

Dec. 31, 1940.

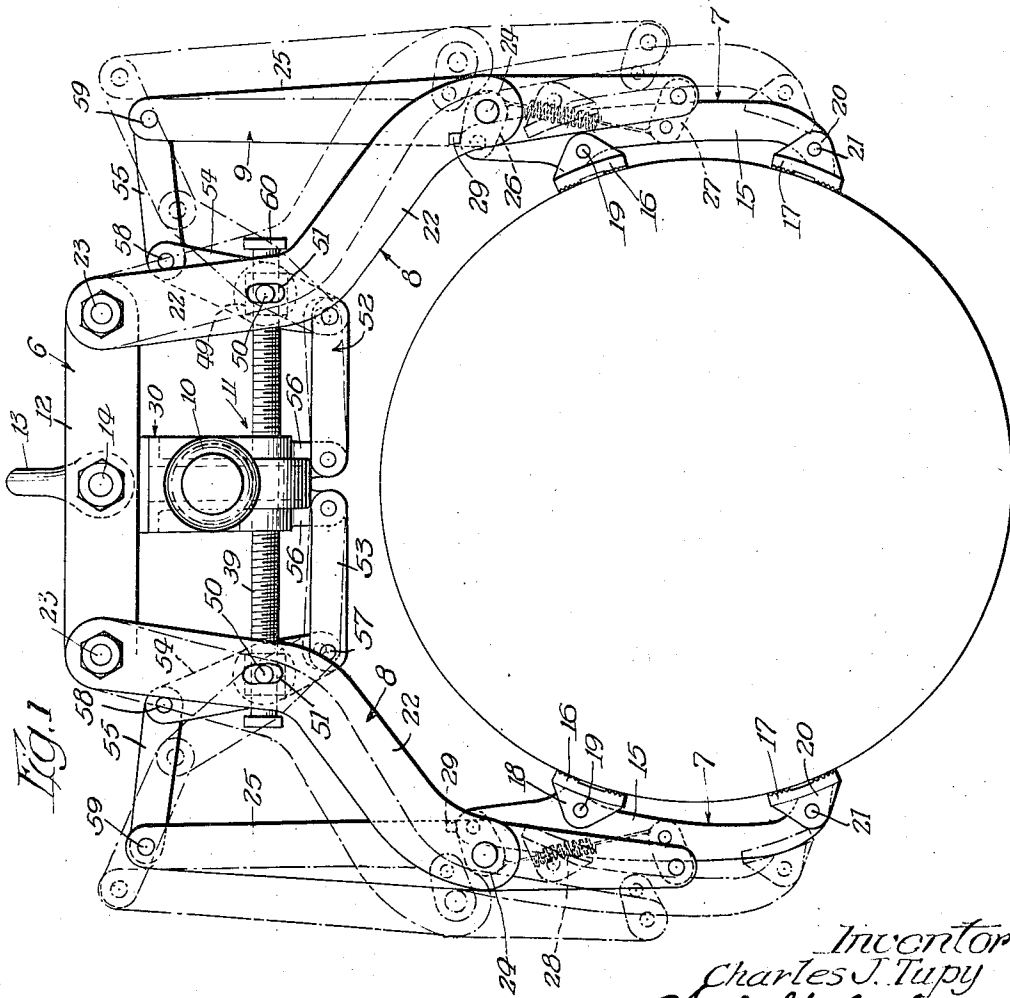
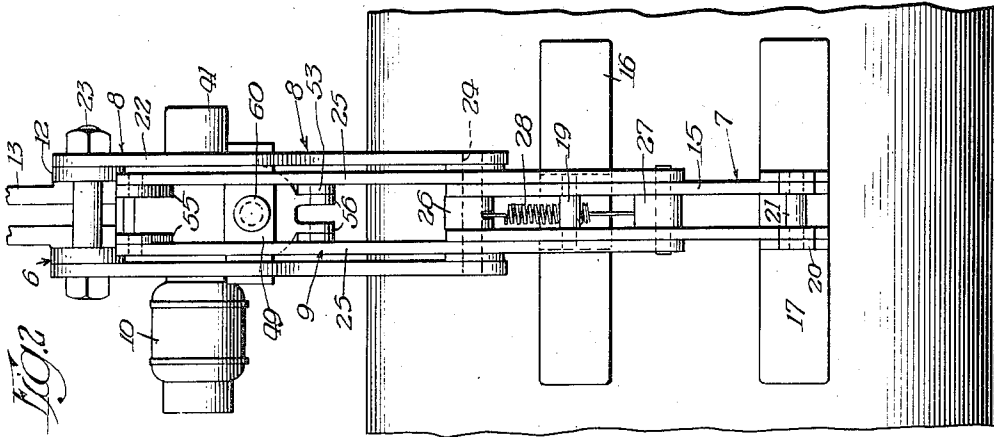
C. J. TUPY

