

Dec. 1, 1959

H. A. COTESWORTH ET AL
MATERIAL HANDLING APPARATUS

2,915,332

Filed July 3, 1956

4 Sheets-Sheet 1

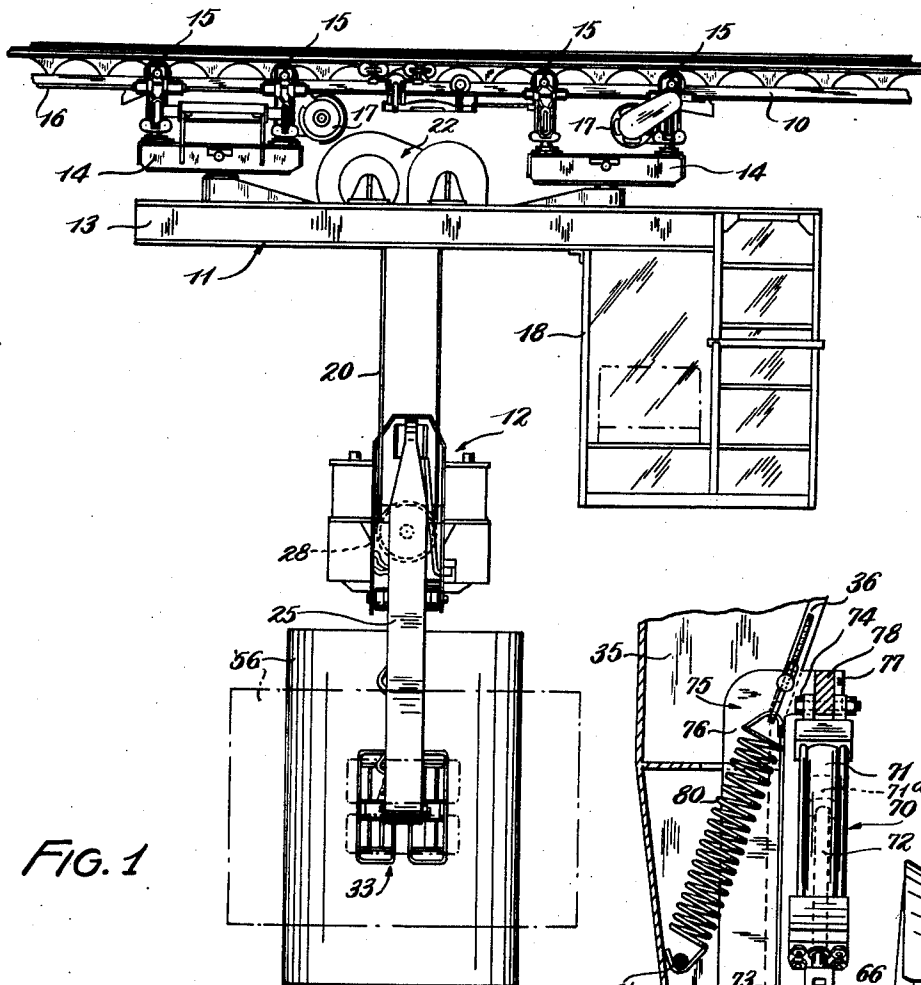


FIG. 1

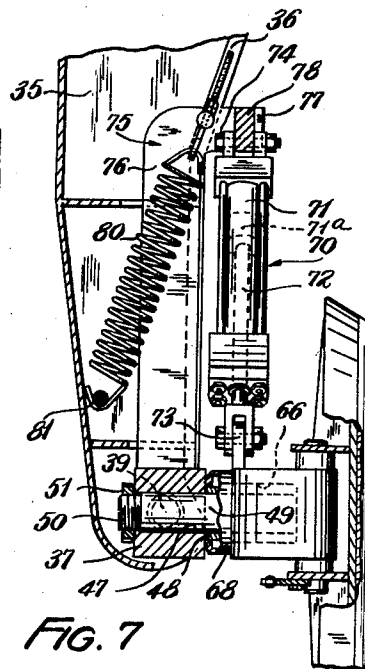


FIG. 7

