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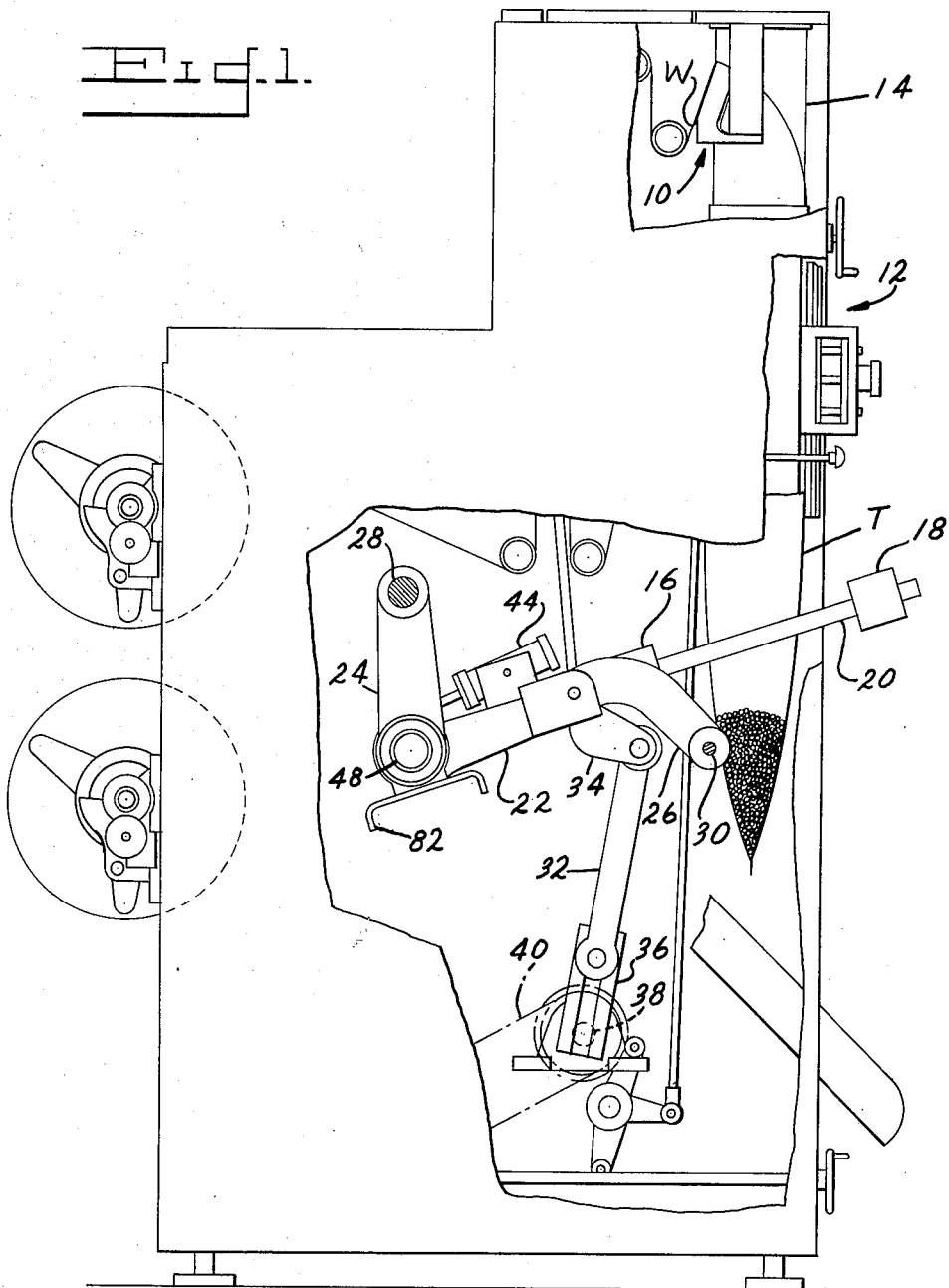
J. A. HART ETAL

3,220,156

BAGGING MACHINE

Filed Dec. 11, 1962

2 Sheets-Sheet 1



INVENTORS
JOHN A. HART
RICHARD M. ANDERSON
BY Chapin & Neal
attorneys

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Fig. 2.

