

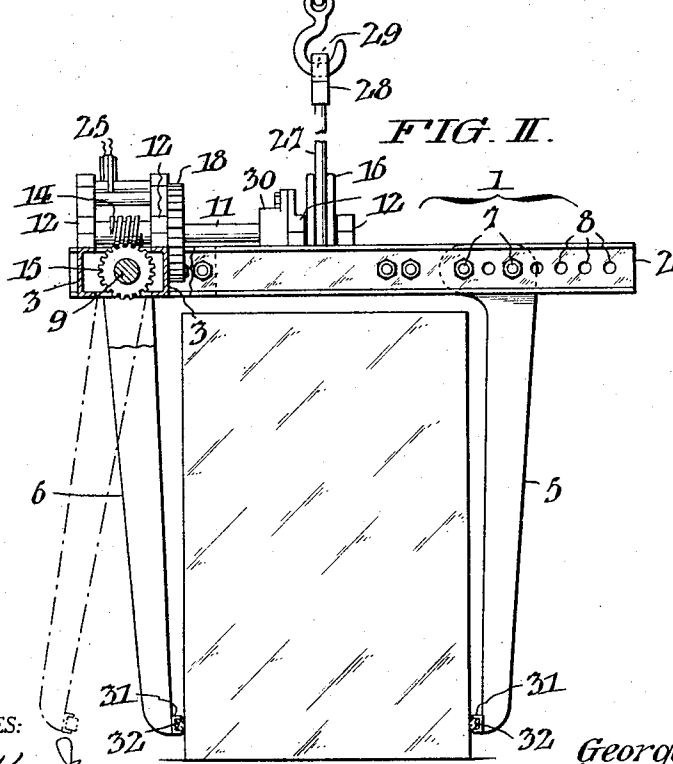
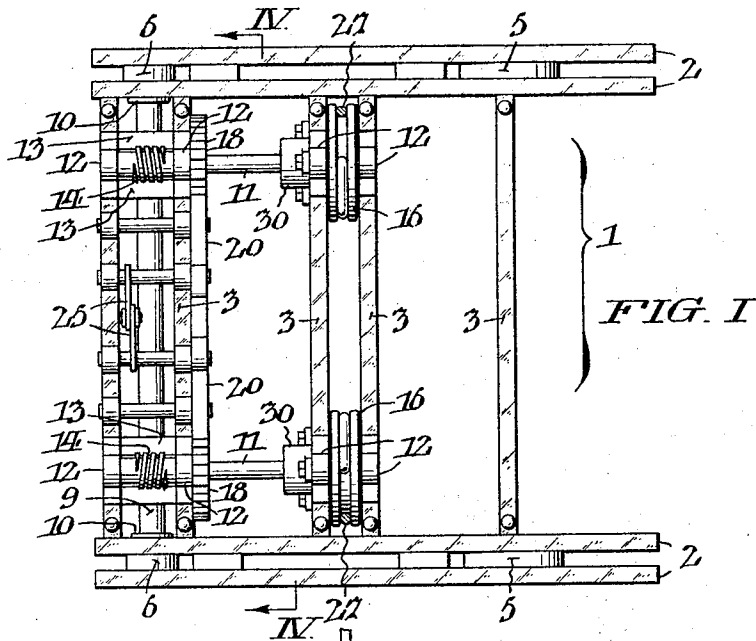
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G. W. BUTTS

1,895,649

LIFTING GRAB

Filed Aug. 12, 1932 2 Sheets-Sheet 1



WITNESSES:

