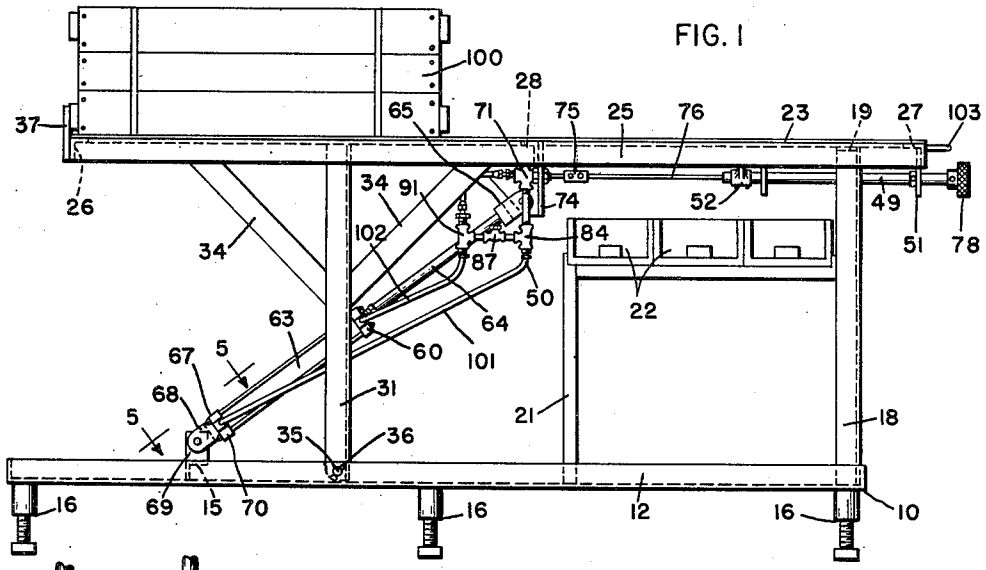
April 2, 1957 F. A. HARDRATH 2,787,509

WORK TABLE WITH TILTING TABLE TOP

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FIG. 1



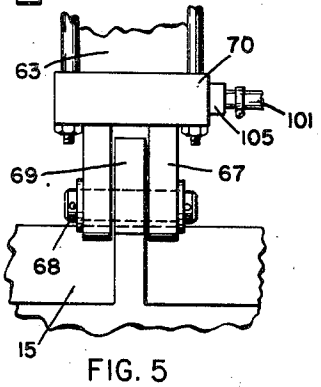


FIG. 5

FIG. 4

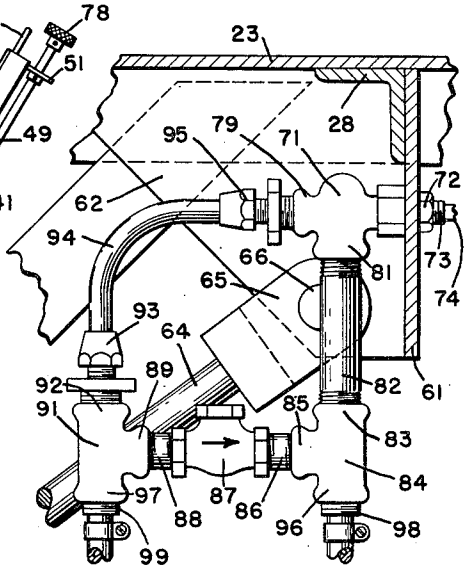


FIG. 8

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FIG. 2

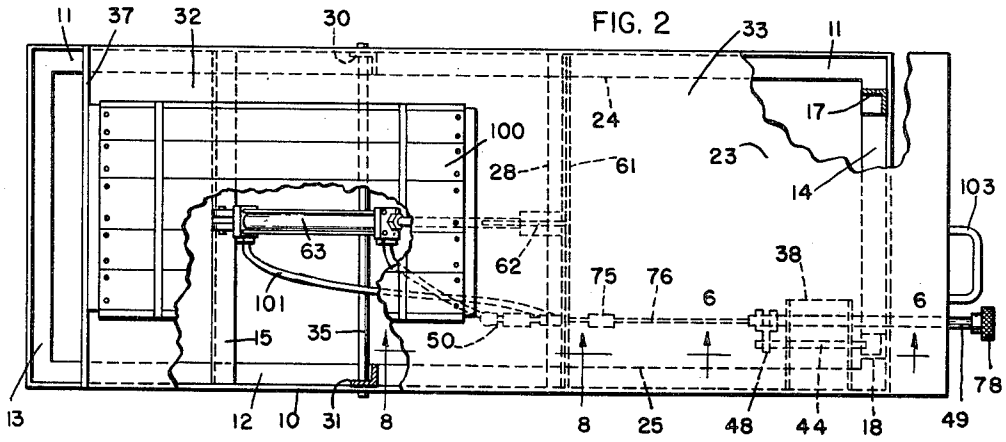
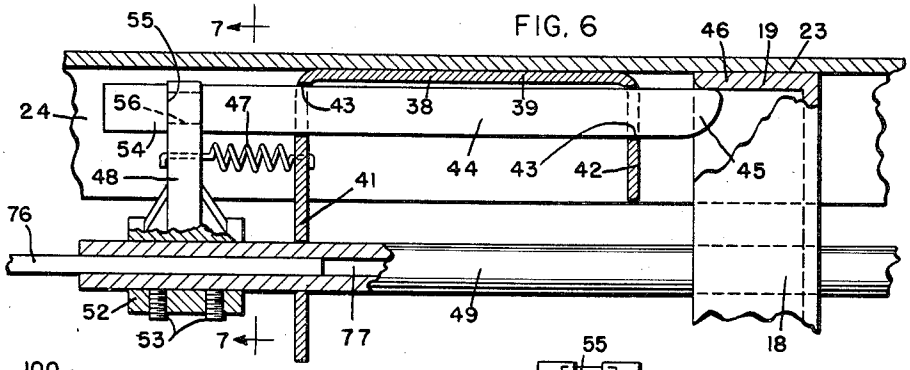


FIG. 6



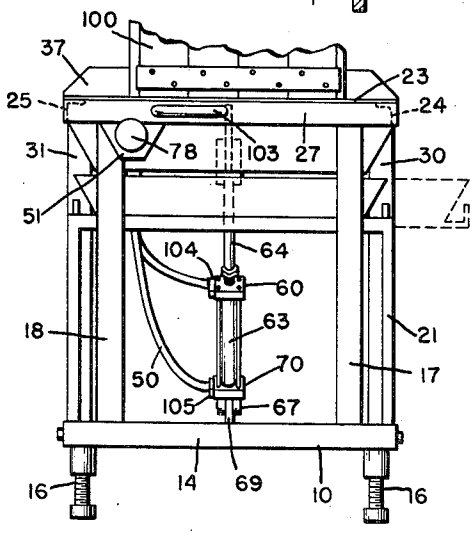


FIG. 3

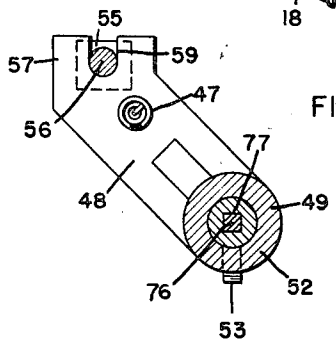


FIG. 7

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2,787,509

WORK TABLE WITH TILTING TABLE TOP

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Application December 29, 1955, Serial No. 556,224

7 Claims. (Cl. 311—38)

The herein disclosed invention relates to work tables and has for an object to provide a table having a table top on which goods may be packaged and which is adapted to be moved into an inclined position with one end adjacent the floor to facilitate discharge of the packages therefrom.

Another object of the invention resides in providing a frame disposed adjacent the floor and in providing the table top with one or more struts extending downwardly therefrom and pivoted to said frame.

Another object of the invention resides in connecting the strut to the table top intermediate its ends so that the package, when slid toward the discharge end of the table, will by its own weight cause the table to descend to its inclined discharge position.

Another object of the invention resides in providing manually controlled latching means for holding the table top in its normal horizontal working positions.

A still further object of the invention resides in providing retarding means for retarding the movement of the table top to discharge position.

An object of the invention resides in utilizing as the retarding means a cylinder having a piston therein and connected to said frame and table top and a fluid circulating circuit connected to opposite ends of the cylinder and having an adjustable restriction therein for controlling the rate of flow from one end of the cylinder to the other and the corresponding movement of the table top.