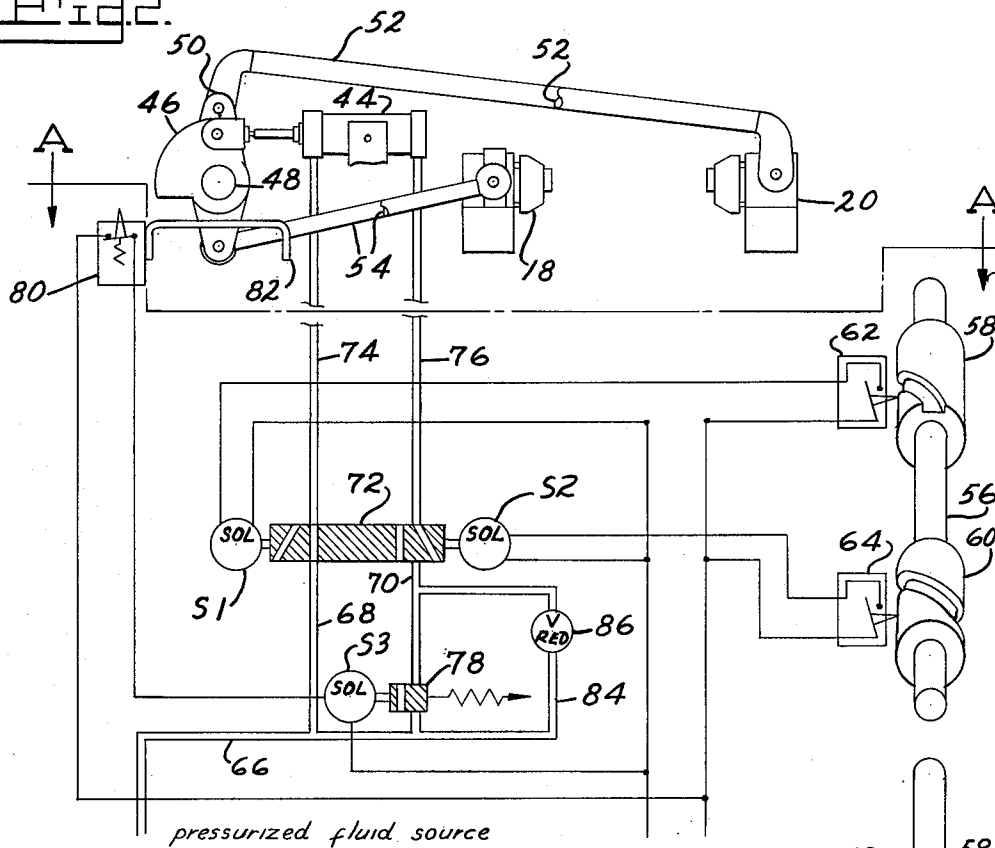
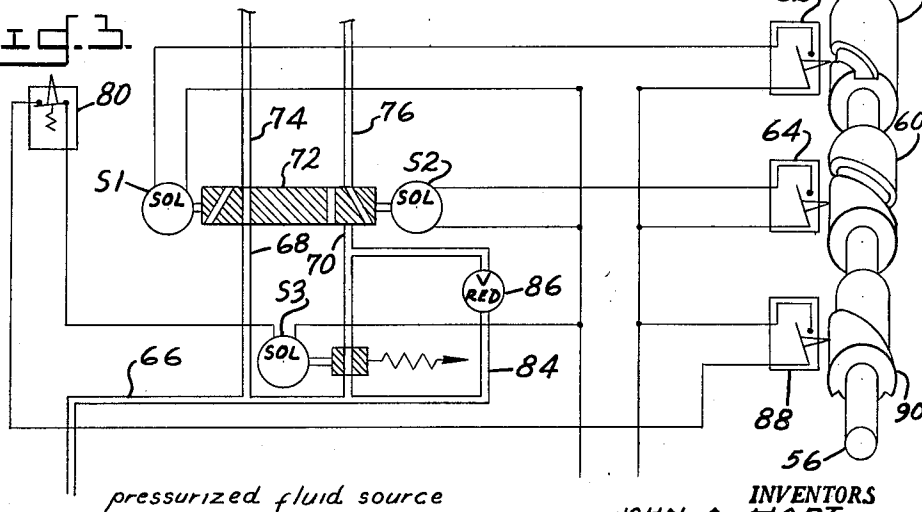


Fig. 3.