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FIG. III

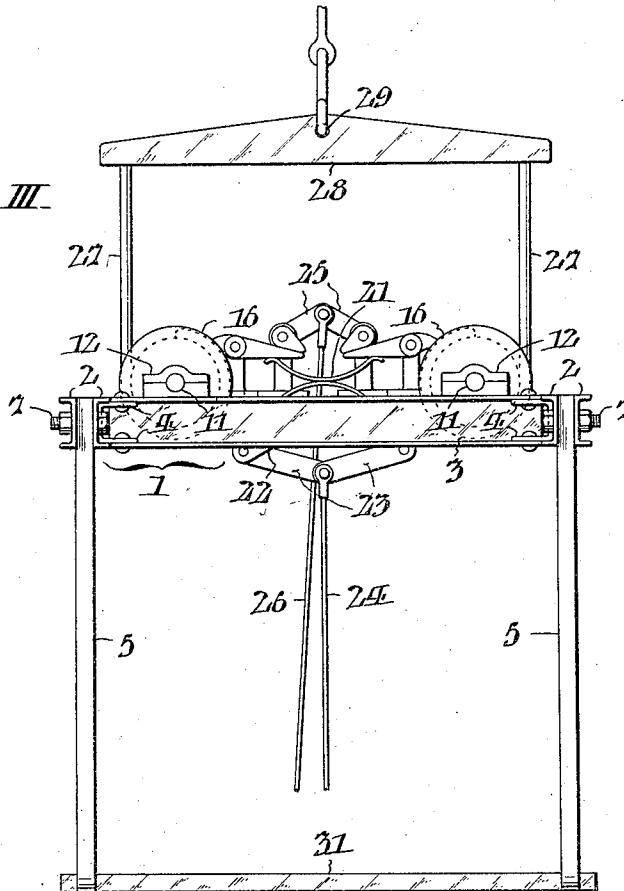
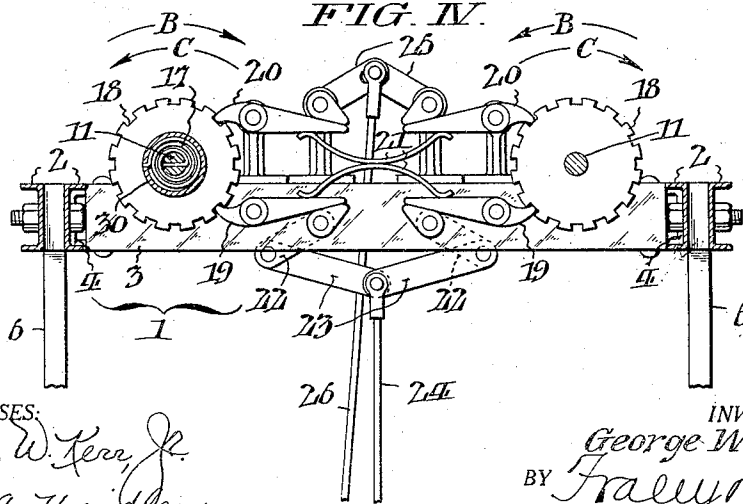


FIG. IV



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UNITED STATES PATENT OFFICE

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LIFTING GRAB

Application filed August 12, 1932. Serial No. 628,490.

My invention relates generally to lifting devices, and more particularly to lifting grabs useful for the hoisting and shifting of containers, or of stacked articles, such as brick, tile or the like, and characterized by jaws which are adapted to surround the load and to hold the same by pressure exerted from opposite sides.

In the handling of containers by the customary lifting slings, it is the usual practice for an operator to couple the sling to hooks or eyes at the top of the container by a manual operation, and this makes it necessary for the man to climb to the top of the container, or to ride on the lifting sling,—a dangerous, time-consuming operation.

Accordingly, the principal object of this invention is to provide a lifting grab which is mechanically operable to engage or release the load, and manually controlled by an operator standing on the ground.

Another object of this invention is to provide in such a lifting grab, gravity actuated mechanism for closing the load engaging jaws and spring-actuated mechanism for spreading the jaws whereby no additional source of power is necessary for these operations.

Other objects and advantages of the invention will be apparent from the description which follows hereinafter and which has reference to the accompanying drawings, in which there is illustrated one form or embodiment which the invention may take. Of the drawings:

Fig. I represents a plan view of a lifting grab of my invention.

Fig. II represents a front elevation of the same, showing its application to a load.

