April 14, 1931. M. B. TROYER 1,801,181

AUTOMATIC SWITCH AND VACUUM CUT-OUT MECHANISM FOR CAN BODY MACHINES

Filed March 28, 1928 3 Sheets-Sheet 1

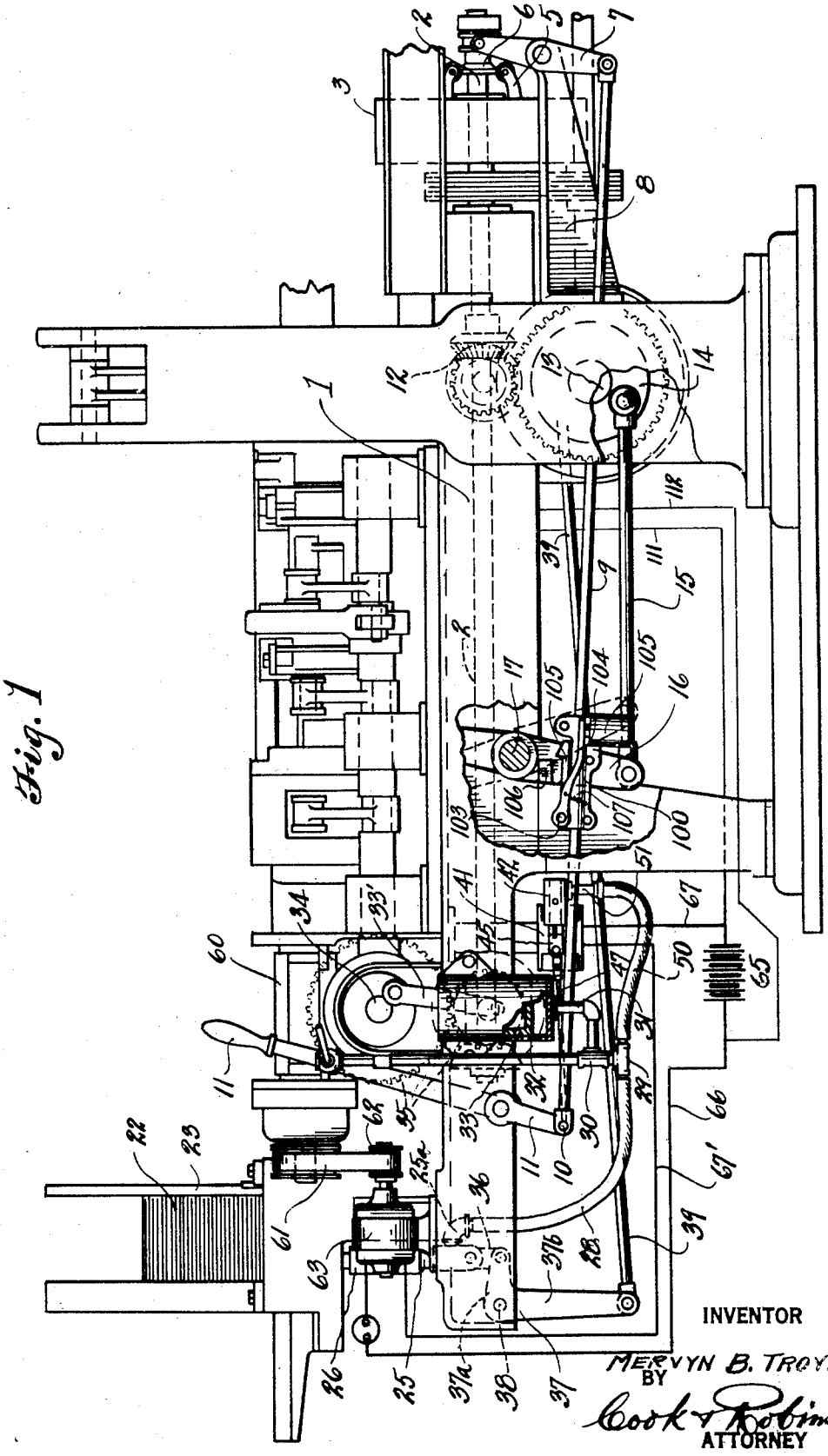


Fig. 1

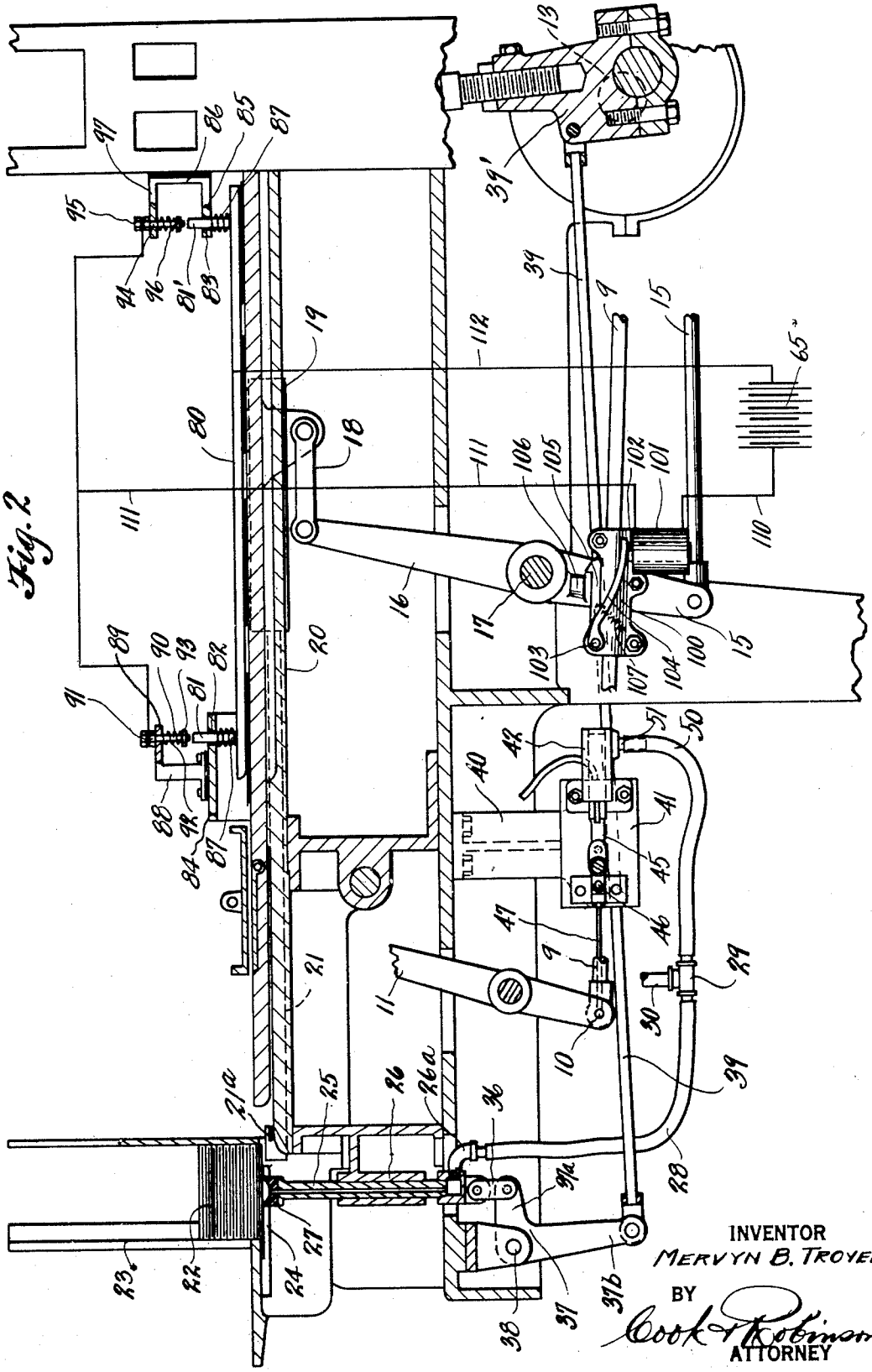
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Fig. 2