2,226,789

LIFTER

Filed Nov. 28, 1938

2 Sheets-Sheet 1



Inventor
Charles J. Tupy
By Fred Oberlach
his Atty.

Dec. 31, 1940.

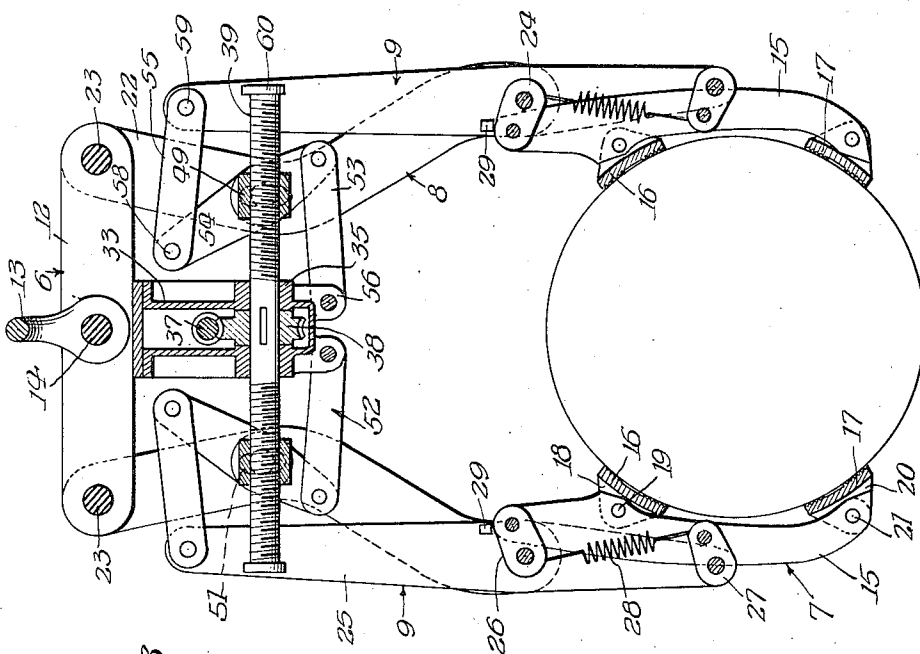
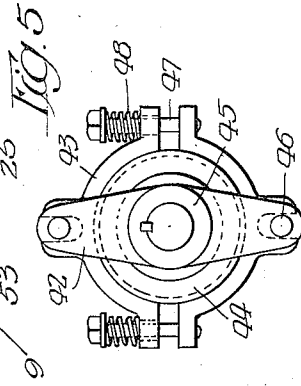
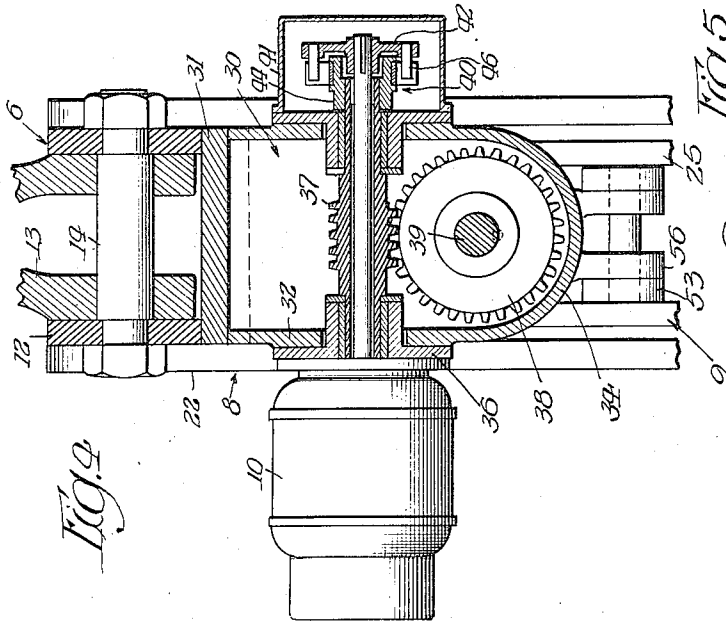
C. J. TUPY