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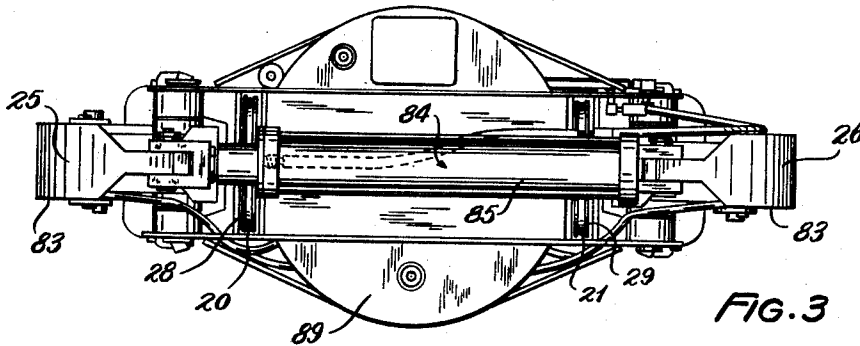
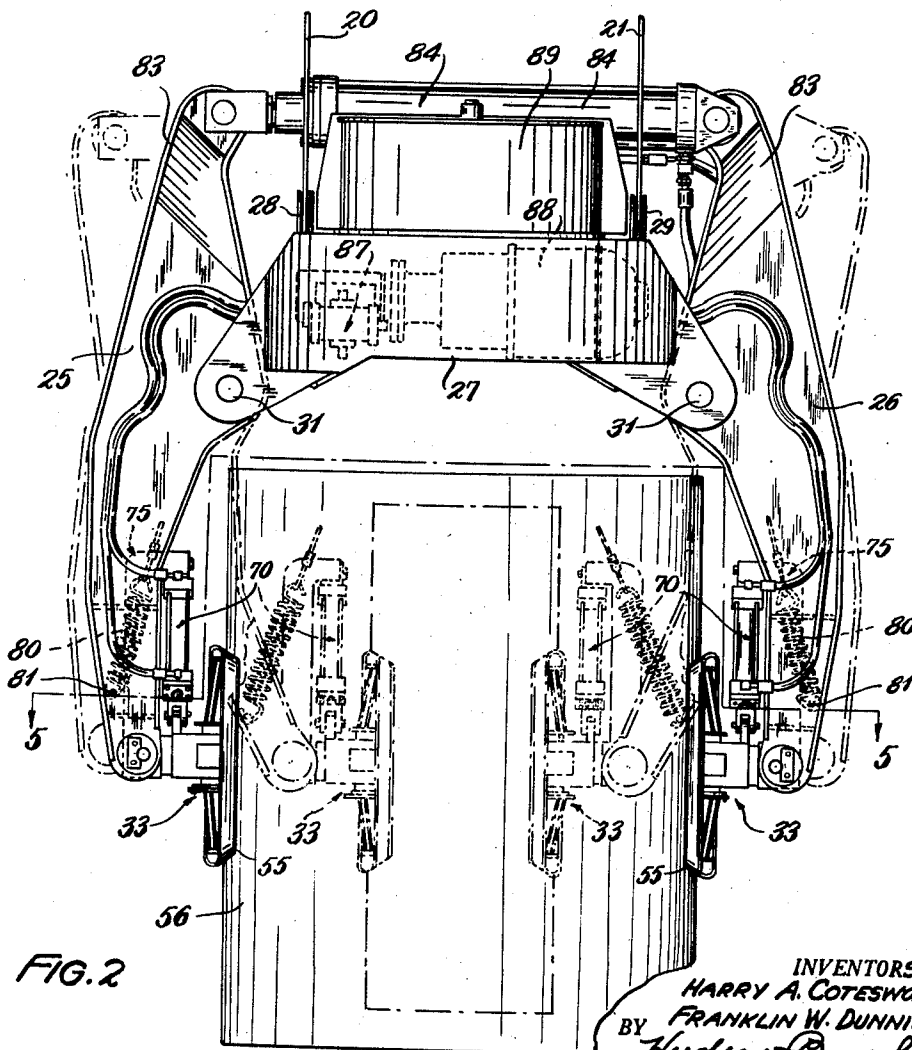
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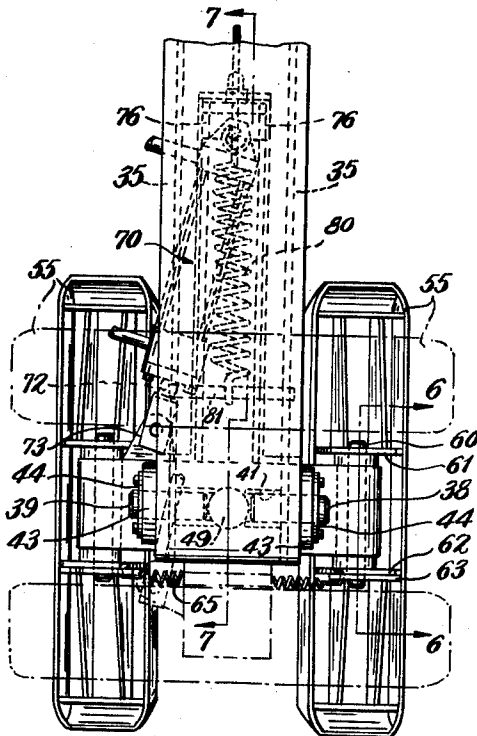