A feature of the invention resides in providing in said circuit a check valve by-passing said restriction whereby the table top may be quickly moved to its normal horizontal working position.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a side elevational view of a table illustrating an embodiment of the invention.

Fig. 2 is a plan view of the structure shown in Fig. 1.

Fig. 3 is an end elevational view of the structure shown in Fig. 1.

Fig. 4 is an elevational view similar to Fig. 1 showing the table top in tilted position.

Fig. 5 is a detailed sectional view taken on line 5—5 of Fig. 1 and showing the connection for the lower end of the hydraulic cylinder of the invention and drawn to a greater scale.

Fig. 6 is a fragmentary elevational-sectional view taken on line 6—6 of Fig. 2 showing the latching mechanism of the invention and drawn to a greater scale.

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 6.

Fig. 8 is a fragmentary elevational-sectional view of the control mechanism of the invention taken on line 8—8 of Fig. 2 and drawn to a greater scale.

The invention consists of a frame 10 comprising two longitudinal frame members 11 and 12 constructed of angle iron. These frame members are connected together at their ends by means of transverse frame members 13 and 14 and intermediate their ends by means of a transverse frame member 15. All of these frame members are of angle iron construction and are welded or otherwise secured together in any suitable manner. The frame 10 is supported on a number of jacks 16 disposed at the ends of the frame and intermediate the ends thereof and which permit of adjusting the height of the table to suit the user. At the rear end of the frame are mounted two uprights 17 and 18 and which have attached to the upper ends of the same a transverse frame member 19. The frame 10 also carries a support 21 which carries a number of drawers 22 for the purpose of containing tools and other implements used with the work for which the table is designed.

The table further consists of a table top 23 constructed of sheet metal or any other similar, suitable material and which is reinforced at its edges by means of longitudinal reinforcing members 24 and 25 and at its ends by transverse reinforcing members 26 and 27. The table top 23 is further reinforced intermediate its ends by means of a transverse reinforcing member 28. Extending downwardly from the longitudinal reinforcing members 24 and 25 are two struts 30 and 31. These struts are disposed intermediate the ends of the table dividing the table top 23 into a forward section 32 and a rearward section 33. Suitable braces 34 connected to the said struts and to the reinforcing members 24 and 25 stiffen the construction and securely attach the struts to the table top. The said struts and braces may be welded to one another and to the longitudinal reinforcing members or secured thereto in any other suitable manner. The lower ends of the struts 30 and 31 are pivoted to the longitudinal frame members 11 and 12 by means of a shaft 35 extending through said frame members and the said struts. Cotter keys 36 hold the shaft in position. At the forward end of the table top 23 is provided an upstanding flange 37 which serves as a stop for limiting the movement of the articles on the table when the table top is lowered. It will readily be comprehended that the table top 23 may be moved from a horizontal position, as shown in Fig. 1, to an inclined position, as shown in Fig. 2, and in which the forward end of the table top is brought close to or engages the floor on which the table rests.

Latching means are provided for holding the table top 23 from movement when the table is in its horizontal position. This construction is best shown in Figs. 1, 2, 6 and 7. Attached to the under side of the table top 23, near its rearward end, is a U-shaped bracket 38 having a web 39 welded to said table top. This bracket is further constructed with two depending legs 41 and 42. The legs 41 and 42 are formed with rectangular slots 43 in the same and in which is slidably mounted a rectangular bolt 44. Bolt 44 has a curved end 45 which is adapted to engage the upper flange 46 of the transverse frame member 19 of frame 10. The slots 43 are so positioned that the bolt 44 may slide under said flange to latch the table in position or to be withdrawn therefrom so as to allow swinging movement of the table top 23. A tension coil spring 47 is secured at one end to the leg 41 of the bracket 38 and at its other end to a forked arm 48 movable with said latch. This spring urges the bolt 44 into engagement with the said flange. When the table top is lowered, the curved surface 45 of the bolt engages the upper edge of the flange 46 and retracts the bolt inwardly permitting the bolt to pass said flange. When the table top is in position, spring 47 forces the latching end of the bolt under the flange 46 as shown in Fig. 6.