2,226,789

LIFTER

Filed Nov. 28, 1938

2 Sheets-Sheet 2



Inventor
Charles J. Tupy
By Fred E. Glash
his Atty

UNITED STATES PATENT OFFICE

2,226,789

LIFTER

Charles J. Tupy, Chicago, Ill., assignor to Cullen-Friededt Company, Chicago, Ill., a corporation of Illinois

Application November 28, 1938, Serial No. 242,694

8 Claims. (Cl. 294—106)

The present invention relates generally to lifters for use in handling or transporting from place to place large paper rolls or like articles. More particularly the invention relates to that type of lifter which is adapted to be hoisted and moved from place to place by a crane or overhead hoist, and comprises as its main or principle parts an elongated supporting element which is adapted normally to extend horizontally and has means whereby it may be attached to a hook or other connecting device on the operating end of the crane or hoist with which the lifter is used, a pair of opposed vertically and horizontally elongated jaws which are disposed beneath the ends of the supporting element and are adapted to be brought into engagement with the sides of a roll, vertically extending arms which extend between the supporting element and the jaws and serve to carry or support the latter, and motor driven gearing which is associated with, and carried by, the supporting element and operates when driven in one direction to shift the arms and jaws apart and when driven in the opposite or reverse direction to shift the arms so as to bring the jaws into gripping relation with the roll or other article to be carried by the lifter.

One object of the invention is to provide a lifter of this type which is an improvement upon previously designed lifters of the same general character and is so designed and constructed that it occupies materially less space and hence has greater capabilities of use and is readily manipulable or usable in places or spaces where other lifters cannot be used because of their size.

Another object of the invention is to provide a lifter of the type under consideration in which the jaw carrying arms are four in number and consist of (1) a pair of primary arms which have the upper ends thereof pivotally connected to the ends of the horizontally extending elongated supporting element and their lower ends pivotally connected to the upper portions of the jaws, and are connected to the motor driven gearing so that they swing outwards in response to drive of the gearing in one direction and swing inwards in response to drive of the gearing in the opposite or reverse direction; and (2) a pair of secondary arms which have the central portions thereof pivotally connected to the lower ends of the primary arms and their lower ends connected to the central portions of the jaws.

A further object of the invention is to provide a lifter of the last mentioned character which includes linkages whereby the secondary arms are so controlled during outward or inward shift or

swing of the jaws that the jaws are maintained substantially in parallel relation at all times and hence operate effectively and efficiently to grab the sides of a roll or article regardless of whether it is of large or small size.

A still further object of the invention is to provide a roll or article lifter which is generally of new and improved design and may be manufactured at a low and reasonable cost.

Other objects of the invention and the various advantages and characteristics of the present lifter will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Figure 1 is a side elevational view showing a lifter embodying the invention in gripping relation with a paper roll of large size;

Figure 2 is an end view of the lifter;

Figure 3 is a vertical longitudinal sectional view, showing the lifter in gripping or grabbing relation with a paper roll of small size;

Figure 4 is an enlarged sectional view of a part of the motor driven gearing for swinging the arms and jaws to and from one another; and

Figure 5 is an end view of the friction clutch between the motor and the gearing.

