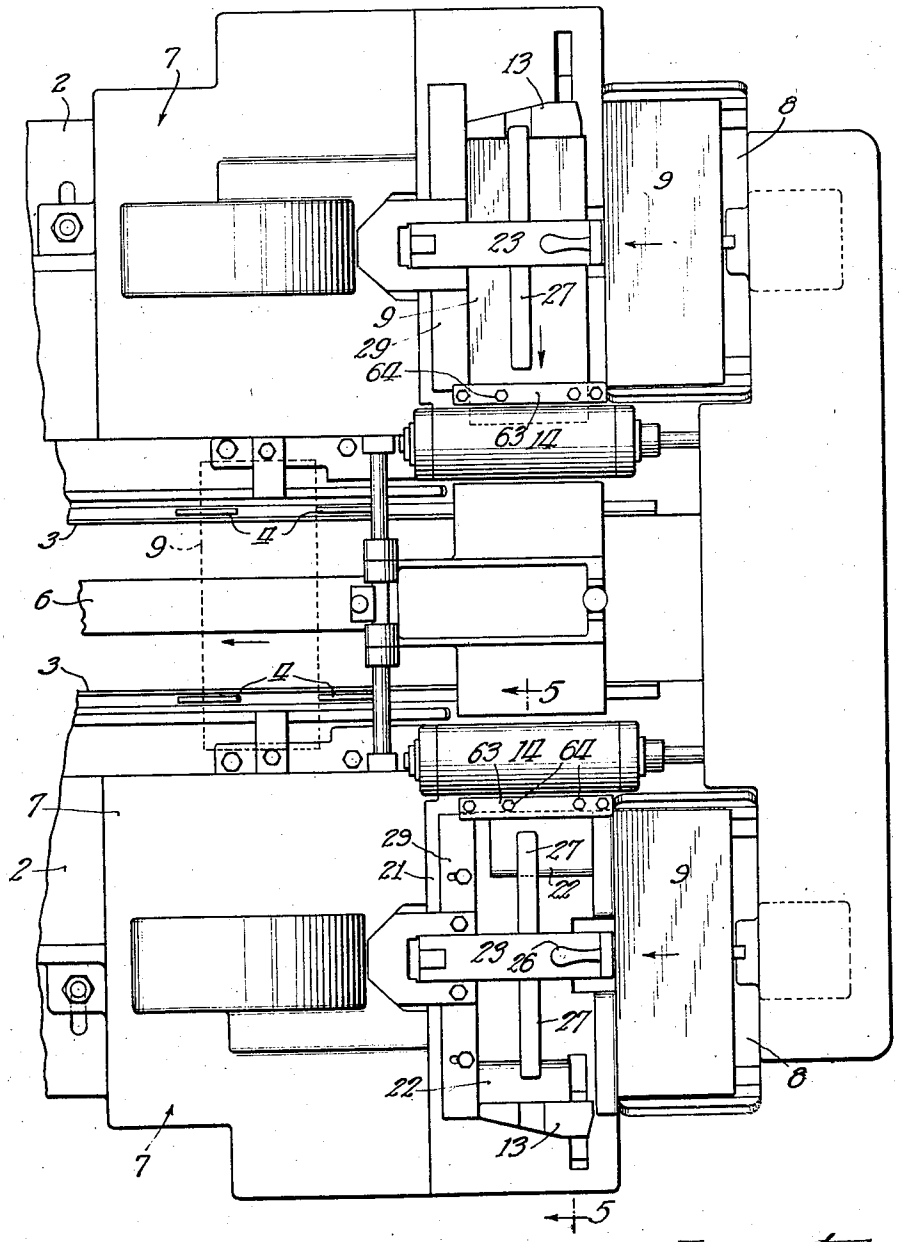
May 22, 1934. W. CAMERON 1,959,854

SHEET FEEDING MECHANISM

Filed April 4, 1931 5 Sheets-Sheet 1

Fig. 1.



