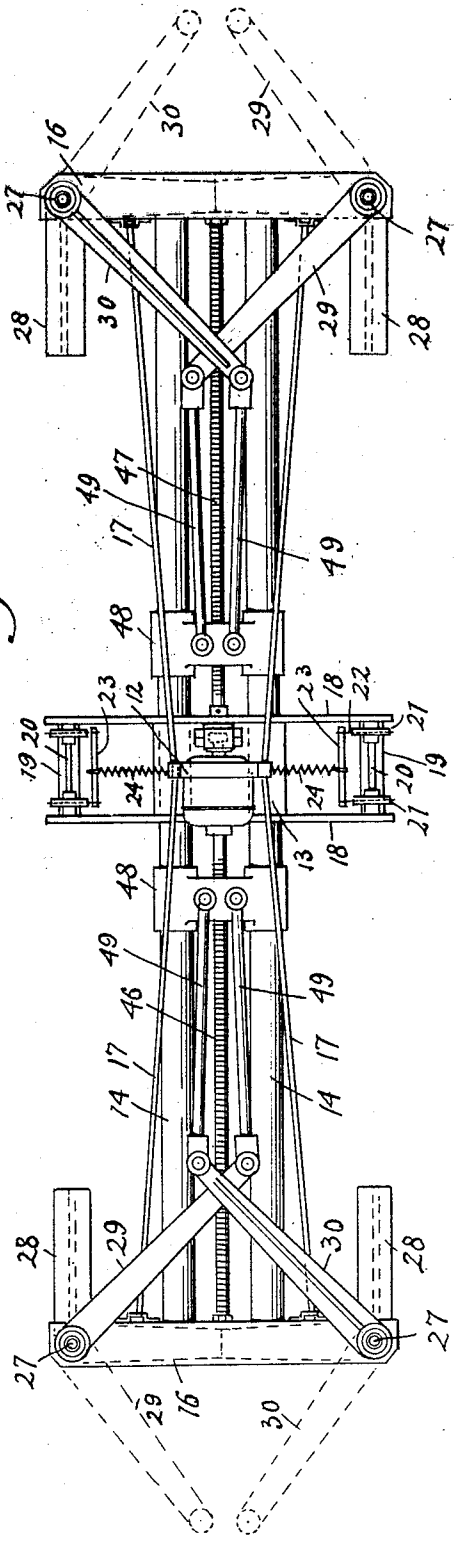
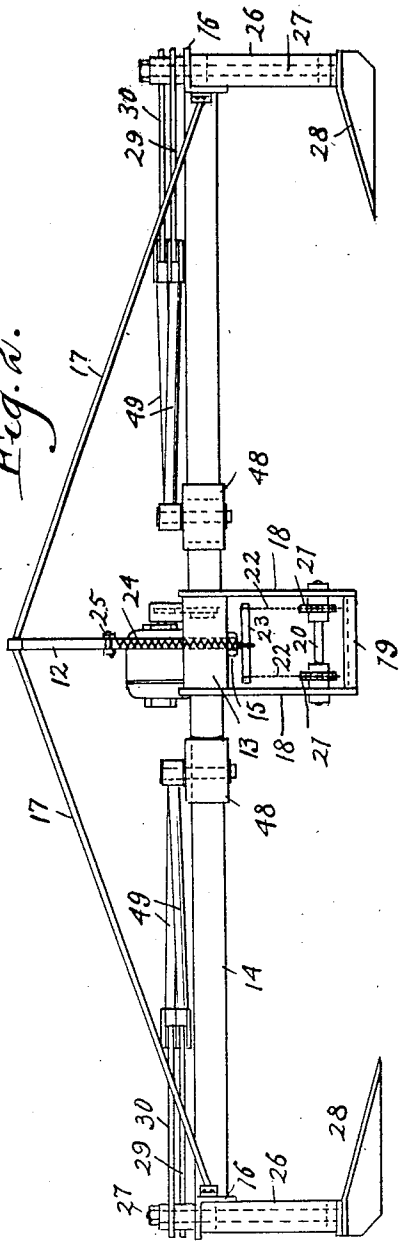


Fig. 2.