FIG. 4

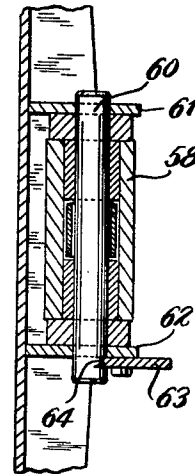


FIG. 6

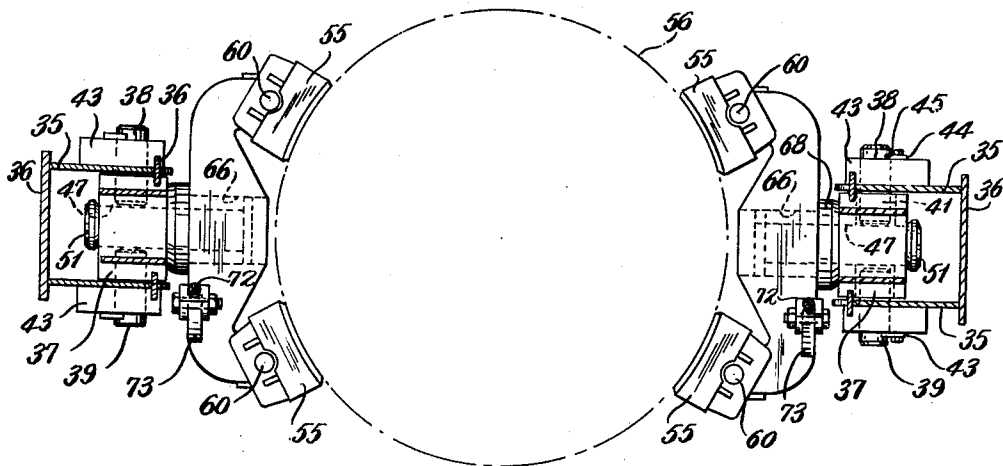


FIG. 5

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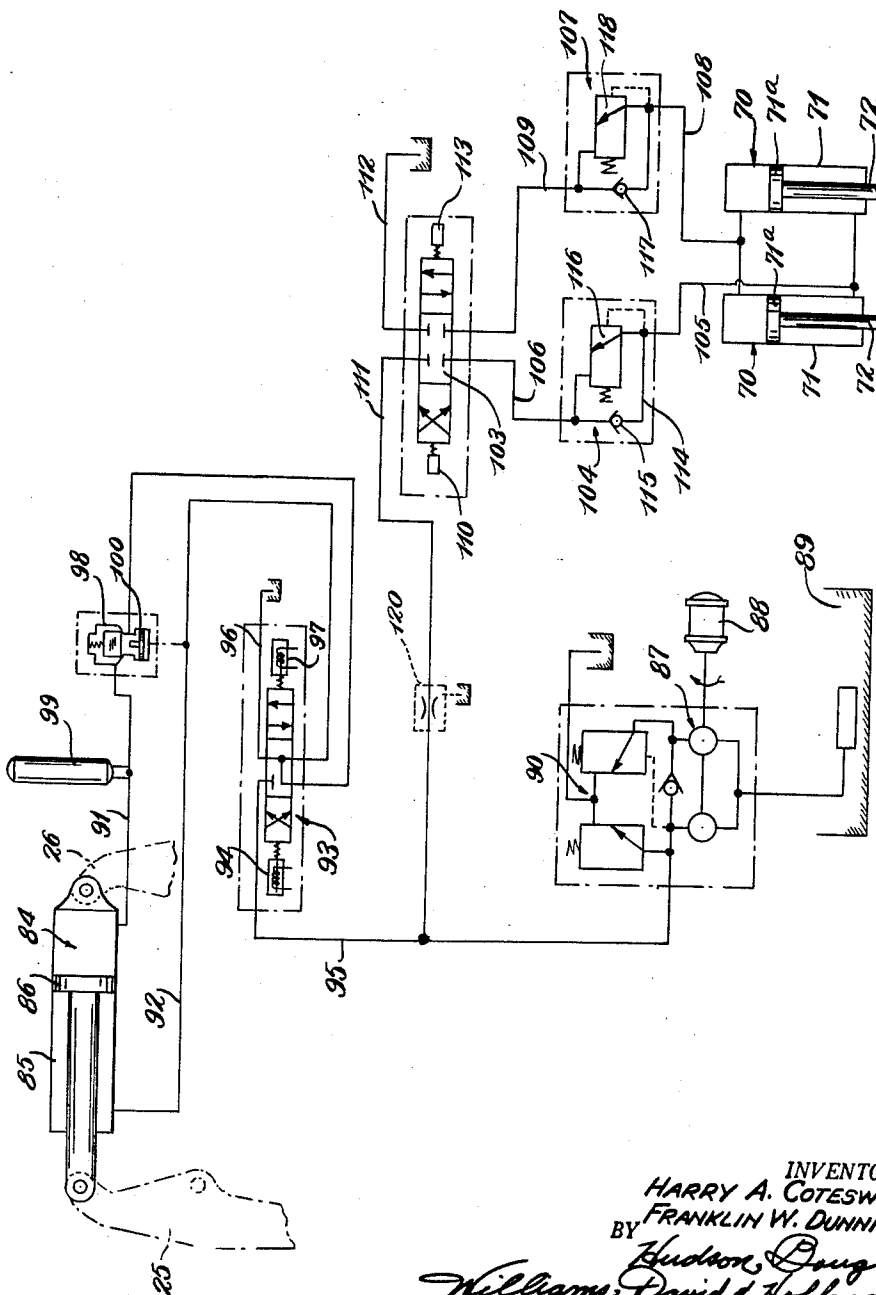


FIG. 8

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2,915,332

MATERIAL HANDLING APPARATUS

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Application July 3, 1956, Serial No. 595,692

3 Claims. (Cl. 294—88)

The present invention relates to a material handling apparatus and, more particularly, to an apparatus including an overhead movable support having suspended therefrom a grab for handling the load, particularly cylindrical articles such as a roll of paper, the grab, preferably, being adapted to rotate or pivot the load being handled about a generally horizontal axis.