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Fig. 4

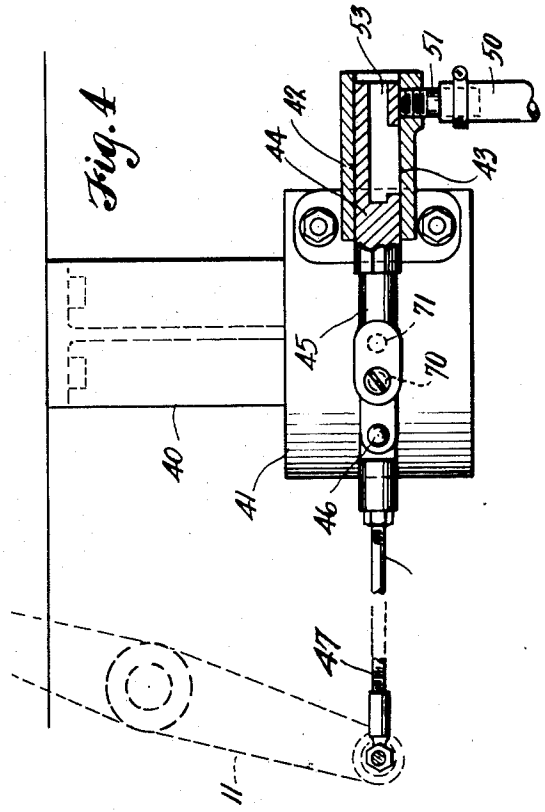


Fig. 5

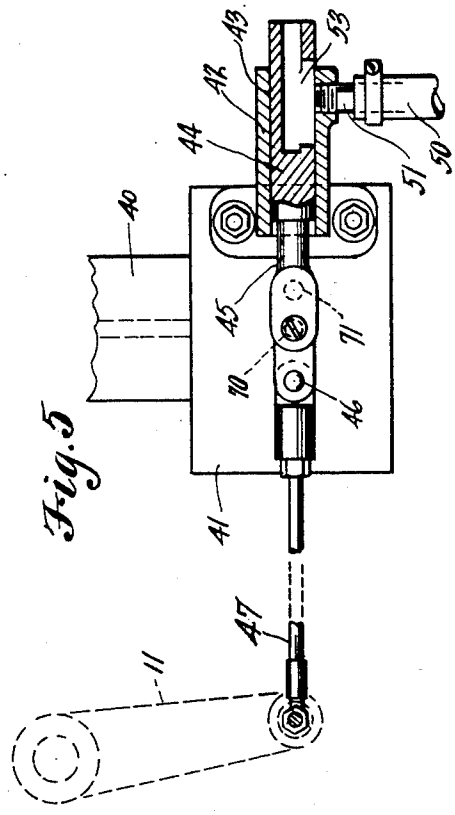
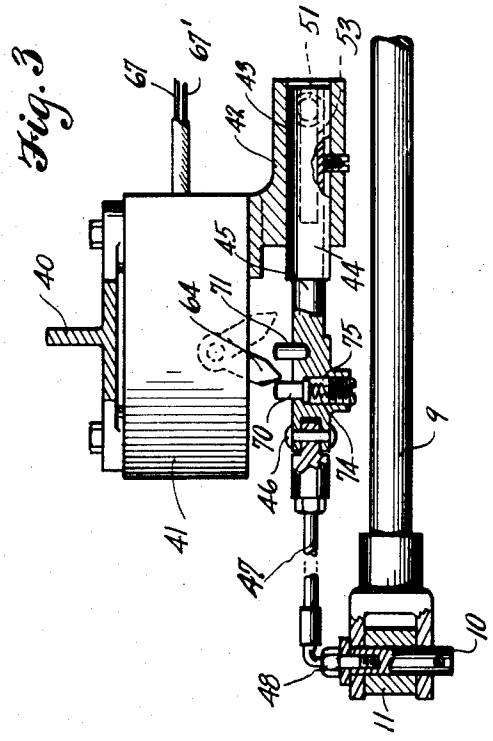


Fig. 3



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UNITED STATES PATENT OFFICE

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AUTOMATIC SWITCH AND VACUUM CUT-OUT MECHANISM FOR CAN-BODY MACHINES

Application filed March 28, 1928. Serial No. 265,272.

This invention relates to improvements in can body making machines, and has particular reference to a feed control mechanism for use with machines of that character described and illustrated in the application of Nelson Troyer for can body making machine, filed February 23, 1926, under Serial Number 89,979, now Patent Number 1,772,820, dated Aug. 12, 1930.