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Fig. 3.

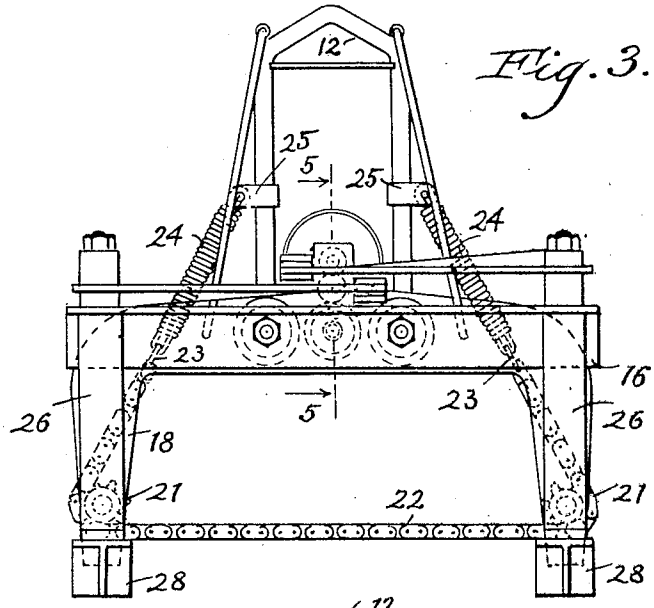
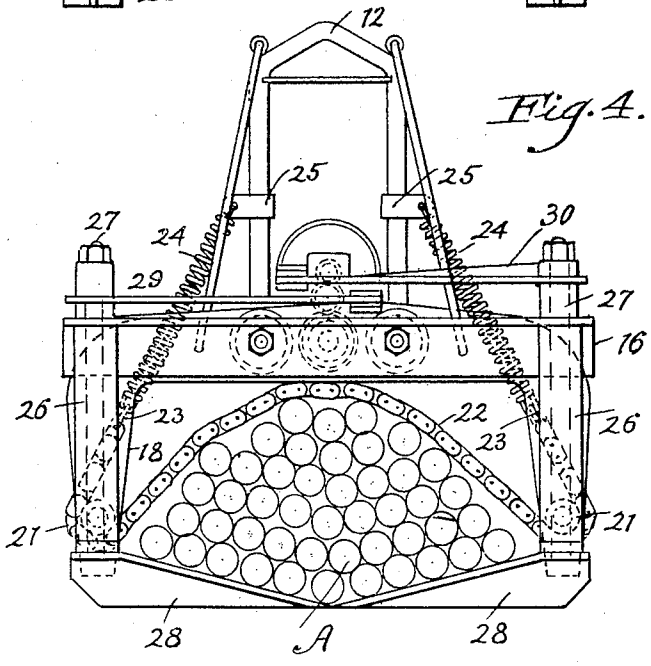


Fig. 4.



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Fig. 5.