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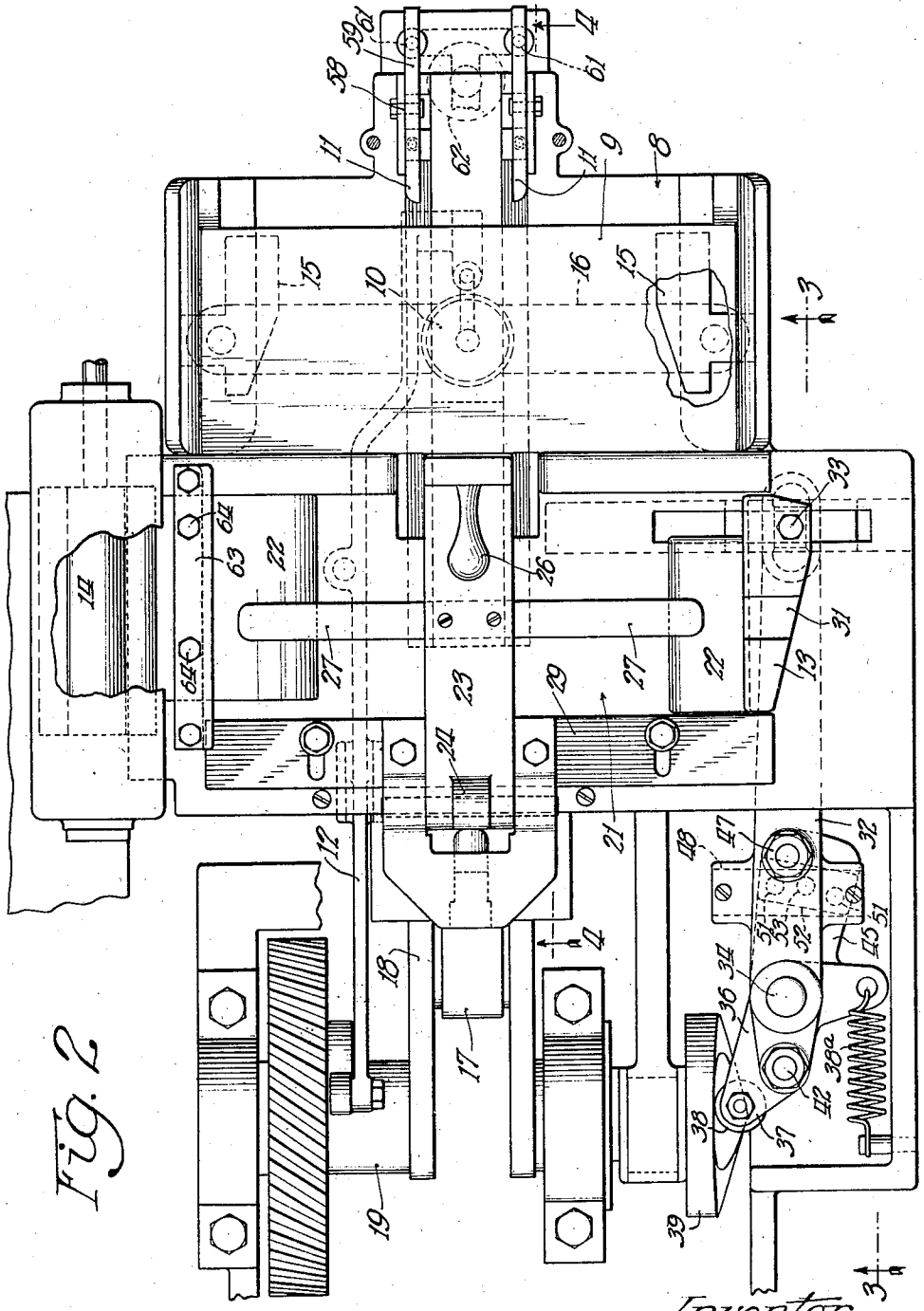