The machine with which the present invention is incorporated is one for forming cylindrical can bodies from flat blanks of tin, which, by the action of a vertically reciprocating suction cup and horizontally reciprocating feed bars, are fed into the machine, one at a time, from the lower end of a supply stack. The feed mechanism advances the blanks through the machine by intermittent movements, successively, to various stations for rolling, notching, flanging and finally to a station at which the blanks are bent about a forming horn where their ends are seamed together. This machine operates at high speed and is capable of forming from two hundred and fifty to three hundred can bodies per minute. Heretofore, the machine has been equipped with mechanism for automatically disconnecting the main drive of the machine in the event that any irregularity in the feeding of the body blanks should occur, such as the delivery of more than one blank at a time into the machine, and while this automatic stop mechanism, as heretofore employed, operates satisfactorily for its particular purpose, it is not sufficient to overcome all the difficulties resulting incident to improper feeding, for the reason that, even though it functions promptly each time any irregularity occurs, the high speed at which the machine operates causes it to coast for sufficient time after disruption of the drive that several more blanks will be delivered into the machine. This invariably results in a jam and, at the least, it causes an undesirable delay in again starting operation.

In view of the above, it has been the principal object of this invention to provide, in conjunction with the automatic stop mechanism as heretofore used on the machine, an additional device which will function upon disruption of the main driving connection of the machine whether this be done automatically or manually, to immediately discontinue the feeding of the body blanks to the machine even though the machine continues to coast for some time after the drive is disrupted.

More specifically stated, the invention resides in the provision of means in connection with control devices of the machine, that will operate to immediately discontinue the feeding of the blanks from the supply hopper into the machine in the event that the machine driving clutch is manually or automatically shifted to disconnect the machine from the main drive; this particular means comprising, as a part thereof, an air suction control valve that is shiftable by connection with the clutch shifting means from normally closed to open position to thereby relieve the suction in the device whereby the blanks are caused to be drawn from the supply stack into the machine and to thereby render the feed device inoperative.

Other objects of the invention reside in the various details of construction and in the combination of parts as is hereinafter described.

In accomplishing the objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation of a can body forming machine equipped with an automatic feed control mechanism embodied by the present invention; a part of the machine

side frame being broken away for better illustration.

Figure 2 is a sectional detail taken in a vertical plane longitudinally of the machine, showing the suction cup for drawing the body forming blanks from the supply hopper into the machine and the reciprocating feed bars whereby the blanks are then advanced through the machine through the several stations where operations are performed thereon.

Figure 3 is an enlarged plan or top view, partly in section, of the suction control valve; showing its connection with the clutch shipper lever and showing also the means for actuating the control switch for the motor which operates the blank rolling attachment of the machine.

Figure 4 is a side view of the same parts, with the valve housing and valve slide in section for better illustration.

Figure 5 is a sectional detail of the valve, showing it in open position.

Referring more in detail to the drawings—1 designates the frame structure of the machine upon which the various mechanisms, which operate on the body blanks, are mounted; these mechanisms not being illustrated only in so far as is thought necessary to impart an understanding to the action of the feed control means of the present invention. The various operating parts of the machine are driven by connection with a longitudinally extending shaft 2 equipped for driving with a belt wheel 3 which is adapted to be connected, or disconnected, with the shaft for driving the latter by the shifting of a clutch mechanism 5 under control of a conical, sliding collar 6 on the shaft; the collar being movable under the control of a lever 7 that is pivotally supported from the frame 1 by a bracket 8, or other suitable means, and which is connected to one end of a shift rod 9 that extends lengthwise of the machine and which, at its other end, has connection, by means of a pivot pin 10, with the lower end of a shipper lever 11 whereby the clutch mechanism may be manually shifted to make or release driving connection with the belt wheel 3 as in starting or stopping the machine.

The shaft 2 has an operative driving connection, through suitable gearing, as designated in dotted lines at 12 in Figure 1, with a transverse shaft 13 on which a wheel 14 is fixed and, pivotally attached eccentrically to this wheel, is one end of a link 15 which, at its other end, connects with the lower end of a rocker lever 16 on a cross shaft 17. At its upper end, the rocker lever is connected, by means of a short link 18, with a feed slide 19 that is reciprocally mounted on a longitudinally extending, horizontal guide bar 20. This slide has fixed connection with feed bars 21 and the latter are equipped with suitable devices, not described in detail, whereby the body blanks are advanced through the machine.

The body blanks, as designated at 22, are stacked for delivery into the machine in a feed hopper 23 and are fed, one at a time, from the lower end of the stack into the machine by the action of a suction feed mechanism, presently described, and the action of the reciprocating feed bars 21.