For operating the bolt 44, a shift rod 49 is employed which is guided for sliding movement in a hole 40 in the

lowermost portion of the leg 41 of bracket 38, and similarly in another depending guide member 51 secured to the transverse reinforcing member 27 of the table top 23. The arm 48, previously referred to, is formed with a boss 52 which is bored to receive said rod. This boss is secured to the rod by means of set screws 53. The bolt 44 is formed with a groove 55 turned into the same near its inner end. This construction provides a short shaft 56 at the bottom of the groove coaxially disposed with respect to said bolt. The end 57 of the arm 48 is constructed with a slot 59 which snugly receives the shaft 56. The groove 55 is of a width slightly greater than the thickness of the end 57 of arm 48 so that the end of said arm enters the said groove. By means of this construction, the bolt 44 is caused to travel in unison with the arm 48 and the shift rod 49.

For controlling the rate of movement of the table from the horizontal to the inclined position, the construction shown in Figs. 1 and 8 is employed. Attached to the table top 23 is a bracket 61 which is also secured to the transverse reinforcing member 28 of said table top. This bracket is reinforced by means of a brace 62 welded to said table top and bracket. A hydraulic cylinder 63 is also employed and which is provided with cylinder heads 60 and 70 at its ends. The said cylinder has mounted in it a piston, not shown, and which is connected to a piston rod 64. The piston rod 64 is provided at its outer end with a shackle 65 which is pivoted by means of a pin 66 to the bracket 61. The head 70 is provided with a shackle 67 which in turn is pivoted by means of a pin 68 extending through a lug 69 welded on and extending upwardly from the transverse frame member 15 of the frame 10. The upper and lower ends of the cylinder 63 are provided with fittings 104 and 105 which communicate with the interior of said cylinder at opposite ends thereof. A fluid circulating circuit 50 is connected to these fittings and which will be presently described in detail.

In the circuit 50 is mounted a control device for controlling the flow of fluid into and out of the cylinder 63, which is shown in detail in Fig. 8. This construction utilizes a needle valve 71 which is mounted on and attached to the bracket 61 by means of a nut 72 screwed on the shank 73 of said valve and clamping the said bracket against the body of the valve. Valves of such construction being well known in the art, the details of the valve have not been shown, but it will readily be comprehended that any suitable construction may be employed. The valve 71 has an operating rod 74 which is coaxially disposed with reference to the shank 73 and which extends outwardly therefrom. This rod is connected by means of a coupling 75, Fig. 1, to a square rod 76 which in turn extends into and is slidably mounted in a square hole 77 formed in the shift rod 49. By means of this construction, the rod 76 can be rotated upon rotation of the shift rod 49 and also said shift rod can be independently reciprocated to operate the latch bolt 44. For the purpose, a knob 78 is attached to the outer end of the said shift rod. The valve 71 has an outlet 79 and inlet 81. The circuit 50 further includes a nipple 82 which is screwed at one end into the inlet 81 and at its other end into one branch 83 of a T 84. The outlet 79 of valve 71 has connected to it a tube connector 95 which has connected to it a tube 94. This tube is in turn connected to a tube connector 93 which in turn is connected to one branch 92 of another T 91. Screwed into the opposite branches 96 and 97 of the T's 84 and 91 are hose connectors 98 and 99. These connectors have attached to them flexible hose 101 and 102 which in turn are connected to the fittings 104 and 105 of the cylinder 63. Hose 101 goes to the lower end of the cylinder and communicates with the space between the piston and the cylinder head 70. Hose 102 goes to the upper end of the cylinder and communicates with the space between the piston and the cylinder head 60. A check valve 87

is connected by means of nipples 86 and 88 with the other branches 85 and 89 of the T's 84 and 91. Check valve 87 is of ordinary construction and may be of the flap valve type. For this reason the construction of the same has not been shown in detail in the drawings. The valve is so positioned that the direction of flow through the same is in the direction indicated by the arrow on the valve.

A fluid such as oil is preferably used in the cylinder 63 and in the circuit 50 and sufficient air is included in the system so that as the fluid travels from one end of the cylinder to the other the difference in volume caused by the piston rod 64 is compensated for by compression of the air.