Fig. 2

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SHEET FEEDING MECHANISM

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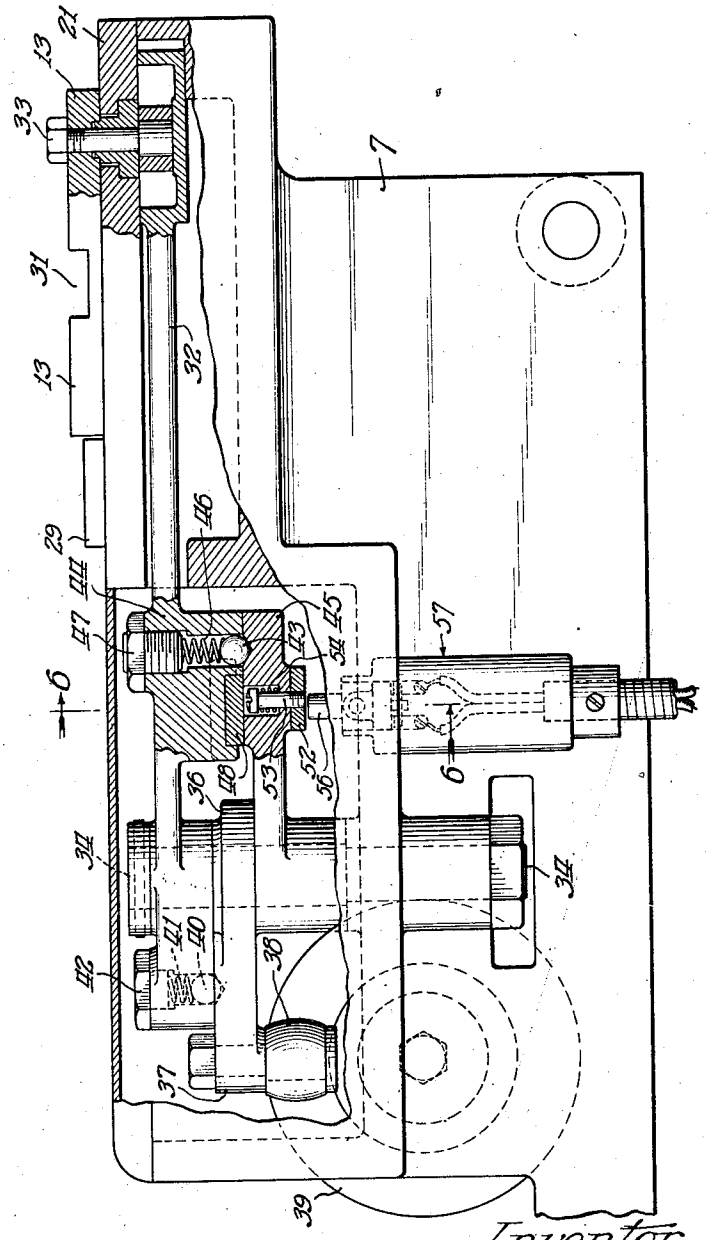