One of the objects of the present invention is the provision of a new and improved material handling apparatus including a support member, or overhead carrier, having suspended therefrom a grab for handling the load, which grab includes pivoted clamp arms and is particularly suitable for handling cylindrical objects such as rolls of paper by clamping against the curved sides thereof and is constructed and arranged so that articles of different size may be securely handled without modifying the device and so that the articles may be rotated endwise.

Another object of the present invention is the provision of a new and improved material handling apparatus including a support member, or overhead carrier, having suspended therefrom a grab for handling the load, which grab device includes pivoted clamp arms movable about their pivots to move oppositely disposed one ends thereof toward each other to clamp a load therebetween, power means including a pump and driving motor therefor supported on the grab, and a fluid pressure actuator operatively connected between the ends of arms remote from the load-clamping ends, the operation of the driving motor for the pump and the actuator being controlled from a position remote from the grab.

Another object of the present invention is the provision of a new and improved grab for handling material and having a pivoted arm and a load-engaging member on one end of the arm engageable with the load upon movement of the arm about its pivot, the member being supported on the arm for self aligning movement about a plurality of axes to enable the member to properly engage the article being handled.

Another object of the present invention is the provision of a new and improved overhead suspended grab device having a load-engaging shoe supported for aligning movement about a horizontal axis on engagement with the load, the grab being so constructed and arranged that the member has a large range of aligning movement about the horizontal axis but yet will not tilt to a position, when not in engagement with the load, which will prevent the aligning movement from occurring upon engagement with the load.

A further object of the present invention is the provision of a new and improved material handling apparatus having a pair of oppositely disposed load-engaging elements rotatably supported by different ones of a pair of pivoted arms movable about their pivots to move the members toward and away from each other and double-acting hydraulic actuators for rotating the load-engaging members, the connections of the actuator to the fluid under pressure and reservoir return system being so arranged that the load-engaging elements are held in

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their immediate positions upon the closing of the fluid pressure supply connection thereto, or on the loss of pressure in the supply system by fluid pressure within the actuators.

A still further object of the present invention is the provision of a new and improved material handling apparatus including a grab device having a double-acting hydraulic cylinder and cooperating piston connected between corresponding ends of a pair of pivoted clamp arms and operable upon the supply of pressure to a first side thereof to move the arms about their pivot and apply a clamping pressure to the load and upon supply of fluid pressure to the other side to move the arms in the opposite direction about their pivots and release the clamping pressure, the hydraulic system being so arranged that the pressure fluid cannot be exhausted from the first side of the cylinder until pressure fluid is supplied to the other side.

The invention resides in certain constructions, combinations, and arrangements of parts, and further objects and advantages will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification, in which:

Fig. 1 is an elevational view of an overhead-supported material handling apparatus embodying the present invention;

Fig. 2 is an enlarged elevational view of the material manipulating device or grab of the apparatus shown in Fig. 1;

Fig. 3 is a plan view of the device shown in Fig. 2;

Fig. 4 is an enlarged fragmentary side elevational view of the material manipulating device or grab shown in Fig. 2;

Fig. 5 is a horizontal sectional view taken approximately along line 5—5 of Fig. 2;

Fig. 6 is a fragmentary sectional view taken approximately along line 6—6 of Fig. 4;

Fig. 7 is a fragmentary sectional view taken approximately along line 7—7 of Fig. 4; and

Fig. 8 is a diagrammatic view of the fluid pressure circuit of the apparatus shown in the drawings.

While the present invention is susceptible of various constructions and of use in various applications, it is herein shown as embodied in a material handling apparatus supported for overhead movement by an overhead rail 10 and particularly adapted for handling cylindrical articles such as rolls of paper. The material handling apparatus comprises a carrier 11 having a material manipulating, or grab, device 12 suspended therefrom. The carrier 11 includes a frame 13 supported from front and rear trucks 14 each having wheels 15 which ride on a horizontal flange 16 of the overhead rail 10. The trucks 14 have motors 17 thereon for driving one of the wheels of each truck to move the carriers 11 along the rail 10. The motors 17 and the grab device 12 are controlled from an operator's cab 18 depending from the frame member 13 at one end thereof. The material manipulating, or grab device 12, is suspended from the frame 13 by cables 20, 21 which are taken in or let out to raise or lower the grab 12 by motor-driven mechanism 22 supported on the frame 13.

The material handling apparatus, as thus far described, is of conventional construction well known to those skilled in the art and does not, per se, form a part of this invention. It has not, therefore, been described or shown in detail and it will be understood that other suitable mechanism for supporting the grab device 12 may be substituted for that shown.