The operation of the invention is as follows: The table is first adjusted through the jacks 16 to bring the table top 23 to the desired height. If the table is to be used for packaging goods, the boxes or cartons are placed on the table when in its horizontal position and the boxing or packaging of the same conveniently completed. This operation is preferably done at the section 33 of the table where the tools and materials for the purpose contained in the drawers 22 are conveniently available. A completed package or box, which is indicated by the reference numeral 100 in Fig. 1, is then slid down to the section 32 of the table and until the same engages the flange or stop 37. The latch for the table is now released by pressing the knob 78 on shift rod 49 inwardly. This disengages the bolt 44 from engagement with the flange 46 of the transverse frame member 19, and due to the fact that the center of gravity of the table with the package on the same is to the left of the axis of the shaft 35 of the table top, the table top tends to swing toward the position shown in Fig. 4 by the weight of the box mounted thereon. The speed in which the table is lowered is determined by the setting of the valve 71. Fluid in the cylinder 63 travels from the lower end of the cylinder through the hose 101, through valve 71, and back to the upper end of the cylinder through hose 102. During such movement, check valve 87 is closed and valve 71 controls the rate of downward descent of the box. When the flange 37 reaches the floor, movement terminates and the parts become arranged as shown in Fig. 4. The box is now in a position so that the same may be readily loaded on a hand truck and removed from the table. The table top 23 is provided with a handle 103 attached to the transverse frame member 27. As will be noted in Fig. 1, the center of gravity of the table is to the right of the pivot 35 when the table is horizontal. A slight pull on the handle 103 starts the table moving toward its normal horizontal position and after the center of gravity is past the pivot point less effort is required to bring the table to normal position. During such movement, the fluid flows from the upper end of the cylinder to the lower end but instead of going through the needle 71 is bypassed by the check valve 87. Movement of the table hence requires little force and the table can be quickly brought to normal position. In reaching normal position, the curved end 45 of the bolt 44 strikes the flange 46 of transverse frame member 19 which retracts the bolt against the action of spring 47 which in turn causes the bolt to latch beneath said flange when the table top is in final position. The rate at which the loaded table top descends can be determined by rotating the knob 78 and which controls the rate of flow through the needle valve 71.

The advantages of the invention are manifest. Goods can be packaged or boxed or other work performed upon the same while the goods or articles are at table height and supported on the table top. When completed, the table top can be tilted to bring the goods or articles to a position adjacent the floor so that the same may be readily loaded on the ordinary hand truck. The device is simple in operation and sturdy and rigid in construction. Little effort is required to return the table top to

normal position while the weight of the article causes the table top to descend.

Changes in the specific form of the invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of the invention.

Having described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. In combination, a frame for disposition on a supporting surface and having a part disposed near said surface, a table top normally overlying said frame and having a strut extending downwardly therefrom, pivot means between said part of the frame and the lower end of said strut and guiding said table top for movement from a horizontal position overlying said frame and to an inclined position in which one end of said table top is in close proximity to the surface on which the frame rests and control means acting between said frame and table top and controlling the relative movement therebetween.

2. In combination, a frame for disposition on a supporting surface and having two longitudinal frame members disposed near said surface, a table top normally overlying said frame and having two struts extending downwardly therefrom, pivot means between said frame members and the lower ends of said struts and guiding said table top for movement from a horizontal position overlying said frame and to an inclined position in which one end of said table top is in close proximity to the surface on which the frame rests and control means acting between said frame and table top and controlling the relative movement therebetween.

3. In combination, a frame for disposition on a supporting surface and having a longitudinal frame member, supports at the ends of said frame and engaging said surface, a table top normally overlying said frame and having a strut extending downwardly therefrom, pivot means between said frame member and the lower end of said strut and disposed near said surface, said pivot means guiding said table for swinging movement from a substantially horizontal normal position to an inclined position in which one end of said table top is lowermost, said strut and pivot means being positioned so that when the table is in normal position the denoted end of said table lies within the confines of said frame and with the distance between said pivot means and said end of the table being greater than the distance between said pivot means and the corresponding end of the frame, said pivot means being situated so that the center of gravity of the table top lies inwardly of the pivot means.

4. In a table comprising a frame for disposition on a supporting surface and having a part disposed near said surface, a table top overlying said frame, said table top and frame having juxtaposed parts, pivot means between said parts and guiding said table top for movement from a horizontal position and to an inclined position in which one end of said table top is in close proximity to the surface on which the frame rests, the combination of a hydraulic cylinder having a piston slidable therein and a piston rod connected thereto and projecting outwardly from one end of said cylinder, pivot means on the other end of said cylinder, pivot means on the outer end of said piston rod, one of said pivot means being connected to the table top and the other to the frame, a fluid conducting circuit connected to the ends of said cylinder and having a fluid therein, a restriction in said circuit restricting the flow of fluid therethrough and reducing the rate of travel of said table top toward its inclined position and a check valve by-passing said restriction to cause rapid return of said table top to horizontal position.