Fig. 3

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SHEET FEEDING MECHANISM

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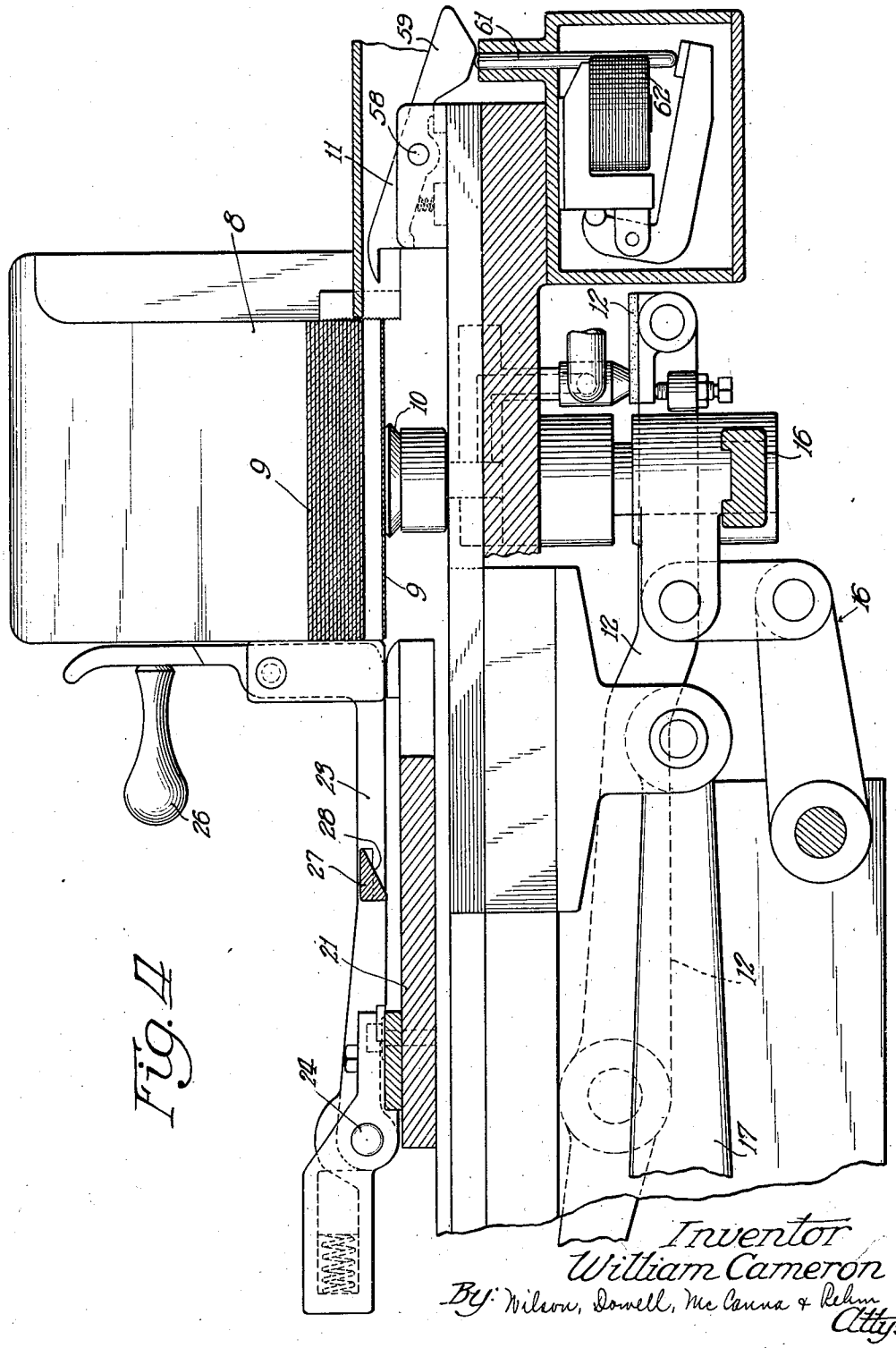