The stack of body blanks 22 is supported at its side edges by fingers 24 fixed to the base of the hopper and the means, as best shown in Figure 2, whereby the blanks are delivered from the stack into the machine is as follows: Reciprocally mounted in a bearing 26 centrally below the stack of body blanks is a vertically directed tube 25 and, fixed to the upper end of this for contact with the bottom of the stack, is a sucker head 27 consisting of an upwardly facing, flexible cup, of rubber or the like. At its lower end, the tube 25 has connection through suitable fitting 25*a* with a flexible tube 28 that connects with one branch of a T-pipe fitting 29 which, in turn, has connection through pipes 30 and 31 with a pump cylinder 32 that is fixed to the frame 1, and wherein a piston 33 is reciprocally actuated by a pitman 33′ connected with a driven shaft 34, so as to create suction through the tubes. The shaft 34 may be driven in any suitable manner by connection with the driven shaft 2, such as by gearing designated in dotted lines in Figure 1, as at 35.

The lower end of the tube 25 is also connected at its lower end, by means of a short link 36, with the horizontal arm 37*a* of a bell crank 37 that is pivotally mounted on a pin 38 and which has a depending arm 37*b* connected by a rod 39 to an eccentric 39′ on the shaft 13, as shown in Figure 2. The various connections described provide that, upon rotation of the shaft 13, there is caused a functioning of the suction pump to create suction through the tubes 31—30 and 28 to the cup 27, and a vertical, reciprocal action of the sucker tube 25 which, first, advances the suction cup upwardly against the lower blank of the stack and then moves it downwardly so that, incident to the suction that is created by the pump and transmitted to the cup through various pipe connections, the engaged blank will be held to the cup and drawn down at its center to a position at which it will be engaged by the feed fingers 21*a* at the ends of the feed bars as they move inwardly and will be drawn thereby into the machine. The movement of the feed bars, of course, is properly synchronized with the reciprocal movement of the sucker tube so that this action will result.

As a means for instantly stopping the feeding of the body blanks from the supply hopper into the machine by the shifting of the driving clutch to "off" position, whether this

be manually done by movement of the shipper lever 11 or automatically by other means presently described, I have provided the following mechanism:

Fixed to the underside of the bed plate of the main frame of the machine is a bracket 40 which supports a switch housing 41 and, fixed to this switch housing, is a valve housing 42 having a cylindrical bore 43 therethrough within which a valve slide 44 is fitted. This slide has a continuing shank 45 at one end which is attached pivotally, by a pin 46, to one end of a connecting link 47 which, at its other end, has a ball and socket connection, as designated at 48, with the pin 10 at the lower end of the shipper lever 11. This connection provides that shifting of the lever 11 for throwing the clutch 5 into or out of gear will cause a corresponding shifting of the valve slide in its housing and this movement, as will now be described, renders the action of the suction cup effective or non-effective for feeding the body blanks into the machine from the supply.

Leading from the T-fitting 29 to which the suction tube 28 is connected, is a flexible tube 50 which is connected to the valve housing 42 by means of a short nipple 51 which opens into the bore 43 of the latter. When the shipper lever 11 is adjusted to that position at which the clutch mechanism is shifted to a position for driving the machine, the valve slide 44 will be moved to the position in the housing as shown in Figure 4, at which it closes the valve against the admittance of air into the connecting tube 50, but, when the shipper lever is moved to its opposite position, at which the driving clutch is released, the valve slide will be shifted to the position in which it is shown in Figure 5, at which air will be admitted to the tube 50 through an open channel 53 which leads from the end of the valve slide to one side thereof at a point at which it will register with the inner end of the nipple 51 when the sleeve is shifted to this latter position. It is readily apparent, that since the feeding of the body blanks 22 from the supply hopper into the machine is dependent upon suction being created by the pump and transmitted to the suction cup, the breaking of this suction by opening the valve and admitting air to the connecting conduit will render the feed mechanism ineffective and no blanks will be fed into the machine, but as soon as the admittance of air to the tube 50 is cut off, by closing of the valve, the suction is again rendered effective and blanks will be delivered by action of the cup.

In the present can body making machine there is embodied a blank rolling means whereby the body blanks, after being fed into the machine but prior to any operation thereon, are passed about a series of cylindrical rollers as a means of breaking their stiffness. This rolling attachment is not shown in detail but is designated in its entirety by reference numeral 60, and its rollers are driven by a belt connection 61 with the driving pulley 62 of an electric motor 63 that is mounted on the frame of the machine, as shown in Figure 1. This motor operates automatically under the control of a switch mechanism that is contained in the switch housing 41. The switch mechanism itself is not illustrated in the present drawings, but it is to be understood that it may be of any suitable character that may be adjusted between "on" and "off" positions by the shifting of a switch lever 64, which, as shown in Figure 3, projects laterally from the side of the housing.