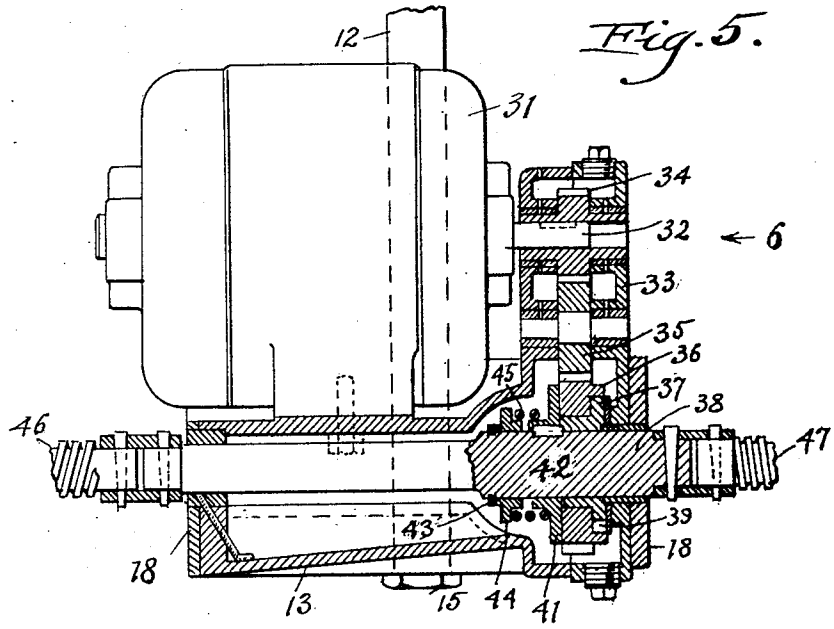


Fig. 7.

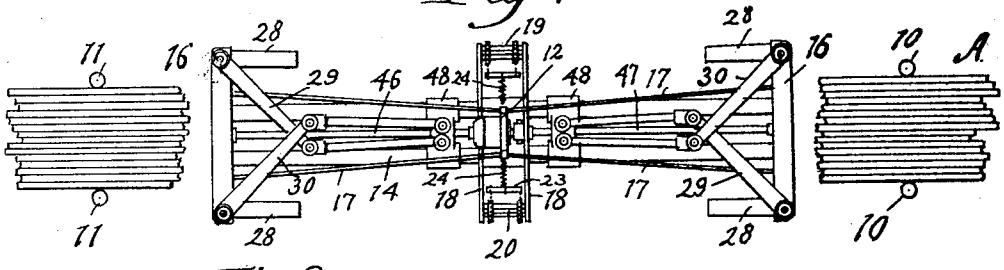


Fig. 8.

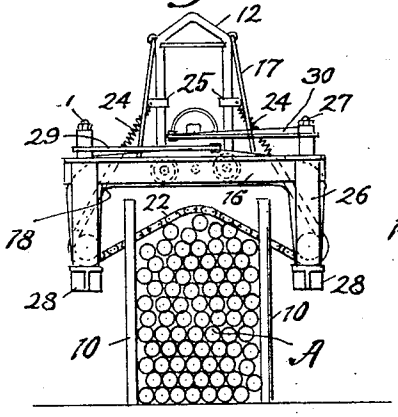
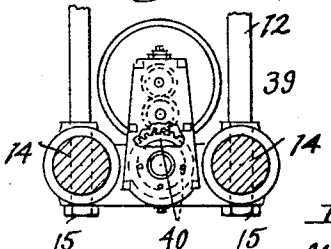


Fig. 6.



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UNITED STATES PATENT OFFICE

WILLIAM G. WEHR, OF EAST CLEVELAND, OHIO, ASSIGNOR TO THE CLEVELAND CRANE & ENGINEERING COMPANY, OF WICKLIFFE, OHIO, A CORPORATION OF OHIO

PIPE GRAB

Application filed November 22, 1929. Serial No. 409,068.

This invention relates to improvements in pipe grabs, that is loading and unloading devices adapted to grasp, lift and carry a large number of pipes or the like at one time.

One of the objects of the invention is the provision of a hold-down which will automatically adjust itself to the top of the pile of pipe being handled.

Another object is the provision of a hold-down which adjusts itself to the pile before the latter is lifted, and is maintained in operative position when a pile of pipe is deposited after the weight of the pile is taken off the grab, as distinguished from a hold-down which is drawn toward operative engagement by the weight of the pipe or other material being lifted.

Another object is the provision of a flexible hold-down which is capable of closely conforming to the contour of the pile, and of adapting itself to any changes that may occur in the arrangement of the pipes as the pile is lifted, transported and deposited.

Another object of the invention is the provision of a power operated drive mechanism for moving the feet of the grab, these feet being projectable inwardly from the legs of the grab to form the bottom support for a pile of pipes, this driving means acting positively to withdraw the feet and acting through a slip clutch to project the feet into the pile, whereby damage to the mechanism and to the pipe being handled is prevented.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawings, in which

Figure 1 is a plan view of a pipe grab embodying the invention.

Fig. 2 is a side elevation of the same.

Fig. 3 is an end view of the structure illustrated in Figs. 1 and 2.