Fig. 4

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SHEET FEEDING MECHANISM

Filed April 4, 1931 5 Sheets-Sheet 5

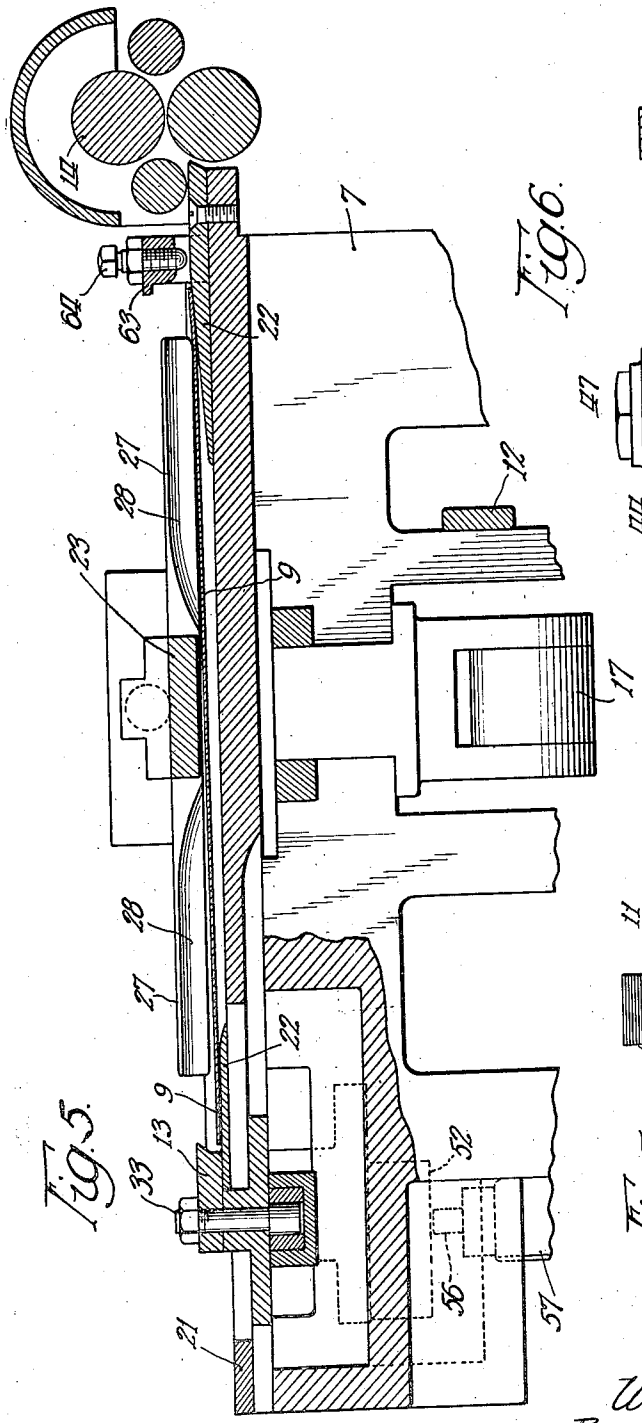

Fig. 5.

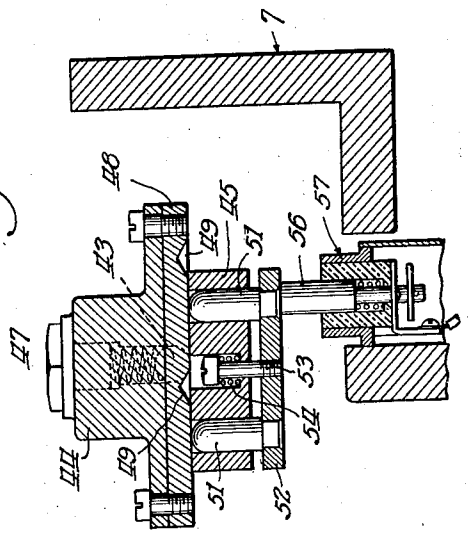

Fig. 6.

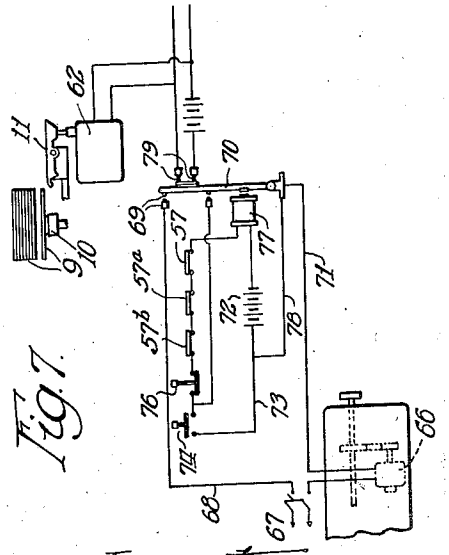

Fig. 7.