The lifter which is shown in the drawings constitutes the preferred embodiment of the invention. It is adapted in connection with a crane or overhead hoist having a connecting device at its operating end, to lift and remove from one place to another a roll of newsprint paper, or a like object, and comprises as its principle parts or elements, an elongated supporting element 6, a pair of opposed jaws 7, a pair of jaws carrying primary arms 8, a pair of secondary arms 9, a reversible electric motor 10, and gearing 11 between the motor and the arms for conjointly shifting the latter to and from one another in order to bring the jaws into and out of engagement with the sides of the roll.

The supporting element 6 is adapted normally to extend horizontally. It carries the motor and gearing and also the primary arms 8 and consists of a pair of laterally spaced parallel coextensive bars 12. A bail 13 extends between, and is fixedly connected by a bolt 14 to, the central portions of the bars 12 and serves as the attach-

ing medium between the lifter and the connecting device at the operating end of the crane or hoist with which the lifter is associated.

The jaws 7 are adapted, as hereinafter described, to be shifted or swung to and from one another in response to actuation of the gearing 11 by the reversible electric motor 10. They are vertically and horizontally elongated and comprise pairs of laterally spaced vertically extending bars 15, upper horizontally extending shoes 16, and lower horizontally extending shoes 17, and are pivotally connected, as hereinafter described, to the lower ends of the primary and secondary arms 8 and 9. The upper shoes 16 of the jaws are connected to the central portions of the bars 15 for limited pivotal movement by means of pairs of pivot lugs 18, and a pair of horizontally extending pivot pins 19. The lugs are formed integrally with and extend outwardly from the central portions of the shoes 16 and are arranged in straddled relation with the inner central portions of the bars 15 of the jaws. The pivot pins 19 are carried by the bars 15 and extend through aligned holes in the lugs 18 and the central inner portions of the bars 15. The lower shoes 17 are positioned beneath the upper shoes and are connected to the lower ends of the bars 15 for limited pivotal movement by way of pairs of pivot lugs 20 and a pair of pivot pins 21. The lugs 20 are formed integrally with and project outwardly from the central portions of the shoes 17 and are arranged in straddled relation with the lower ends of the bars 15. The pins 21 are carried by the lower ends of the bars 15 and extend through holes in the lugs 20. By having the shoes 16 and 17 connected to the bars 15 of the jaws for limited pivotal movement the shoes adjust themselves readily to the contour of the roll. If desired, facings (not shown) of rubber or other suitable material may be applied to the inner faces of the shoes 16 and 17 in order to prevent the shoes from digging into or otherwise injuring the roll when the jaws are brought into gripping relation with the latter.

The arms 8 consist of pairs of laterally spaced bars 22. The upper ends of these bars extend substantially vertically and are arranged in straddled relation with the ends of the bars 12 constituting the horizontal supporting element 6. Bolts 23 extend through aligned holes in the ends of the bars 12 and the upper ends of the bars 22 and constitute pivotal connections between the upper ends of the primary arms 8 and the ends of the element 6. The lower ends of the bars 22 constituting the primary arms 8 extend downwardly and outwardly at an angle of approximately 45° with respect to the horizontal, and embody at their lower extremities horizontally extending pivot pins 24.

The secondary arms 9 extend substantially vertically, as shown in Figures 1, 2 and 3 and comprise pairs of bars 25. The latter are formed of steel or any other suitable material and are arranged in laterally spaced and parallel relation. The central portions of the bars 25 constituting the secondary arms 9 fit against the inner faces of the lower ends of the bars 22 constituting the primary arms 8 and have holes through which the pivot pins 24 extend. These holes are of such diameter that the central portions of the arms 9 are free to pivot on the pins 24.