Fig. III represents a side elevation of the same; and,

Fig. IV represents a section taken as indicated by the lines IV—IV of Fig. I, showing the control mechanism.

In the drawings there is shown a lifting grab adapted to be applied to rectangular objects such as containers or stacks of bricks. The rectangular frame comprehensively designated 1 comprises longitudinal channel beams 2 joined together by transverse chan-

nel beams 3 which are riveted to connecting pieces 4, which in turn are riveted to the longitudinal channel beams 2. The longitudinal channel beams 2 are arranged back to back in pairs, and fixed jaws 5 and movable jaws 6 are mounted between the members constituting a pair. The fixed jaws 5 are secured in place by means of bolts 7. Additional holes 8 are provided in the longitudinal channel beams 2 to allow adjustment of the fixed jaws 5 to adapt the apparatus to the handling of loads of different size. The movable jaws 6 are mounted between longitudinal channel beams 2 on a common shaft 9 supported in bearings 10.

Certain of the transverse channel beams 3 serve as a framework for supporting the operating mechanism hereinafter described. Drive shafts 11 are mounted in bearings 12 which are supported on the transverse channel beams 3. The bearings 12 are preferably of the usual type with a removable top for inspection, repair and cleaning. Plates 13 are bolted to the channel beams 3 adjacent to the bearings 12 to add strength to the structure. The drive shafts 11 have thereon worm gears 14 which engage gear teeth 15 on said shaft 9. A drum 16 is mounted on each drive shaft 11 at the opposite end from its said worm gear 12. Springs 17 mounted in casings 30 on the frame 1 serve to urge the drive shafts 11 to revolve in a direction that will maintain the movable jaws 6 in an open position. These springs 17, in the present example of my invention, are of a common helical type, though obviously other types of springs may be used to perform the same function.

Also mounted on these drive shafts 11 to turn simultaneously therewith are ratchet wheels 18, by means of which the operation of the jaws 5 and 6 is controlled. These ratchet wheels 18 are fitted with pawls 19 and 20 urged into engagement with the ratchet wheels 18 by springs 21. The pawls 19 prevent the ratchet wheels 18 from turning in one direction, while the pawls 20 prevent them from turning in the other direction. The pawls 19 are disengaged from the ratchet wheels 18 by links 22. Additional links 23

connected to the links 22, and to which the trip cord 24 is connected, coordinate the operation of both pawls when the trip cord 24 is pulled. The other pawls 20 are disengaged from the ratchet wheels 18 by pivoted links 25. The links 25 are so formed that they may be operated by an additional trip cord 26.

Fastened to the drums 16 and winding around them are suspension cables 27 which lead to a spreader 28. The spreader 28 is adapted to be suspended from overhead hoisting apparatus by a cable fastened to the eye 29. The force of gravity acting on the apparatus transmitted through the suspension cables 27, the drums 16, the drive shaft 11, and the worm gear 14 to the shaft 9 furnishes the power to close the jaws 6. The springs 17 are of sufficient strength to urge the jaws 6 open when no load is carried, and the cables 27 are so wound on the drums 16 that the turns around the drums 16 are not exhausted before the jaws 6 are urged to complete closure. The springs 17 may be adjusted to the proper tension by turning the casings 30. To aid in the grasping of the load, a long channel piece 31 is bolted to the tips of each of the fixed jaws 5 and a similar piece 31 is bolted to the movable jaws 6. These channel pieces 31 are lined with compressible material 32, preferably rubber, to facilitate the grasping of the load and to insure a firm grip thereon.