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Patented May 22, 1934 1,959,854

UNITED STATES PATENT OFFICE

1,959,854

SHEET FEEDING MECHANISM

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Application April 4, 1931, Serial No. 527,687

17 Claims. (Cl. 271—44)

This invention relates to a blank feeding mechnism for delivering blanks from a source of supply to an operating mechanism such as a body maker or lock seamer. It will be apparent, however, that the principles of this invention may be applied to other uses and to other units of can making machines. In a body making unit, shown for illustrative purposes only, a flat sheet of stock cut to size and known as a blank is prepared and fed from a stack of such blanks onto a conveyor such as a slide which in turn transfers the blanks to a horn around which the blank is formed into a cylindrical or otherwise shaped body. The preparation consists mainly of rolling or flexing the blanks to prevent the formation of flat spots as the blank is shaped.

The output capacity of machines of this character is often limited by inability to handle the blanks with the requisite speed and accuracy. Furthermore, the feeding of a bent, buckled or otherwise deformed blank, or the feeding simultaneously of two blanks stuck together results in a serious jam and frequently in injury to the machine.

One of the purposes of my present invention is the provision of feeding mechanism which will feed perfect blanks singly with extreme speed and great accuracy and which, in the event of the presentation thereto of a deformed blank or of doubles, will not only prevent the further feeding of the objectionable blanks but will also instantaneously prevent the feeding from the magazine of additional blanks even before the machine as a whole has been brought to a stop.

Other novel features in the details of construction of the various elements will be apparent from the following description of one embodiment of this invention described by way of illustration in the drawings in which:

Fig. 1 is a plan view of the feeding end of a body making machine employing dual feeding and rolling units each of the feeding units embodying the features of this invention.

Fig. 2 is an enlarged plan view of a single feeding unit.

Fig. 3 is a vertical section on line 3—3 of Fig. 2.

Fig. 4 is a vertical section on line 4—4 of Fig. 2.

Fig. 5 is a partial vertical section on line 5—5 of Fig. 1.

Fig. 6 is an enlarged section on line 6—6 of Fig. 3.

Fig. 7 is a schematic diagram of the electrical control circuits.

For purposes of illustration the feeding and controlling device embodying the principles of this invention have been shown as applied to a body making unit of a can making machine, the blank feeding end only being shown. The machine comprises a bed 2 (Fig. 1) which forms the main support for the machine including the two feeding units and the center feeding slide or conveyor 3 leading to any operating mechanism such as a horn (not shown) and upon which the blanks may be formed into can bodies. The blanks are fed along the slide by reciprocating feed bars equipped with feed dogs 4 and are maintained in contact with the slide by a bar 6. It is obvious of course that the slide may be omitted and the blanks fed directly from the magazines to any suitable operating mechanism. The bed 2 supports a pair of housings 7 which are adjustable toward and from the slide or conveyor in order to accommodate different sized blanks. Each housing 7 carries one of the dual feeding devices each of which comprises a magazine 8 for holding a stack of blanks 9 which are removed therefrom in succession by feed dogs 11 cooperating with a stationary suction cup 10 the suction of which is controlled by a suitable valve actuated through levers 12. A transverse feed bar 13 delivers the blanks into the preforming rolls 14 which in turn transfer the blanks onto slide 3 to be conveyed to the forming mechanisms.

The dual feeding devices are similar in construction and therefore only one will be described in detail. Each of the feeding devices comprises a magazine arranged forwardly and to one side of the slide 3 for supporting a stack of blanks 9. The ends of the blanks are raised by table arms 15 actuated by suitable reciprocating mechanism 16 while the center is held down by suction cup 10 to permit reciprocating pivoted feed dogs 11 to remove the lower blank all in a manner substantially as described in my prior Patent 1,283,657, issued November 5, 1918.

The feed bars carrying the feed dogs 11 are reciprocated by a connecting rod 17 (Fig. 4) from a crank 18 formed on crank shaft 19 to remove the lowermost blank from the stack and advance it to a position upon an intermediate table or station 21 with the ends of the blanks resting upon two slightly raised platforms 22. The blank is held upon this table in flat condition by an arm 23 pivoted at its rear end at 24 and provided at its front end with a handle 26. Arm 23 is provided with a cross arm 27 at right angles thereto and which extends across the length of the blank overlying platforms 22. The under-

side of the cross arm 27 is bevelled as at 28 to guide the blanks thereunder as they are advanced by feed dogs 11. Feed dogs 11 advance the blank inwardly into engagement with guide bar 29 adjustably secured upon table 21.