INVENTORS
JOHN A. HART
RICHARD M. ANDERSON
BY Chapin + Neal
attorneys

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BAGGING MACHINE

John A. Hart, Longmeadow, and Richard M. Anderson, Westfield, Mass., assignors to Package Machinery Company, East Longmeadow, Mass., a corporation of Massachusetts

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4 Claims. (Cl. 53—77)

The present invention relates to improvements in packaging or bagging machines and more particularly to improvements in that type of machine wherein a pair of draw bars or clamps grip successive portions of a tube of wrapper material at spaced points along the length thereof to seal the tube in the forming of pillow-shaped packages.

The object of the invention is to minimize, if not eliminate, the possibility of serious injury to the draw bars in the event an article within the wrapper tube is disposed between the draw bars as they close to clamp and seal the tube.

The particular problem which has been overcome by the present invention is best illustrated in the packaging of hardware such as screws, hinge plates, and the like. In a vertical type bagging machine, a tube of wrapper material is formed around a feed or drop tube, through which the articles to be packaged fall. A transverse seam is formed at the lower end of this wrapper tube from a previous operation and the articles then fall to the bottom of the tube. The draw bars then grip the wrapper tube with considerable force to facilitate the formation of a second transverse seal which defines the upper end of the package and the lower end of the next package. If an item has rebounded between the draw bars or has failed to fall below the draw bars, the closing pressure is sufficient to cause serious damage, necessitating a loss of production from the machine and the expense of repairing or replacing the damaged draw bars.

In accordance with the inventive concepts of the present invention, means are provided for closing the draw bars with a minimum force and then applying a greatly increased force to the draw bars after they are at least substantially closed. In other words, if an article were between the draw bars, they would be held apart by the article and full clamping pressure would not be applied in that particular machine cycle. Preferably the draw bars are opened and closed by a fluid pressure motor and optional means may be provided for initiating closing movement with a high pressure in order to obtain a faster cycle of operation.

The above and other related objects and features of the invention will be apparent from a reading of the following description of the disclosure found in the accompanying drawings and the novelty thereof pointed out in the appended claims.

In the drawings:

FIG. 1 is a diagrammatic view of a bagging machine of the type employing the present invention;

FIG. 2 is a schematic view of means for opening and closing the draw bars of such machine in accordance with the present invention;

FIG. 3 is a schematic view illustrating a modified embodiment of the invention which may replace the components seen in FIG. 2 below line AA.

Referring first to FIG. 1, the machine therein shown

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is essentially the same as in U.S. Patent No. 3,061,989. Basically, this machine comprises a folder 10 about which a web W of wrapper material is trained to form a tube T of wrapper material. The marginal edges of the web W are lapped and sealed by a heat sealing unit 12, which forms a continuous longitudinal seam. A feed or drop tube 14 is disposed within the tube T. A pair of draw bars 16 and 18 are slidably mounted on a pair of rods 20 which project from a swinging arm or bracket 22. The bracket 22 is mounted by links 24 and 26 which in turn are mounted on fixed pins 28 and 30. A link 32 is pivotally connected at its upper end to an extension 34 of the bracket 22 and at its lower end to a crank arm 36. The crank arm 36 is connected to a shaft 38 which is rotated from an appropriate power source by a chain 40. As is more fully explained in the aforementioned patent, rotation of the crank 36 will cause the draw bars 16 and 18 to reciprocate in a vertical direction.

Means including a fluid motor 44 (see also FIG. 2) mounted on the bracket 22 are provided for opening and closing the draw bars 16 and 18. These means further include a lever 46 to which the rod of the fluid motor 44 is pivotally connected. The lever 46 is secured to a shaft 48 journaled on the bracket 22. A pair of double-ended levers 50 are also secured to the shaft 48. Links 52 extend from the upper ends of the levers 50 to the front draw bar 20 and links 54 extend from the lower ends of the levers 50 to the rear draw bar 18.