Fig. 4 is a view similar to Fig. 3 but showing the grab loaded with pipe.

Fig. 5 is a detail view, partly in vertical section on the line 5—5, Fig. 3, showing the motor drive on a larger scale.

Fig. 6 is an end view, looking in the direction of the arrow 6 in Fig. 5, showing the drive gearing.

Fig. 7 is a plan view on a smaller scale illustrating the pipe grab as it is being lowered over a pile of pipe, the middle portions of the pipes being broken away for the sake of clearness, and

Fig. 8 is an end view of the same.

In Figs. 7 and 8 I have shown a pile of pipes A, retained by the standards 10 and 11, this being a common arrangement for storing pipes. The pipe grab is of a length preferably short enough to be located between the standards 10 and 11. It is adapted to be raised and lowered and moved about by means of a suitable crane, the hook of which engages beneath an arched hanger 12, comprising legs which extend through a box-like casting 13 and through parallel frame bars or tracks 14 which extend through said casting, the lower ends of the hanger legs being threaded for the reception of nuts 15, upon the upper surfaces of which the casting 13 rests. The ends of the frame consist of angle bars 16 which extend laterally in both directions beyond the parallel frame bars 14. In order to brace the frame, truss rods 17, attached to both of the angle bars 16, may connect the latter with the hanger 12 near the top thereof.

Secured to the casting 13 are two vertical plates 18, which are cut out on their lower sides to clear the pipe or other stacked material when the grab is lowered over the same and to provide depending arms spaced apart sufficiently to straddle the pile of material (see Fig. 8). These depending arms may be connected at their lower extremities at each side of the device by tie-bars 19. Spaced a short distance above the tie-bars 19 shafts 20 are mounted to rotate in the plates 18. These shafts carry sprockets 21 under which pass chains 22. The two chains are connected at their respective ends by bars 23, and each of these bars at an intermediate point is connected by means of a coil spring 24 with a bracket 25 upon the hanger 12. It will be apparent that as the device is lowered over a pile of pipe, for instance, the chains 22 will engage with the uppermost pipes of the pile, and thereafter as the frame continues to de-

scend the weight of the apparatus puts a pull upon the chains, causing them to turn the sprockets 21 and putting the springs 24 under tension. When the apparatus is lifted away from a pile of pipe on the other hand, the tension in springs 24 takes up the slack which would otherwise exist in the chains, that is to say, the springs 24 pull upwardly upon the ends of the chains, until when the apparatus is entirely clear of the pile the chains assume the position shown in Fig. 3 of the drawings.

Extending downwardly from the ends of transverse frame members 16 are cylindrical legs 26 which are fixed rigidly in position approximately in line with the depending arms of the plates 18. Through these legs extend vertical rock-shafts 27. To the lower ends of these rock-shafts are secured pipe supporting feet 28 that are preferably tapered toward their free ends, and are of a length to approximately meet when the feet are turned toward each other. On the upper ends of the rock-shafts 27 there are fixed lever arms 29 and 30 having hubs thicker on one side than on the other, the thick side of hubs of levers 29 being up and the thick sides of levers 30 being down so as to bring the levers proper to different levels and enable them to clear each other.

On the casting 13 between the legs of hanger 12 I mount an electric motor 31 of the reversible type. Any convenient electrical connections and switching means for starting and stopping the motor and changing the direction of rotation may be employed, such connections and means not being illustrated as the details of the same form no part of the present invention. The motor shaft 32 extends into a gear casing 33, where it is keyed to a pinion 34 that meshes with a pinion 35, which in turn meshes with a gear 36. This latter gear is in the form of a counterbored ring which is rotatably mounted upon a flanged collar 37 that is fixed to a shaft 38 that extends through the casting 13 and is mounted for rotation therein. The flange of the collar 37 is provided with a series of notches 39 in which are received balls 40 that are adapted to positively clutch the gear and collar together during rotation of the gear in one direction, and to permit free rotation of the gear in the opposite direction. In other words the gear 36 and collar 37 are connected by an overrunning clutch. 41 is a friction clutch plate adapted to frictionally engage a side surface of the gear 36, this plate being slidably connected with the shaft 38 by means of a key 42 or the like which prevents relative rotation between these parts. A ring 43 is set into a groove in the shaft 38 to form a stop against which bears a collar 44 that constitutes one abutment for a coil spring 45, the opposite end of the spring bearing against the clutch plate 41. Hence the rotation of the gear 36 in either direction tends to act through the friction clutch plate 41 to rotate the shaft 38 correspondingly, but the rotation of the gear 36 in one direction causes the over-running clutch to lock the gear 36 to the collar 37 and produces positive rotation of the shaft 38. In the latter case, the friction clutch connection is short circuited, so to speak.