The jaws 7 are connected to the primary and secondary arms 8 and 9 by upper links 26 and

lower links 27. The upper links extend between and are pivotally connected to the pins 24 and the upper ends of the bar 15 of the jaws and the lower links 27 extend between and are pivotally connected to the lower ends of the bars 25 constituting the secondary arms 9 and the central portions of the bars 15. The upper and lower links are disposed in parallel relation. They extend upwardly and inwardly, as shown in Figures 1 and 3 and constitute a parallel linkage whereby the jaws 7 after being brought into contact with the sides of a roll or other article, are caused to move inwards into firm clamping relation with such roll or article upon raising of the lifter. Upon disengagement from the sides of a roll or article the jaws are adapted to be retracted into their normal position by way of a pair of tension springs 28. These springs are disposed between the lower ends of the bars 25 constituting the secondary arms 9 and have the upper ends thereof anchored to the outer portions of the links 26. The lower ends of the springs 28 are anchored in any suitable manner to the inner ends of the links 27. Stop lugs 29 on the central portions of the bars 25 serve to limit upward and outward swinging of the jaws 7 by the springs 28. The inner ends of the links 26 are adapted to abut against these lugs 29 when the jaws 7 are in their retracted position.

The electric motor 10 for actuating the gearing 11 for jaw opening and closing purposes is located at one side of the lifter, as shown in Figure 2, and is positioned beneath the central portion of the horizontal supporting element 6. It is supplied with current by way of an electrical conductor (not shown) and is subject to the control of the operator for the lifter.

The gearing 11 is carried by and is for the most part mounted within a housing 30 beneath the central portion of the element 6. Said housing comprises a top plate 31, a pair of side walls 32, a pair of end walls 33, and a semi-cylindrical bottom wall 34. The top plate extends between and is welded or otherwise fixedly secured at the side margins thereof to the central portions of the bottom faces of the bars 12 constituting the element 6, and serve to hold such bars against tilting one relatively to the other. The side walls 32 depend from and are connected to the side margins of the top plate and are cross-connected at their lower ends by the bottom wall 34. The end walls 33 of the housing 30 fit against and are suitably secured to the end margins of the side and bottom walls and embody in the lower portions thereof a pair of aligned bearings 35. The side walls of the housing are provided above the bearings 35 with a pair of aligned bearing plates 36. The gearing 11 comprises a worm 37, a worm gear 38, and a screw shaft 39. The worm 37 is hollow, as shown in Figure 4, and has the ends thereof mounted in the bearing plate 36. It is in mesh with and serves to drive the worm gear 38 and is driven from the armature shaft of the reversible electric motor 10 by way of a friction clutch 40. The armature shaft extends through the worm 37 and projects into a clutch case 41 at the side of the lifter that is oppositely disposed with respect to the motor 10. The case 41 is removably secured in any suitable manner to one of the bearing plates 36. The friction clutch 40 comprises a driving arm 42, a pair of arcuate shoes 43, and a drum 44, and permits the motor 10 to run in the event that the jaws 75