The blanks are fed from table 21 in a direction at right angles to the movement imparted by dogs 11 and into the rollers 14 by the feed bar 13. The latter is of sufficient length to engage substantially one entire edge of the blank and is grooved as at 31 to receive the cross bar 27. Feed bar 13 is secured to the outer end of a lever 32 positioned below table 21 by means of a stud 33 which projects through a guide slot provided in table 21. Lever 32 is pivoted adjacent its opposite end upon a pin 34 secured to housing 7. Pivoted to the same pin directly beneath lever 32 is a bell crank lever 36 having one arm 37 extending rearwardly and carrying a cam roller 38 for engagement with a cam 39 upon crank shaft 19. The roller is maintained in contact with the cam by a spring 38*a*. Bell crank lever 36 is yieldingly and detachably connected to lever 32 to impart movements thereto by a ball 40 seated in a bore formed in the rear end of lever 32 and engaged in a recess formed in arm 37 and maintained therein by a spring 41, the latter being adjustably held in place by a screw and lock nut 42 and a similar ball 43 seated in a bore formed in an enlarged portion 44 of arm 32 on the other side of pivot pin 34 from ball 40 and engaging a recess in the other arm 45 of bell crank lever 36. Ball 43 is urged into this recess by a spring 46 adjustably held in the bore of arm 32 by a screw and lock nut 47. It will be seen from the foregoing that rocking movements of bell crank lever 36 will impart oscillatory movements to lever 32 unless resistance is offered to the movements of lever 32 upon which balls 40 and 43 will retract into their bores in lever 32 and permit a slip between lever 32 and bell crank lever 36.

This slip or relative movement between levers 32 and 36 which occurs upon resistance to movements of lever 32 is utilized to actuate an electric switch for controlling the feeding of the blanks. For this purpose a wear plate 48 is secured to the underside of the enlarged portion 44 of lever 32 in which plate is formed a pair of depressions 49 adapted to receive the rounded projecting ends of a pair of pins 51 secured to and projecting upwardly from a plate 52 disposed below arm 45 of bell crank lever 36. The arm 45 is provided with suitable apertures through which the pins pass and the plate is held in upper position with the pins in engagement with depressions 49 by cap screw 53 and spring 54. Upon sliding movement of arm 45 relatively to lever 32, pins 51 will be forced out of the depressions 49 and accordingly move plate 52 downwardly. Plate 52 is in contact with a plunger 56 of a limit switch 57 which is arranged to be opened upon downward movement of plunger 56. The switch is shown in closed position in Fig. 3 and in open position in Fig. 6. The limit switch 57 is placed either in the motor circuit or in the circuit controlling the feed mechanism as will be hereinafter explained.

Means are provided for stopping the feeding of the blanks without interruption of the entire machine and to thereby permit the machine to at least clear itself of all blanks in the process of being formed should a jam occur in the feeding mechanism and to immediately prevent the feeding of any more blanks into the machine as would necessarily follow if it were necessary to wait for the high speed machine to come to a stand still. The jam may be due to a deformed blank or the passage of superimposed blanks both of which would create a blank of undue thickness and cause damage in the machine were they allowed to proceed through the machine.

For this purpose feed dogs 11 (Figs. 2 and 4) which are pivoted intermediate their ends as at 58, are provided with projecting arms 59 arranged to be engaged by rods 61 actuated by a magnet or solenoid 62. Upon energization of the magnet 62, rod 61 will rotate feed dogs 11 about their pivots 58 to depress the hooked ends which ordinarily engage the lowermost blank in the stack and cause them to pass beneath the stack during their reciprocatory movements and be inoperative to feed any more blanks.