In Figure 1, I have designated a source of electricity at 65, with a circuit wire connection 66 leading therefrom to one side of the motor and another circuit connection 67 leading to the switch and a connection 67′ from the switch to the other side of the motor. As a means of opening or closing this circuit incident to shifting of the clutch operating mechanism, we have mounted two laterally projecting studs 70—71 in the shank of the valve slide, and these are so positioned that one or the other will engage the switch lever 64 when the slide is moved from one position to the other. When the valve slide is moved from open position as in Figure 5 to closed position as in Figure 3, the switch lever 64 will be shifted so as to close the circuit to start the motor simultaneously with the starting of the machine. When the valve is moved back to the position as shown in Figure 5 incident to stopping of the machine, the switch lever will be actuated to reverse position to open the motor circuit. In order that the stud 70 during shifting of the shipper lever from "on" to "off" positions may pass beneath the switch lever 64, it is mounted for inward movement but is normally held in an extended position by pressure of a spring 74 which bears against its inner end; the spring being contained in a socket 75 in which the stud is slidably mounted. This yieldability of the stud 70 is essential since the movement of the slide is of such extent that the stud must pass beyond the switch lever in moving from one position to another and must necessarily be depressed in passing.

The above stop mechanism functions the same whether the shipper lever 11 is moved manually or is moved automatically under the influence of the electric stop mechanism with which the machine is equipped to disrupt the driving mechanism incident to an irregularity in the feed of body blanks into the machine. This automatic stop mechanism, as shown best in Figure 2 with its circuit and contacts, comprises a bar 80 which closely overlies the bar 20 along which the feed slide 19 operates, and upon which the body blanks are advanced in their passage

through the machine. On the ends of the bar 80 are upwardly directed posts 81—81′ which project slidably through openings 82 and 83, respectively, in a plate 84 that is fixed over the guideway, and the lower arm 85 of a bracket 86 that is fixed to the frame. Coiled springs 87 are wound about these posts and bear against the plate and bracket and downwardly against the bar to press the latter yieldably against the blanks as they pass beneath it. Supported upon the plate 84 and insulated therefrom, is a bracket 88 having a horizontal arm 89 in which a contact bolt 90 is mounted. This bolt is vertically slidable in an opening in the arm and is adjustably supported by a nut 91 threaded onto its upper end so that its lower end normally is spaced slightly above the upper end of the post 81. A coiled spring 92 is wound about the lower portion of this contact bolt and it bears against the bracket arm and against a nut 93 on the lower end of the bolt to yieldingly hold the bolt in this position. Likewise, a contact bolt 94, with adjusting nut 95 and tensioning spring 96, is mounted in a horizontal arm 97 of the bracket 86 and the lower end of this bolt is spaced just slightly above the upper end of the post 81′.

Fixed on the shift rod 9, adjacent the oscillating feed lever 16, is a mounting plate 100 which, at one end supports a solenoid 101 that has a sliding core bar 102 adapted to be lifted when the solenoid is energized. At the other end of the plate is a transverse shaft 103 which, at one end, has a lever arm 104 fixed thereto that rests on the upper end of the core bar and on the other end has a hook lever 105 fixed thereto that is adapted, when its hooked end is lifted, to be engaged by a projecting lug 106 formed on the lever 16 below the shaft 17. The hook of lever 105 is normally held out of the path of movement of the lug by a spring 107 connected thereto and with the plate 100 but is actuated into contact with the lug by the upward action of the solenoid. One pole of the solenoid is electrically connected by a circuit wire 110 with one side of the source of electricity 65 and the other side is connected, by a wire 111, with the bolts 90—94, and the other side of the source of electricity is connected by a wire 112 with the bar 80. With the parts so arranged, in the event that more than one of the body blanks are delivered into the machine at a time, or should a blank of an irregular character be delivered beneath the bar, the latter will be lifted by the contacting of either of the posts 81—81′ with the lower ends of the bolts 90 or 94 so as to cause a circuit to be closed through the solenoid. On energizing the solenoid, the core bar 102 moves upwardly and lifts the lever 104 to thereby rock the hook 105 into a position at which it will be engaged by the lug 106 on the oscillating feed lever 16 and the entire mechanism will be shifted thereby, so that the shift rod 9 on which the plate 100 is fixed will, through the lever 7, shift the clutch and release the driving connection between the wheel 3 and the shaft 2.