are accidentally locked during inward or outward swing thereof when the operator of the lifter fails to cut off the supply of current to the motor when the jaws reach the end of their inward or outward swing. The arm 40 is provided at the central portion thereof with a hub 45 which is keyed or otherwise fixedly secured to the projecting end of the armature shaft. The arcuate shoes 43 are positioned adjacent to the arm 42 and are provided with suitable clutch linings (not shown) which engage frictionally the drum 44. They are connected for drive by the arm through the medium of a pair of pin and slot connections 46 and are connected together for conjoint rotation or drive by a pair of bolts 47. The latter extend through holes in outwardly extending lugs on the ends of the shoes and permit radial movement of the shoes with respect to the drum. Compression springs 48 surround the outer ends of the bolts and serve to urge the shoes toward one another into gripping relation with the drum. The drum is keyed or otherwise fixedly secured to the worm. The pin and slot connections 46 effect rotation of the shoes with the arm in response to drive or rotation of the armature shaft of the motor and at the same time permit the shoes to move outwards. The springs 48 urge the shoes inwards and maintain a driving connection between the arm 42 and the drum 44. When during outward or inward shift of the jaws, an object is encountered so that the jaws are locked against further outward or inward movement, the clutch 40 permits slippage of the motor with respect to the gearing. When the motor is operating at full speed, the shoes are subjected to the action of centrifugal force and tend to move outwards against the force of the compression springs 48. Such action on the part of the shoes decreases the frictional grip between the linings of the shoes and the drum 44 and hence ready slippage between the motor and the gearing is permitted in the event of locking or stoppage of the jaws. The worm gear 38 is located in the bottom portion of the housing 30 and is keyed to the central portion of the screw shaft 39 so that it operates to drive the shaft. As shown in Figure 3 the shaft is journaled in the bearings 35 in the lower portions of the end walls of the housing 30 and is of such length that the ends thereof project slightly beyond the ends of the supporting element 6. One end of the shaft is provided with a right hand screw thread and the other end of the shaft is provided with a left hand screw thread. In addition to the worm, worm gear and shaft, the gearing 11 comprises a pair of nuts 49. These nuts are mounted on the threaded ends of the screw shaft 39 and are adapted to move outwards in responsive to drive of the shaft in one direction and inwards in response to drive of the shaft in the reverse or opposite direction. Each nut is provided at the sides thereof with a pair of laterally extending trunnions 50. As shown in Figure 1 the trunnions 50 project outwardly through vertically elongated slots 51 in the bars 22 constituting the primary arms 8. The trunnions and the slots form connections between the nuts and the arms whereby the arms together with the jaws are caused to swing inwards and outwards in response to inward and outward movement of the nuts. When the screw shaft 39 is driven so as to cause the nuts to move outwards, the primary arms 8 together with the shoes 7 are likewise moved outwards and when the shaft is

reversely driven so as to cause the nuts to move inwards, the arms 8 together with the shoes are also moved inwards.

In order to control the secondary arms 9 so that they move inwards and outwards with the primary arms and operate automatically to maintain the jaws in substantially parallel relation a pair of linkages 52 is provided. These linkages are associated with the secondary arms 9, respectively, and comprise pairs of horizontally extending inner links 53, pairs of upstanding intermediate links 54, and pairs of substantially horizontal outer links 55. The pairs of inner links 53 underlie the ends of the screw rod 39 and have the inner ends thereof arranged in straddled relation with, and pivotally connected to, a pair of depending pivot pin supporting lugs 56 on the lower ends of the end walls 33 of the housing for the gearing 11. The pairs of intermediate links 54 of the linkages 52 extend between the outer ends of the pairs of inner links 53 and the inner ends of the outer links 55 and have circular holes in the central portions thereof through which project the laterally extending trunnions 50 on the sides of the nuts 49. The lower ends of the pairs of intermediate links 54 are disposed between and are pivotally connected by pivot pins 57 to the outer ends of the pairs of inner links 53. The upper ends of the pairs of intermediate links 54 are positioned in straddled relation with, and are pivotally connected by pivot pins 58 to, the inner ends of the pairs of outer links 55. The outer ends of the pairs of links 55 fit within, and are pivotally connected by pivot pins 59 to, the upper ends of the bars 25 constituting the secondary arms 9. By reason of the fact that the central portions of the pairs of intermediate links 54 are connected to the trunnions 50, such links are caused to swing inwards and outwards in response to inward and outward movement of the nuts. As a result of the action of the linkages 52, the secondary arms 9 move outward and inward with the primary arms but at the same time are so controlled, as indicated in Figures 1 and 3, that they maintain the jaws in substantially parallel relation regardless of whether the latter are shifted inwards or outwards. The end extremities of the screw shaft 39 of the gearing 11 are provided with enlarged heads 60, so as to limit outward movement of the nuts 49. The linkages 52 constitute simple or novel means actuated by the nuts for controlling the secondary arms so that they move inwards and outwards with the primary arms, and at the same time maintain or hold the jaws 7 in parallel relation.