The ends of the shaft 38 are connected by any suitable means with oppositely threaded screw shafts 46 and 47 that are arranged between and extend parallel with the frame bars 14, these screw shafts being rotatably mounted at their outer ends in the transverse frame bars 16. Slides 48 are threadably mounted upon the screws 46 and 47 and have smooth bearings upon the frame bars 14. Each of these slides is connected by a pair of links 49 with the corresponding lever arms 29 and 30.

Operation.—Assuming that the pipe grab is connected through the hanger 12 with a crane, the latter may be operated to position the apparatus above a pile of pipes A and lowered to cause the legs 26 and the depending arms 18 to straddle the pile, as indicated in Figs. 7 and 8. As the apparatus is lowered, the chains 22 engage the top of the pile, the springs 24 being extended to permit this action. The lowering of the apparatus is continued until the feet 28, which are then parallel with the pipes A, are brought to the desired level which, of course, may vary depending upon the number of pipes which it is desired to move. The motor 31 is then caused to rotate in the anti-clockwise direction, as viewed from the right of Fig. 5. This produces an anti-clockwise rotation of the gear 36, which is thereby permitted to run on the collar 37 without rotating the latter. Rotation is transmitted to the shaft 38 however through the intermediacy of the slip-clutch 41. The screws 46 and 47 are thereby rotated to produce outward travel of the slides 48, thereby swinging the arms 29, 30 and the feet 28 from their full line positions of Fig. 1 toward their dotted line positions thereof. The pointed ends of the feet 28 wedge apart the pipes A in the pile, imparting a slight lifting movement to the pipes located above the level of the feet. If one or both pairs of feet, in approaching the dotted line positions of Fig. 1, should happen to wedge themselves against the sides of a pipe instead of working themselves between superposed pipes, as will generally occur, the springs 45 will yield permitting the clutch plate 41 to slip and thus preventing the feet from jamming against the pipe. On account of the inertia of the rotating parts, such jamming might be sufficiently tight to render it impossible for the motor, when reversed, to release the feet. Furthermore such jamming would be apt to break some part of the mechanism or ruin the pipe which was thus engaged.

The pipes above the feet 28, being still re-

tained against outward movement by the standards 10 and 11, may now be lifted by the crane. As they clear the standards 10 and 11, they necessarily move laterally to some extent, tending to fill the space between the depending arms 18. As this occurs however, the chains 22 automatically move to conform to the changed contour of the pile, and continue to hold the pile down securely upon the feet 28. As the crane moves, its load is apt to swing more or less, and one end may be tilted above the other, but the chains 22 under tension engaging the uppermost pipes prevent them from sliding off the pile.

When the load is deposited, if it be between standards similar to the standards 10 and 11, the pipe grab and its load is properly positioned above the standards, the legs 26 and depending arms 18 extending laterally beyond the standards. The motor 31 is then started in a clockwise direction, causing the gear 36 to rotate clockwise, whereby it is locked to the collar 37 and the shaft 38 is turned positively to produce travel of the slides 48 inwardly from the dotted line position of Fig. 1 toward the full line position thereof. As soon as the feet 28 are parted sufficiently to clear the lowermost pipe, the pipes drop down centrally between the standards of the pile on the floor or ground, and consequently none of the pipes in being deposited falls outside the standards of the pile. The tension on chains 22 assists gravity in rolling the pipes downwardly upon the feet 28, and when the latter are finally swung outwardly to their parallel position, the lower runs of the chains 22 again assume a horizontal position as shown in Fig. 3 and the grab is ready to be again loaded.