The grab device 12, in the illustrated embodiment, is particularly suitable for handling cylindrical articles, par-

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ticularly rolls of paper, and, preferably, comprises a pair of generally vertical clamp arms 25, 26 pivotally connected to the opposite ends of a horizontal frame member 27 suspended from the carrier 11 by the cables 20, 21 which pass about spaced sheaves 28, 29 mounted on the horizontal frame member 27. The clamp arms are pivoted to the member 27 at a point intermediate the ends of each of the clamp arms by pivot pins 31 and are supported by the pins 31 for movement in a common plane and about parallel axes. Each of the clamp arms has a load-engaging element 33 supported on the lower end thereof for engaging the load to be handled when the clamp arms 25, 26 are moved about their pivots in a clamp direction.

The clamp arms 25, 26 and the load-engaging elements thereon are of the same construction and, therefore, only the clamp arm 26 will be described in detail, the reference numerals, however, for the parts of the clamp arm 26 and the load-engaging element 33 thereon will be applied to the corresponding parts of the clamp arm 25 and its load-engaging element 33.

The clamp arm 26 is formed by spaced side plates 35 joined by inner and outer transverse plates 36 to form a rectangularly shaped member. A rectangular block 37 is supported between the lower ends of the plates 35 by bearing pins 38, 39 received in a bore 41 in the block 37. The pins 38, 39 extend from the opposite ends of the bore 41 through the adjacent plates 35. The outer sides of each of the plates 35 have a circular bearing block 43 secured thereto opposite the block 37. The pins 38, 39 pass through the adjacent bearing block 43 and each are prevented from rotation by a keeper plate 44 bolted or otherwise secured, preferably detachably, to the outer side of the adjacent block 43 and extending into a notch 45 in the adjacent pin. The bore 41 is preferably of such a diameter to permit the positioning of suitable bearings intermediate the pins 38, 39 and the side wall of the bore 41. The described construction permits the block 37 to rotate about the axis of pins 38, 39, which axis is parallel to the axis of the pin 31 pivotally securing the clamp arm 26 to the member 27.

The bore 41 is intersected by a transverse bore 47 extending between the inner and outer sides of the block 37. A trunnion pin 48 is positioned in the bore 47 and extends outwardly of the block 37 at each end thereof, the portion 49 of the trunnion pin 48 extending outwardly from the outer side of the block 37, i.e. the side facing the clamp arm 25 being of greater extent than the portion 50 extending from the other side of the block. The portion 50 of the trunnion pin 48 has a lock nut 51 thereon to prevent the pin 48 from moving outwardly of the block 37. It will be noted that the pins 38, 39 terminate short of each other and that the space between the pins is such as to permit the passage of the trunnion pin 48.

The load engaging element 33 is rotatably supported on the outer portion 49 of the trunnion pin 48 and comprises a pair of elongated shoes 55 supported in parallel relationship and having load-engaging faces shaped to conform to the configuration of the load to be handled. In the illustrated embodiment, the shoes 55 have concave faces curved about an axis parallel to the length of the shoes and adapted to conform to the cylindrical configuration of a paper roll 56 to be handled by the apparatus. The shoes are horizontally spaced from each other and engage the circumference of the paper roll 56 along spaced lines which extend axially of the paper roll. The shoes 55 are joined by a member 58 connected to the shoes 55 at approximately the midpoint of the side of the shoes opposite the load-engaging faces. As is best shown in Fig. 6, the shoes 55 are each connected to the member 58 by a pin 60 which passes through the member 58 and through transverse ribs 61, 62 of the shoe, the ribs 61, 62 being positioned on opposite sides of the member 58. When the shoes 55 are in the vertical

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position shown in the drawing with the member 58 substantially horizontal, the ribs 61 of the shoes 55 are upper ribs and the ribs 62 are lower ribs. The pins 60 extend outwardly of the ribs 61, 62 through which they pass and each of the ribs 62 has a keeper plate 63 bolted thereto which, in turn, has an edge received in a notch 64 in the adjacent pin 60. The keeper plate 63 prevents rotation of the pin 60 engaged thereby with respect to the shoe 55 supporting the pin. The pins 60, however, are rotatable with respect to the member 58. The described construction permits the shoes 55 to rotate a limited amount about the axis of the corresponding pin 60 to permit the load-engaging faces of the shoes 55 to align themselves about an axis extending parallel to the axis of the roll of paper being handled and contained in a plane perpendicular to the axis of trunnion pin 48. The shoes 55 are biased in an outward direction with respect to each other by a spring 65 connected between the keeper plates 63. The member 58 has a bore 66 therein which opens into the side of the member opposite the shoes 55 and which receives the trunnion pin 48. The bore 66 is preferably of such a diameter to permit suitable antifricition means to be interposed between the trunnion pin 48 and the wall of the bore 66. A thrust bearing 68 is preferably provided intermediate the member 58 and the block 37. The load-engaging element 33 is rotatable on the trunnion pin 48 to permit the paper roll 56, or other load being handled, to be rolled to a desired position.