The draw bars are illustrated in their open position. Extension of the piston rod of motor 44 will rotate shaft 48 in a counterclockwise direction and with it the double-ended levers 50. This will cause the draw bars to move towards each other and clamp the tube of wrapper material therebetween. With the wrapper tube thus clamped, means are provided for transversely heat sealing the wrapper tube and then transversely severing the tube intermediate the heat sealed area as the draw bars 16 and 18 are moved downwardly. Upon reaching the bottom of their stroke, the draw bars open, releasing a completed package and then moving upwardly preparatory to a further cycle of operation. Whatever product is to be packaged is dropped into the tube 14 at a proper time so that it will reach the bottom of the wrapper tube T prior to closure of the draw bars 16 and 18.

Again, the constructional details and the specific mode of operation of the draw bars may be obtained by referring to the above-mentioned patent. However, at this point it will be noted that the concepts of the present invention, in general aspects at least, will apply equally well to the more familiar type of vertical bagging machine as exemplified by U.S. Patent No. 1,986,422 of the horizontal type of packaging machine as exemplified by U.S. Patent No. 2,296,142.

The present application deals more specifically with the manner in which the draw bars are closed. The control system shown in the above-mentioned Patent No. 3,061,989, will again be used as the environment of the invention. In that disclosure there is shown a cam shaft here indicated by reference character 56 (FIG. 2) which is rotated in fixed relation to rotation of the crank arm 36 which motivates up and down movement of the draw bars 16 and 18. Spiral grooved cams 58 and 60 are mounted on the shaft 56. Switches 62 and 64 are controlled by the cams 58 and 60 respectively. The switches 62 and 64 are normally closed and are held open by the

cams 58 and 60 except for the periods when the grooves therein are aligned with the actuators for said switches. Thus the switches 62 and 64 are momentarily closed for a short period of time during each cycle of operation.

Pressurized fluid, preferably pressurized air, is conducted from an appropriate source through a conduit 66 and then through conduits 68 and 70 to a valve 72. From the valve 72 the pressurized air may be conducted through either conduit 74 or 76 to one end or the other of the air motor 44. The valve 72 is displaced in one direction by solenoid S-1 and in the other direction by solenoid S-2. Solenoid S-1 is connected in series with switch 62 and solenoid S-2 is connected in series with switch 64. Both sets of switches and solenoids then being connected across an appropriate power source.

Solenoid S-1 is energized to displace the valve 72 to the position illustrated some time during the down stroke of the draw bars 18 and 20, or at least before they begin their upward movement. Thus it will be seen that pressurized fluid flows through the conduits 68 and 74 maintaining the piston of motor 44 in a retracted position with the draw bars open as in FIG. 2. When the draw bars approach the upper limit of their upstroke, switch 64 will momentarily close, energizing solenoid S-2 and shifting valve 72 toward the right so that air will no longer flow to conduit 74, but will now flow from conduit 70 to conduit 76. It will be noted that a valve 78 is interposed in conduit 70 and maintained in a position which blocks flow of air from conduit 66 to conduit 70 by a solenoid S-3. Thus, solenoid S-3 is maintained energized by a normally closed switch 80 mounted on a channel member 82 which is secured to the bracket 22. The switch 80 and solenoid S-3 are connected in series across the same power source previously referred to. Pressurized air thus flows through a by-pass conduit 84 and a pressure reducing valve 86. Thus low pressure air is provided for projecting the rod of fluid motor 44 and rotating the shaft 48 in a counter-clockwise direction to close the draw bars 18 and 20. The low pressure provided for this closing movement is such that should there be an article disposed within the wrapper tube and between the draw bars 18 and 20, the motor 44 will stall rather than apply sufficient force to damage the draw bars. However, if this undesirable condition does not occur, closing movement will continue and the upper end of one of the levers 50 will engage the plunger of switch 80 opening that switch and thereby deenergizing solenoid S-3. The valve 78 is a spring loaded valve which is displaced upon deenergization of solenoid S-3 to bring its port into alignment with conduit 70, whereupon full pressure will be supplied through conduit 76 and greatly increased pressure will be transmitted to the rod of motor 44 to provide the necessary force for draw bars 18 and 20 to obtain an effective heat seal.

Upon further rotation of the cam shaft 56, switch 62 is momentarily energized displacing valve 72 back to the position illustrated, thereby introducing full line pressure through conduit 68 and 74 to the opposite end of the fluid motor 44 and thus opening the draw bars. Switch 80 again closes to energize solenoid S-3 so that the cycle of operation above described may again be repeated.