While in the foregoing specification and accompanying drawings I have disclosed one embodiment of the invention more or less in detail, I desire it to be understood that such detailed disclosure is primarily for the purpose of fully illustrating the invention, and is not to be construed as amounting to a limitation upon its scope.

Having thus described my invention, I claim:

1. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a flexible hold-down carried by said frame and extending transversely of the pile of pipe and adapted to conform to the top of the pile as the frame is lowered thereover, and means projectable across and beneath the pile to form the bottom of the grab.

2. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a chain hold-down carried by said frame and extending transversely of the pile of pipe, means for taking up slack in said chain, said means being adapted to yield as the frame descends, and means projectable across and beneath the pile to form the bottom support therefor.

3. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a flexible hold-down carried by said frame and extending transversely of said pile of pipe and adapted to conform to the top of the pile as the frame is lowered thereover, said hold-down comprising a resilient element adapted to yield as the weight of the frame is applied to the hold-down, and means projectable across and beneath the pile to form the bottom support therefor.

4. In mechanism of the character described, a frame adapted to be lowered over a pile of pipe or the like, depending arms on said frame adapted to straddle said pile, rotatable elements on said arms, a flexible hold-down extending transversely of the frame and running underneath said rotatable elements, the ends of said hold-down being secured to said frame, and yieldable means for taking up the slack in said hold-down.

5. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a track on said frame extending lengthwise thereof, a pair of legs depending from said frame and adapted to straddle the pile of pipe, feet carried by said legs and projectable across and beneath the pile to form a bottom support therefor, a slide movable on said track and operatively connected with said feet to move the latter to and from operative position as the slide moves back and forth upon the track, and power operated means for driving said slide positively in one direction and through a slip-clutch in the opposite direction.

6. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a track on said frame extending lengthwise thereof, a pair of legs depending from said frame and adapted to straddle the pile of pipe, feet carried by said legs and projectable across and beneath the pile to form a bottom support therefor, a slide movable on said track and operatively connected with said feet to move the latter to and from operative position as the slide moves back and forth upon the track, power operated means for driving said slide including a slip-clutch, and means for automatically short-circuiting said clutch during the retraction of said feet.

7. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a track on said frame extending lengthwise thereof, a pair of legs depending from said frame and adapted to straddle the pile of pipe, feet carried by said legs and adapted to swing from a position parallel with the pipe to a position transverse thereof, a slide movable on said track, lever arms mounted for oscillatory movement upon said legs and operatively connected with said feet, links connecting the free ends of said lever arms with said slide, whereby the movement of the slide back and forth upon the track produces a swinging movement of said feet into and out of opera-

tive position, a screw operatively connected with said slide, and a motor drivingly connected with said screw.

8. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a track on said frame extending lengthwise thereof, a pair of legs depending from said frame and adapted to straddle the pile of pipe, feet carried by said legs and adapted to swing from a position parallel with the pipe to a position transverse thereof, a slide movable upon said track, a lever arm mounted for oscillatory movement upon each of said legs and fixed to the corresponding foot, said lever arm being arranged diagonally on one side of the transverse plane through said legs when the corresponding foot is parallel to the pipes in the pile, and being arranged diagonally on the other side of the said plane when the corresponding foot extends inwardly in the said plane, and links connecting the free ends of said lever arms with said slide, whereby the movement of the slide back and forth upon the track swings said feet into and out of operative position.

9. In a pipe grab, a frame adapted to be lowered over a pile of pipe, a track on said frame extending lengthwise thereof, a pair of legs depending from said frame and adapted to straddle the pile of pipe, feet carried by said legs and projectable across and beneath the pile to form the bottom of the grab, a slide movable on said track and operatively connected with said feet to move the latter to and from operative position as the slide moves back and forth upon the track, a screw arranged parallel with said track and threadably connected with said slide, and a motor for rotating said screw.

In testimony whereof, I hereunto affix my signature.

WILLIAM G. WEHR.