In the preferred and illustrated embodiment, the load-engaging element 33 on the arm 26 is rotated about the axis of the trunnion pin 48 by operation of a double acting hydraulic actuator 70. The hydraulic actuator 70 comprises a cylinder element 71 and a cooperating piston element 71a having a piston rod 72 extending through one end of the cylinder element 71 and pivotally connected to a lug or crank arm 73 on the member 58. The other end of the cylinder element 71 is pivotally connected by a bolt to an L-shaped frame 75 mounted on the upper side of the block 37. The framework 75 comprises a pair of spaced parallel L-shaped plate members 76 extending upwardly from the upper side of the block 37 and having L portions 77 extending horizontally from the upper ends thereof in the direction of the shoes 55. The upper ends of the plates 76 are connected together by a vertical transverse plate 78 having a bore for receiving the bolt 74. The framework 75 is movable together with the block 37 and the load-engaging element 33 about the axis of the pins 38, 39. The inner plate 36 is cut away so as to permit the frame 75 to move therethrough. The load-engaging element 33 and the framework 75 are biased approximately to the limit of their necessary movement in one direction about the axis of the pins 38, 39 by a spring 80 connected between the framework 75, plates 78 and a pin 81 supported between the plates 35 of the clamp arm 26. The upper end of the spring is connected to the framework 75 by an eyebolt 82 adjustably connected to the pin 81 supported between the L portions 77. The bias of the spring 80 is such that the spring tends to move the shoes 55 about the pivot so that the lower ends of the shoes are moved toward the load and the upper ends of the shoes away from the load. Preferably, the limit of the movement of the load-engaging element 33 to which the spring 80 urges it is such that when the clamp arms 26 are in their wide-open position, the shoes 55 will be substantially vertical. As the clamp arm 26 is moved about its pivot to move the shoes 55 toward the load, the shoes 55 will, in the absence of engagement with the load, remain in the same angular position with respect to the clamp arms 26 and, therefore, will change their position with respect to the horizontal and vertical since the clamp arm 26 is swinging about its pivot pin 31. When, however, the shoes 55 engage the load, the lower portion of the shoes will engage the load first and cause the shoes to move relative to the clamp arm 26 about the axis of the

pins 38, 39 to permit the load-engaging faces thereof to align themselves with the surface of the paper roll to be handled. It can, therefore, be seen that the support for the shoes 55 permits rolls of various diameters to be handled by the grab device 12 and yet insures proper engagement of the shoes with the paper roll. The pins 38, 39 permit alignment of the shoes about an axis parallel to the axis of pins 31, while the pins 60 permit the shoes to rotate about an axis parallel to the length of the roll to compensate for different radii of curvature of the various rolls. The spring 80 assures that the shoes 55 will not swing downwardly about the axis of the pins 38, 39 to a position where the upper ends of the shoes will engage the load and prevent the aligning movement about the axis of the pins 38, 39 from occurring.

The clamp arms 25, 26 have portions 83 extending upwardly from the pivot pins 31, and a fluid pressure actuator 84 including a cylinder element 85 and cooperating piston 86 is operatively connected between the upper end portion of the clamp arms. When fluid pressure is supplied to the clamp side of the hydraulic actuator 84, the upper ends of the clamp arms 25, 26 are moved apart to cause the lower ends of the clamp arms carrying the load-engaging elements 33 to move toward each other in a clamping movement and to apply a clamping pressure to a load positioned therebetween. Application of fluid pressure to the release side of the hydraulic actuator 84 causes the upper ends of the clamp arms 25, 26 to move toward each other to move the load-engaging means 33 on each clamp arm away from each other.

Fluid pressure is supplied to the actuators 70, 84 from a pump 87 carried by the horizontal frame member 27 of the grab. The pump 87 is driven by a motor 88 and has its suction connected to a reservoir tank 89 mounted on the top of the horizontal frame member 27 intermediate the sheaves 28, 29. The pump 87 is provided with conventional pressure relief means 90.

The hydraulic system interconnecting the pump, the actuators 70, 84, and the reservoir is shown schematically in Fig. 8. As shown therein, each actuator has a connection to each side of the piston thereof. The hydraulic actuator 84 has a conduit 91 connected to cylinder element 85 to supply pressure fluid to the clamp side of the piston to cause the upper ends of the clamp arms 25, 26 to move apart and apply a clamping pressure to the load, and a conduit 92 connected to the cylinder element 85 on the other or release side of the piston. The supply of fluid pressure to the hydraulic actuator 84 is controlled by a three-position solenoid valve 93 having a neutral position wherein its outlet ports are connected to drain or reservoir return. The solenoid valve 93 has a solenoid 94 for shifting the valve from a neutral position, shown in the drawings, to the left to connect the conduit 91 with a pressure conduit 95 leading from the discharge of the pump 87 and connected to a port of the valve, and to connect the conduit 92 with a return conduit 96 leading from the valve to the reservoir 89; and a second solenoid 97 for shifting the valve from its other direction from its neutral position to reverse the connections between the conduits 91, 92 on one hand and the conduits 95, 96 on the other hand. When the valve 93 is in its neutral position the conduits 91, 92 are placed in communication with the return conduit 96 by an internal passage in the valve. When the solenoid 94 is energized, the pressure supplied to the hydraulic actuator 84 through the valve 93 and the conduit 91 causes the actuator to operate to move the clamp arms 25, 26 in a clamp direction and when the solenoid 97 is energized, fluid pressure is supplied to the conduit 92 to cause the actuator to move the clamp arms 25, 26 in a release direction. Preferably, the conduit 91 includes a check valve 98 and has an accumulator 99 in communication therewith at a point intermediate the actuator 84 and the check valve 98. The check valve 98 permits the flow of fluid pressure toward the actuator 84 and normally prevents flow in the opposite direction. When, however,