Patent No. 3,061,989, above referred to, gives a more complete description of the electric control circuit in which the present circuit elements are incorporated. Further detailed description is not deemed necessary for those skilled in the art.

Referring now to FIG. 3, the components therein may replace the elements below line A-A in FIG. 2. It will be seen that switch 80, solenoids S-1, S-2 and S-3, remain the same. Likewise switches 62 and 64 are again controlled by cams 58 and 60 to actuate the solenoids S-1 and S-2 in proper timed relation. Valve 72 controls flow of air from conduits 68 and 70 as above

described to the conduit 74 and 76. Likewise the by-pass conduit 84 and reducing valve 86 provide for a flow of fluid under reduced pressure. Also conduit 66 is connected to an appropriate source of pressurized air or pressurized fluid.

The only difference between the two circuits is in the provision of a second switch 88 for controlling the solenoid S-3. Thus it will be seen that switches 80 and 88 are connected in series with solenoid S-3, across the appropriate electrical power source. Switch 88 is controlled by cam 90 which is also secured to the cam shaft 56.

The operation of this embodiment is the same insofar as opening movement of the draw bars is obtained by energization of solenoid S-1 displacing that valve to the illustrated position. When solenoid S-2 is energized as above described, switch 88 is open so that solenoid S-3 is deenergized. This means that full line pressure may pass through the conduits 70 and 76 to initiate closing movement of the draw bars. A short time later switch 88 is closed energizing solenoid S-3 and preventing further flow of fluid directly from conduit 66 to conduit 70. Thus, the fluid pressure provided for closing the draw bars during the remainder of their closing movement and particularly during the critical time where they might engage and crush an article disposed therebetween, only low pressure fluid is available. If there is no obstruction to their complete closure, the switch 80 will be opened by one of the levers 50 deenergizing solenoid S-3 and again permitting full pressure to be transmitted through conduits 70 and 76 to the motor 44 and thus provide the necessary high pressure for the draw bars 18 and 20 during the heat sealing operation.

It will be noted that cam 90 is also a spiral cam but that its depression or groove is much wider. In the first instance, the use of spiral cams enables a timing adjustment by shifting the switches 62 and 64 in a direction axially of the shaft 56 as described in the aforementioned Patent No. 3,061,989. Switch 88 would also be adjusted in the same fashion and preferably would be coupled to switch 64. However, switch 88 must remain energized, at least in this particular circuit, for a greater period of time, until the draw bars are substantially closed, which accounts for the shape of the depression.

Having thus described the invention, what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. In combination with a bagging machine of the type wherein articles are introduced into a continuously formed tube of wrapper material and having a pair of clamps for gripping the wrapper tube and forming a transverse seam therein, yieldable means for closing the clamps toward each other with a relatively low force and means responsive to the draw bars being moved to a contiguous relation for applying a much greater closing force to the clamps to complete their closing movement in gripping the wrapper tube.

2. In combination with a bagging machine of the type wherein articles are introduced into a continuously formed tube of wrapper material and having a pair of clamps for gripping the wrapper tube and forming a transverse seam therein, yieldable means for initiating closing movement of the clamps with a relatively strong force, continuing closing movement with a relatively low force and means responsive to the draw bars being moved to a contiguous relation for applying a much greater closing force to the clamps to complete their closing movement in gripping the wrapper tube.

3. In combination with a bagging machine of the type wherein articles are introduced into a continuously formed tube of wrapper material and having a pair of clamps for gripping the wrapper tube and forming a transverse seam therein, means for reciprocating the clamps lengthwise of said tube and means including an air motor for closing and opening the clamps in proper timed relation

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to their reciprocating movement, said air motor comprising a piston and cylinder to one end of which pressurized air is directed for closing movement of said clamps, the improvement which comprises means for directing low pressure air to said one end of said cylinder during closing movement of said clamps, means for detecting closure of said clamps to a contiguous relationship and means responsive to actuation of said detecting means for directing high pressure air to said one end of said cylinder.

4. The combination of claim 3 wherein means are provided for directing high pressure air to the said one end of said cylinder for a short period of time when air is first directed to said one end to initiate closing move-

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ment of the draw bars in order that the draw bars may be rapidly accelerated in their closing movement.

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10 FRANK E. BAILEY, *Primary Examiner*.

TRAVIS S. McGEHEE, *Examiner*.