The operation of the lifter is as follows: When it is desired to lift a roll and move it from one place to another for stacking or other purposes, the motor 10 is operated so that it drives the screw shaft 39 in such direction that the nuts 49 are caused to move outwards. During outward movement of the nuts the primary and secondary arms 8 and 9 together with the jaws are moved outwards. After the jaws have been opened sufficiently to permit them to be applied to the roll, the lifter is lowered until the jaws are positioned adjacent to the sides of the roll. Thereafter the motor 10 is reversely driven so as to cause the nuts 49 to move inwards. During inward movement of the nuts the arms 8 and 9 are swung inwards and the jaws 7 are brought into gripping relation with the sides of the roll. When the lifter is hoisted in connection with transportation or shift of the roll, the jaws

as a result of the action of the links 26 and 27 move inwards into firm clamped relation with the roll. Regardless of the extent to which the jaws are moved inwards or outwards, the jaws are maintained in substantial parallelism as a result of the action of the linkages 52.

The herein described lifter is simple in design and may be manufactured at a low and reasonable cost. It effectively and efficiently fulfills its intended purpose and is characterized by the fact that its construction or design is such that it occupies but a small amount of space and hence is usable in places where heretofore designed lifters cannot be used because of large size.

Whereas the lifter has been described as being particularly adapted for use in connection with the lifting of rolls of paper, it is to be understood that by different shaping of the jaws it may be used in connection with bails or other articles. In the event that the lifter is used for stacks of sheets it is contemplated that the jaws be in the form of angle iron bars and connected rigidly to the lower ends of the secondary arms 9.

The invention is not to be restricted to the details set forth since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A lifter comprising in combination a supporting element, a pair of upstanding primary arms beneath the element having the upper ends thereof pivotally connected to said element, and adapted to swing to and from one another, a pair of upstanding secondary arms having the lower portions thereof pivotally connected to the lower ends of the primary arms and provided with opposed article gripping jaws, and adapted to move inward and outwards with the primary arms, gearing associated with the element for conjointly swinging said primary arms together with the secondary arms and jaws to and from one another, and a pair of linkages between the element and said secondary arms and including links connected to and actuated by movable parts of the gearing, for so controlling the last mentioned arms that during inward or outward movement thereof with the primary arms they serve to hold the jaws in approximate parallelism.

2. A lifter comprising in combination an elongated horizontal supporting element, a pair of upstanding primary arms having the upper ends thereof pivotally connected to the ends of the element, and adapted to swing to and from one another, a pair of upstanding secondary arms having the lower portions thereof pivotally connected to the lower ends of the primary arms and provided with opposed article gripping jaws, and adapted to move inwards and outwards with the primary arms, gearing disposed beneath and carried by the element for conjointly swinging said primary arms together with the secondary arms and jaws to and from one another, and means applied to the upper ends of said secondary arms and including links connected to and movable with the parts of the gearing that serve conjointly to swing the primary arms, for so controlling the secondary arms that during inward and outward movement thereof with the primary arms they serve to hold the jaws in approximate parallelism.

3. A lifter comprising in combination a supporting element having a depending part, a pair of upstanding primary arms having the upper ends thereof pivotally connected to the element and adapted to swing to and from one another, a pair of upstanding secondary arms having the lower portions thereof pivotally connected to the lower ends of the primary arms and provided with opposed article gripping jaws, and adapted to move inwards and outwards with the primary arms, gearing carried by the element for conjointly swinging said primary arms together with the secondary arms and jaws to and from one another, and linkages extending between said depending part and the upper ends of said secondary arms and actuated by the gearing for so controlling said secondary arms that during inward or outward movement thereof with the primary arms they serve to hold the jaws in approximate parallel relation.

4. A lifter comprising in combination an elongated horizontal supporting element having a gear housing connected to and depending from the central portion thereof, a pair of upstanding primary arms having the upper ends thereof pivotally connected to the ends of the element, and adapted to swing to and from one another, a pair of upstanding secondary arms having the lower portions thereof pivotally connected to the lower ends of the primary arms and provided with opposed approximately parallel article gripping jaws, and adapted to move inwards and outwards with the primary arms, motor actuated reversible drive gearing mounted for the most part within the housing and operative conjointly to swing said primary arms together with the secondary arms and jaws to and from one another, and a pair of linkages extending between the housing and the upper ends of the secondary arms and actuated by the gearing for so controlling said secondary arms that during inward or outward movement thereof with the primary arms they serve to hold the jaws in approximately parallel relation.