pressure is supplied to conduit 92 to cause the actuator 84 to move the clamp arms 25, 26 in a release direction, pressure is also supplied to a piston element 100 of the check valve 98 which operates to lift the valve element of the check valve from its seat and permit flow through the conduit 91 in a direction away from the actuator 84. The above described arrangement assures that if power is lost while a load is being handled, the pressure on the clamp side of the cylinder will not be released. The fluid pressure on the clamp side of the piston will be trapped in the actuator 84 and will not be able to flow therefrom because of the action of the check valve 98. The check valve, however, does not interfere with the normal operation of the actuator 84.

The side of each of the hydraulic actuators 70, to which pressure is supplied to roll the load in one direction, is connected to one port of a three-position solenoid valve 103 through a back pressure regulating means 104 by a conduit 105 leading from the actuator 70 to the back pressure regulating means 104 and by a conduit 106 leading from the back pressure regulating means 104 to the solenoid valve 103. Similarly, the opposite side of each of the hydraulic actuators 70 is connected to a different port of the solenoid valve 103 through a back pressure regulating means 107 by a conduit 108 leading from the hydraulic actuators 70 to the back pressure regulating means 107 and a conduit 109 connecting the back pressure regulating means 107 and the solenoid valve 103. The solenoid valve 103 is similar to the solenoid valve 93 and includes a solenoid 110 which, when energized, moves the solenoid valve from a neutral position to a position wherein the conduit 106 is connected to a pressure conduit 111, which is, in turn, connected with the pressure conduit 95, and wherein the conduit 109 is connected to a return conduit 112. The valve 103 also includes a solenoid 113 which shifts the solenoid valve 103 in its other direction from its neutral position to connect the conduit 106 with the return conduit 112 and the conduit 109 with the pressure conduit 111. When pressure is supplied to the conduit 106, the hydraulic actuators 70 roll the load in one direction, and when supplied to the conduit 109, the actuators roll the load in the opposite direction.

The back pressure regulating means 104, 107 permit unimpeded flow from the solenoid valve 103 to the actuators 70, but permit flow from the actuators 70 only when a predetermined pressure is exceeded in the lines 105, 108, respectively. To this end, the back pressure regulating means 104 includes a connection 114 between the conduits 106, 105, having a check valve 115 therein that permits flow to the actuator 70 but prevents flow in the opposite direction. A pressure differential valve 116 is connected in parallel with the check valve 115 and permits flow between the conduit 105 and conduit 106 in a direction away from the actuator 70 when the pressure in the conduit 105 exceeds the pressure in the conduit 106 by a predetermined amount. The back pressure regulating means 107 is the same, in the illustrated embodiment, as the back pressure regulating means 104 and includes a check valve 117 which permits unimpeded flow to the actuator 70 through the conduits 108, 109, and a pressure differential valve 118 which permits flow from the actuator 70 through the conduit 108 to the conduit 109 only when the pressure in the former exceeds the pressure in the latter by a predetermined amount. The above-described system assures that pressure fluid will always be trapped on the opposite sides of the pistons of the actuators 70 and will enable the load to be rolled to a particular position and held therein since the pistons will be unable to move in absence of a pressure applied thereto directly from the pump 87. In the event of a power failure, the pressure fluid trapped in the actuators 70 assures that the load will also be held in its immediate position.

A flow control valve 120 is preferably included in the

conduit 111. This valve limits the amount of fluid flowing into line 111 and protects against detrimental drop in the pressure to the actuator 84 when the actuators 70 are operated.

The material manipulating device described is extremely flexible in that other types of load-engaging elements may be readily substituted for those shown by simply removing the pins 38, 39. This is done by first detaching the keeper plates 44 and then pulling the pins 38, 39. When this is done, the block 37, the framework 75 and actuator 70, and the shoes 55 will be movable as a unit and a new unit can be easily substituted. Similarly, different shoes 55 may be put on the elements 33 by pulling the pins 60.

From the foregoing description, it can be seen that the present invention provides a material handling apparatus having load-engaging elements supported on one end of pivoted clamp arms for self-aligning movement about an axis perpendicular to the plane of movement of the clamp arms and about an axis parallel to the plane of movement of the clamp arms. The load-engaging elements are preferably rotatable with respect to the clamp arms by power actuated means and are urged about their axes perpendicular to the plane of movement of the clamp arms to a position which will assure that the load-engaging elements will be able to properly align themselves upon engagement with the load. The clamp arms are moved about their pivots and the load-engaging elements are rotated about their axes by fluid pressure actuators which are connected into a fluid under pressure and return system which is so constructed and arranged that a pressure is always maintained in the clamp arm actuator for moving the clamp arms in a clamp direction and pressure is also always maintained on both sides of the pistons of the actuators for rotating or rolling the load-engaging elements. Preferably, the pump for supplying fluid under pressure and the return reservoir are carried by the grab.