With the machine so equipped, it is readily apparent that should any irregularity in the feeding of blanks into the machine occur the action of the automatic disrupting device will cause shifting of the clutch, and conjointly with disruption of the drive, whether manually or automatically accomplished, feeding of blanks into the machine is discontinued and the circuit to the motor which drives the rolling device is cut off.

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

1. In a machine of the character described having a driving element, a body blank feeding means, a control for connecting and disconnecting the machine with its driving element and means operable therewith for rendering the feeding means effective or non-effective.

2. In a machine of the character described, a driving means, means operable with the machine for feeding body blanks thereinto, means for disconnecting the driving means from the machine and other means operable incident to functioning of the disconnecting means for rendering the blank feeding means non-effective.

3. In a machine of the character described, a driving means having an operative connection with the machine, a main control member for making or releasing the driving connection, means operable with the machine for feeding body blanks into the machine and means operable incident to movement of the control main member from "on" to "off" positions for rendering the feeding means effective or non-effective.

4. In a machine of the character described, in combination, an automatic disrupting means, a blank feeding means, and an automatic feed control operable conjointly with the automatic disrupting means.

5. In a machine of the character described, a driving element, a control that is shiftable to make or disrupt driving connection between the machine and driving element, means for feeding blanks into the machine, means for advancing them through the machine and means operable incident to disruption of the driving connection to instantly render the blank feeding means non-effective regardless of coasting of the machine.

6. In a machine of the character described, a drive controlling element, a suction system for feeding body blanks to the machine and a valve in the suction system that is adjustable in accordance with movement of the drive controlling element to render the suction system effective or non-effective.

7. In a machine of the character described, a driving clutch, a suction system operable with the machine to feed body blanks to the machine, a valve in the suction system, a clutch shifting means and a connection between the shifting means and valve whereby the latter is opened and closed in accordance with different positions of the clutch to thereby render the blank feeding system effective or non-effective.

8. In a machine of the character described, a driving clutch, a clutch shifting lever, a suction feed system for delivering body blanks to the machine comprising a suction creating means, blank engaging means, a connection from the suction creating means to the blank engaging means and a valve in said connection, and means connecting the valve with the clutch shifting lever whereby the valve will be opened to render the suction system inoperative simultaneous with disruption of the driving connection.

9. In a machine of the character described, a drive disrupting element and a suction system for feeding body blanks to the machine comprising a pump that is operable to furnish suction to the system, a valve housing connected with the suction system and a valve slide in said housing connected with the drive disrupting element to be moved thereby and adapted to open the suction system to atmosphere to thereby render it non-effective simultaneous with disruption of the drive.

10. In a machine of the character described, in combination with feed bars for advancing body blanks through the machine and a control lever, a hopper for holding a stack of body blanks, a suction feed system for delivering the blanks from the stack to the machine comprising a suction pump, a suction cup, a conduit connecting the cup with the pump, means for causing the cup to be actuated against and from the stack to flex the engaged blank to a position for engagement by the feed bars, a valve housing having a conduit leading therefrom to the suction system, a slide valve in the housing having a passage opening to atmosphere and a link connecting the valve slide with the control lever whereby the slide will be moved so as to close or open the suction through the passage in accordance with shifting of the control lever.

11. In a machine of the character described, in combination, a drive controlling element, blank preforming means, an electric motor for driving the latter, a circuit for the motor, a blank feeding means that is rendered effective or non-effective in accordance with movement of the controlling element and a control switch for the circuit that is moved to "on" and "off" positions with the feed control means.

12. In a machine of the character described, a drive disrupting element, a blank preforming means, an electric motor for the latter, a circuit for the motor, a controlling switch in the circuit, a suction feed system for delivering body blanks to the machine, a valve in the suction system having a valve slide connected with the drive disrupting element to be moved thereby and adapted to open the suction system to render it non-effective simultaneous with disruption of the drive and means on the slide for actuating the switch between "on" and "off" positions in accordance with movement of the valve slide.

Signed at Seattle, Washington, this 25th day of November, 1927.

MERVYN B. TROYER.