5. In a table comprising a frame for disposition on a supporting surface and having a part disposed near said surface, a table top overlying said frame, said table top and frame having juxtaposed parts, pivot means between said parts and guiding said table top for movement from a horizontal position and to an inclined position in which one end of said table top is in close proximity to the surface on which the frame rests, the combination of a hydraulic cylinder having a piston slidable therein and a piston rod connected thereto and projecting outwardly from one end of said cylinder, pivot means on the other end of said cylinder, pivot means on the outer end of said piston rod, one of said pivot means being connected to the table top and the other to the frame, a fluid conducting circuit connected to the ends of said cylinder and having a liquid and a gas therein, a restriction in said circuit restricting the flow of fluid therethrough and reducing the rate of travel of said table top toward its inclined position, a check valve by-passing said restriction to cause rapid return of said table top to horizontal position, said circuit being closed and the gas in said circuit expanding and compressing to compensate for unequal volumetric displacement at the two ends of the cylinder.

6. In a table comprising a frame for disposition on a supporting surface and having a part disposed near said surface, a table top overlying said frame, said table top and frame having juxtaposed parts, pivot means between said parts and guiding said table top for movement from a horizontal position and to an inclined position in which one end of said table top is in close proximity to the surface on which the frame rests, manually controlled latching means between the other end of said table top and said frame, the combination of a hydraulic cylinder having a piston slidable therein and a piston rod connected thereto and projecting outwardly from one end of said cylinder, pivot means on the other end of said cylinder, pivot means on the outer end of said piston rod, one of said pivot means being connected to the table top and the other to the frame, a fluid conducting circuit connected to the ends of said cylinder and having a fluid therein, a needle valve in said circuit restricting the flow of fluid therein, an operating member movable in two directions, means acting between said operating member and needle valve and varying the restriction in said circuit produced thereby upon movement of said operating member in one direction and means acting between said operating member and latch and procuring disengagement of the latch upon movement of said operating member in the other direction.

7. In a table comprising a frame for disposition on a supporting surface and having a part disposed near said surface, a table top overlying said frame, said table top and frame having juxtaposed parts, pivot means between said parts and guiding said table top for movement from a horizontal position and to an inclined position in which one end of said table top is in close proximity to the surface on which the frame rests, manually controlled latching means between the other end of said table top and said frame, and comprising a bolt carried by the frame and guided for longitudinal movement with reference to said table top, the combination of a hydraulic cylinder having a piston slidable therein and a piston rod connected thereto and projecting outwardly from one end of said cylinder, pivot means on the other end of said cylinder, pivot means on the outer end of said piston rod, one of said pivot means being connected to the table top and the other to the frame, a fluid conducting circuit connected to the ends of said cylinder and having a fluid therein, a needle valve in said circuit restricting the flow of fluid therein having a rotatable valve stem, an operating member carried by said frame and guided for sliding movement in a longitudinal direction relative thereto and for rotating movement with reference to said frame, connecting means between said operating member and bolt and causing unlatching of said latching means upon longitudinal movement of said operating member in one direction and rotary motion transmitting means between said operating member and said valve stem, said last named means including a part

splined to said operating member and providing relative longitudinal sliding movement therebetween.

References Cited in the file of this patent

UNITED STATES PATENTS

520,720	Armstrong	May 29, 1894
1,404,335	Barnes	Jan. 24, 1922
1,534,797	McLeod	Apr. 21, 1925
1,925,425	Wilent	Sept. 5, 1933
2,011,627	Graham	Aug. 20, 1935
2,105,473	Dean	Jan. 18, 1938
2,217,783	Bell	Oct. 15, 1940
2,288,076	Erling	June 30, 1942
2,379,071	Faust et al.	June 26, 1945
2,436,773	Lambert	Feb. 24, 1948
2,568,236	Kizaur	Sept. 18, 1951
2,636,348	Murray	Apr. 28, 1953
2,682,437	Howard	June 29, 1954
2,735,738	Berne	Feb. 21, 1956