5. A lifter comprising in combination a horizontal supporting element, a pair of upstanding primary arms having the upper ends thereof pivotally connected to the element, and adapted to swing to and from one another, a pair of upstanding secondary arms having the lower portions thereof pivotally connected to the lower ends of the primary arms and provided with opposed approximately parallel article gripping jaws, and adapted to move inwards and outwards with the primary arms, reversible drive gearing operative conjointly to swing the primary arms together with the secondary arms and jaws to and from one another including a shaft beneath the element with right and left hand screw threads at its ends and nuts mounted on the ends of the shaft respectively and operatively connected to the central portions of the primary arms, and linkages applied to the upper ends of the secondary arms and including links operatively connected to the nuts for so controlling said secondary arms that during inward or outward movement thereof with the primary arms they serve to hold the jaws in approximately parallel relation.

6. A lifter comprising in combination an elongated horizontal supporting element having a gear housing connected to and depending from the central portion thereof, a pair of upstanding primary arms having the upper ends thereof pivotally connected to the ends of the element, and

adapted to swing to and from one another, a pair of upstanding secondary arms having the lower portions thereof pivotally connected to the lower ends of the primary arms and provided with opposed vertically elongated approximately parallel article gripping jaws, and adapted to move inwards and outwards with the primary arms, reversible drive gearing for conjointly swinging said primary arms together with the secondary arms and jaws to and from one another mounted for the most part within the housing and including a horizontal shaft beneath and in parallel relation with the element and having right and left hand screw threads at its ends and a pair of nuts mounted on the ends of the shaft respectively and operatively connected to the ends of the primary arms, and a pair of three link linkages extending between and pivotally connected to the housing and the upper ends of the secondary arms and having the intermediate links thereof operatively connected to the nuts for so controlling said secondary arms that during inward or outward movement thereof with the primary arms they serve to hold the jaws in approximately parallel relation.

7. A lifter of the character described comprising in combination a supporting element, a jaw depending from and carried by said element, a second jaw positioned in opposed relation with the first mentioned jaw and movable to and from the latter for article gripping and releasing purposes, supporting means for said second jaw comprising an upstanding primary arm having the upper end thereof pivotally connected to the element and an upstanding secondary arm having the central portion thereof pivotally connected to the lower end of the primary arm and its lower end connected to said second jaw, gearing carried

by the element for swinging said primary arm together with the secondary arm and second jaw, and a linkage between the element and the upper end of said secondary arm and including a link connected to and movable with the primary arm swinging part of the gearing, for so controlling said secondary arm that during inward and outward swinging movement thereof with the primary arm it serves to hold said second mentioned jaw in approximate parallelism with the first mentioned jaw.

8. A lifter comprising in combination a horizontal supporting element, a jaw disposed beneath and carried by the element, a second jaw disposed in opposed relation with the first mentioned jaw and movable to and from the latter for article gripping and releasing purposes, supporting means for said second jaw consisting of an upstanding primary arm having the upper end thereof pivotally connected to the element and an upstanding secondary jaw having the central portion thereof pivotally connected to the lower end of the primary arm and its lower end connected to said second jaw, reversible drive gearing operative to swing the primary arm together with the secondary arm and said second jaw to and from said first mentioned jaw including a shaft beneath the element with a screw thread at one end thereof and a nut mounted on the screw thread and operatively connected to the central portion of the primary arm, and a linkage applied to the upper end of the secondary arm and including a link operatively connected to the nut for so controlling said secondary arm that during inward or outward movement thereof with the primary arm it serves to hold said jaw in approximately parallel relation with the first mentioned jaw.

CHARLES J. TUPY.