While the preferred form of the invention has been described in considerable detail, it will be apparent that the invention is not limited to the construction shown or the uses referred to, and it is my intention to cover hereby all adaptations, modifications and changes which come within the practice of those skilled in the art to which the invention relates and the scope of the appended claims.

Having thus described our invention, we claim:

1. In a material handling apparatus including an overhead support member, a material manipulating grab, and means suspending said grab from said support member and operable to raise and lower said grab, said grab comprising a generally horizontal frame member, first and second generally vertical clamp arms pivoted to said frame member for movement in a first vertical plane about parallel first axes, power-actuated means operatively connected to said arms for moving said arms about said axes, first and second load-engaging elements adapted to engage opposite vertical sides of a load and each having a load-engaging position in which the element is disposed in a generally vertical plane normal to said first vertical plane and in which position the element is supported for rotation about a roll-over axis through the element and normal to the plane thereof and for rotation about a self-aligning axis parallel to said first axes and normal to said roll-over axis, first and second connecting means respectively connecting said first and second elements to corresponding ends of said first and second clamp arms respectively, each of said connecting means comprising a first member connected to the corresponding clamp arm for rotation about said self-aligning axis when the element is in said load-engaging position and a second member carried by said first member for rotation about said roll-over axis when the element is in said load-engaging position, said second member of each connecting means carrying the respective load-engaging element, means carried by each of said arms and limiting the movement

of the member of the connecting means associated with the arm which is rotatable about the self-aligning axis of the connecting means, and power-actuated means carried by at least one of said arms and operatively connected to the member of the connecting means associated with the arm which is rotatable about said roll-over axis for rotating the member, the members of said connecting means rotatable about said self-aligning axis each being biased to a predetermined position about its axis.

2. In a material handling apparatus including an overhead support member, a material manipulating grab, and means suspending said grab from said support member and operable to raise and lower said grab, said grab comprising a generally horizontal frame member, first and second generally vertical clamp arms pivoted to said frame member for movement in a first vertical plane about parallel first axes, power-actuated means operatively connected to said arms for moving said arms about said axes, first and second load-engaging elements adapted to engage opposite vertical sides of a load and each having a load-engaging position in which the element is disposed in a generally vertical plane normal to said first vertical plane and in which position the element is supported for rotation about a roll-over axis through the element and normal to the plane thereof and for rotation about a self-aligning axis parallel to said first axes and normal to said roll-over axis, first and second connecting means respectively connecting said first and second elements to corresponding ends of said first and second clamp arms respectively, each of said connecting means comprising a first member connected to the corresponding clamp arm for rotation about said self-aligning axis when the element is in said load-engaging position and a second member carried by said first member for rotation about said roll-over axis when the element is in said load-engaging position, said second member of each connecting means carrying the respective load-engaging element, a spring carried by each of said arms and operatively connected to the member of the connecting means associated with the arm which is rotatable about the self-aligning axis of said connecting means to yieldably hold the member in a predetermined load-engaging position with respect to said member, and power-actuated means carried by at least one of said arms and operatively connected to the member of the connecting means associated with the arm which is rotatable about said roll-over axis for rotating the member.

3. In a material handling apparatus including an overhead support member, a material manipulating grab, and means suspending said grab from said support member and operable to raise and lower said grab, said grab comprising a generally horizontal frame member, first and second generally vertical clamp arms pivoted to said frame member for movement in a first vertical plane about parallel first axes, power-actuated means operatively connected to said arms for moving said arms about said axes, first and second load-engaging elements adapted to engage opposite vertical sides of a load and each having a load-engaging position in which the element is disposed in a generally vertical plane normal to said first vertical plane and in which position the element is supported for rotation about a roll-over axis through the element and normal to the plane thereof and for rotation about a self-aligning axis parallel to said first axes and normal to the roll-over axis, first and second connecting means respectively connecting said first and second elements to corresponding ends of said first and second clamp arms respectively, each of said connecting means comprising a first member connected to the corresponding clamp arm for rotation about said self-aligning axis when the element is in said load-engaging position and a second member carried by said first member for rotation about said roll-over axis when the element is in said load-engaging position, said second member of each connecting means carrying the respective load-engaging element,

and power-actuated means carried by at least one of said arms and operatively connected to the member of the corresponding connecting means rotatable about said roll-over axis for rotating the member, a spring carried by each arm and operatively connected to the member of the connecting means associated with the arm that is rotatable about the self-aligning axis to bias the member to a predetermined position about its axis which positions the corresponding element in a position which corresponds approximately to its said load-engaging position when a maximum width load is engaged and being handled by said elements.

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