With the foregoing description in mind, the operation of the above described lifting grap is as follows. Assuming the jaws 5 and 6 to be in the spread position, as shown in dot-and-dash lines in Fig. II, and the load to be upon the ground ready to be lifted, the apparatus is lowered over the load with the jaws 5 and 6 straddling the load. As both pawls 19 and 20 are held in engagement with the ratchet wheels 18, the jaws are locked in the open position at this stage. After the jaws are carefully positioned with the load, the control line 26 is pulled by hand, releasing pawls 20 and allowing rotation of the drive shafts 11 in the direction indicated by arrow B, urging the movable jaws 6 to a closed position. This closure is effected through the force of gravity acting on the lifting apparatus as explained above. When the jaws 5 and 6 have firmly grasped the load, the control line 26 is released, allowing the pawls to engage again the ratchet wheels 18 under the pressure of the springs 21. The apparatus and load is then lifted and deposited as desired. The spreader 28 is further lowered to cause slack in the suspension cables 27. Then the control line 24 is pulled by the operator, disengaging the pawls 19 from ratchet wheels 18, and allowing the ratchet wheels 18 and drive shafts 11 to rotate under the force of the spring mechanisms 17 in the direction indicated by

arrows C. This causes the movable jaws 6 to move to an open position, releasing the load. As all the machinery is located on top of the apparatus, there is no danger of damage to the machinery from contact with other objects in its operation.

While I have shown one form which the invention may take, and have described a particular arrangement of parts, it will be apparent that various changes may be made in the form of the apparatus without departing from the spirit of my invention as defined in the claims hereto annexed.

Having thus described my invention, I claim:

1. In a lifting device of the character described, a frame, gripping jaws mounted on said frame, one such jaw being pivotally mounted for movement toward and away from the other jaw, gravity actuated mechanism operable to close said movable jaws incident to suspension of the frame, spring actuated mechanism for opening said movable jaws, and means for controlling the operation of said gravity actuated and said spring actuated mechanisms.

2. In a lifting device of the character described, a frame, gripping jaws mounted on said frame, one such jaw being pivotally mounted for movement toward and away from the other jaw, a shaft rotatable on said frame, said shaft being geared to said pivoted jaw, a drum on said shaft, and a suspension cable for said frame attached to said drum.

3. In a lifting device of the character described, a frame, gripping jaws mounted on said frame, one such jaw being pivotally mounted for movement toward and away from the other jaw, a shaft rotatable on said frame, said shaft being geared to said pivoted jaw and normally spring urged to maintain said jaws in spread position, a drum on said shaft, and a suspension cable for said frame attached to said drum whereby said jaws are drawn together incident to the raising of a load.

4. In a lifting device of the character described, a frame, gripping jaws mounted on said frame, one such jaw being pivotally mounted for movement toward and away from the other jaw, drive shafts mounted on said frame and geared to said movable jaws, springs for turning said shafts in one direction, drums mounted on said shafts for turning them in the other direction, suspension cables fastened to and wound around said drums so that the weight of the lifting device causes said drums to turn, and means for locking and unlocking said drums on said frame.

5. In a lifting device of the character described, a frame, spaced movable jaws mounted on said frame, fixed jaws mounted on said frame to cooperate with said mov-

able jaws, drive shafts geared to said movable jaws, said shafts being normally spring urged to maintain said jaws in spread position, drums on said shafts, suspension cables attached to said drums whereby said jaws are drawn together incident to the suspension of the frame, ratchet wheels mounted on said shafts, one set of pawls engaging said ratchet wheels to prevent rotation in one direction, another set of pawls engaging said ratchet wheels to prevent rotation in the opposite direction, and a tripping mechanism including control lines for disengaging said pawls to allow said shafts to rotate in one or the other direction.

6. In a lifting device of the character described, a frame, spaced movable jaws mounted on said frame, fixed jaws mounted on said frame to cooperate with said movable jaws, drive shafts geared to said movable jaws, said shafts being normally spring urged to maintain said jaws in spread position, drums on said shafts, suspension cables attached to said drums whereby said jaws are drawn together incident to the suspension of the frame, ratchet wheels mounted on said shafts, one set of pawls engaging said ratchet wheels to prevent rotation in one direction and another set of pawls engaging said ratchet wheels to prevent rotation in the opposite direction, springs normally maintaining said pawls in engagement with said ratchet wheels, and a tripping mechanism including control lines for disengaging said pawls to allow said shafts to rotate in one or the other direction.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 10th day of Aug., 1932.

GEORGE W. BUTTS.