In order to detect deformed blanks or blanks of undue thickness or doubles and stop at least the feeding mechanism upon encountering them, a gauge bar 63 is placed over the platform 22 adjacent forming rollers 14. A series of detecting fingers in the form of cap screws 64 having their ends rounded are threaded into the gauge bar with their rounded ends projecting therebelow and adjusted to permit a blank of a given thickness only to pass between the ends of the screws and platform 22.

Should a deformed blank or a double blank be presented to the gauge it will not be able to pass therethrough and accordingly will jam and create a resistance to the feeding movement of feed bar 13 which will cause the bar 13 to remain stationary relatively to lever 32 as the latter continues to move, that is, cause a slipping movement between the two as the bar 32 continues its feeding stroke. This slip or relative movement between lever 32 and crank lever 36 will result in a downward movement of plate 52 because of plunger 51 and will actuate switch 57 which in turn will control the feeding mechanisms by controlling the source of power and the magnet which will cause feed dogs 11 to become inoperative. The switch may merely control either the motor or the magnet or both in accordance with the circuit employed as will be hereinafter explained.

Referring more particularly to Fig. 7, one circuit is illustrated in which the main driving motor is indicated at 66 which motor serves to actuate all of the operating instruments and conveyors of the lock seamer and may be utilized to actuate one or more of the succeeding machines if desired. The motor is supplied from a source of current 67 one wire 68 being carried through a pair of contacts 69 one of which is stationary and the other of which is upon the movable element of a relay 70, the circuit being continued through wire 71 from the other side of the relay contact. The current is supplied to the motor when contacts 69 of relay 70 are closed. The relay is controlled by a pilot or control circuit including a source of current 72 which may be a battery or transformer, one side of which is connected by wire 73 to a starting switch 74. The circuit continues through a stopping switch 76 and a series of limit switches 57, 57*a*, 57*b*, 57 being the limit switch illustrated in the foregoing feeding device and the other being placed at different points throughout the machine as found most desirable. After passing through the foregoing switches the circuit continues through the coil 77 of the relay and back to the source of current 72. A holding circuit is provided by wire 78 which maintains

coil 77 energized after the starting switch has been released into open position. If any of the limit switches are opened during operation of the machine, relay 70 will open contacts 69 and stop motor 66. The same result will also be obtained from opening stop switch 76. Relay 70 also controls a pair of back contacts 79 which control a circuit for energizing magnet 62 which, as can be seen, is energized when relay 79 is de-energized or when contacts 69 are open. Energization of magnet 62 of course depresses feed dogs 11 to cause them to be inoperative. It follows therefore that if any of the limit switches such as switch 57, are opened, relay 70 will open and thereby close contact 79 to energize magnet 62 which will depress feed dogs 11.

In high speed machines of the character disclosed in the foregoing description, it is sometimes not sufficient merely to open the circuit to the driving motor. This, it is true, stops the machine but due to the high speed and momentum the feeding devices could very well remove several more blanks from the magazine before the machine finally came to rest. The foregoing circuit and associated elements however stops any further feed of the blanks immediately upon actuation of limit switch 57. As previously described, limit switch 57 will be actuated whenever sufficient resistance is offered to the feeding movements of feed bar 13. It is obvious that limit switch 57 may be employed in any suitable circuit and may for instance be inserted in the source of supply to magnet 62 so that this magnet only is energized upon actuation of limit switch 57.

Arrangement of feed bar 13 and gauge bar 63 with its detecting finger 64 provides a positive accurate feed of the blanks in a manner which prevents them from skewing to one side and also provides for an accurate positive detection of the blanks as they are fed into the bite of the preforming rollers 14.

Many other variations of the illustrated embodiment of this invention will be apparent to those skilled in the art without departing from the spirit and scope of this invention as defined in the appended claims.

I claim:

1. In a blank feeding mechanism, means for supporting a blank, a feed member for engaging a blank and advancing it over said support, actuating means for imparting feeding movements to said feed member, said latter member being movable relatively to said actuating means upon excessive resistance to feeding movements thereof and means operable upon relative movement between said actuating means and said feed member to stop the feeding of additional blanks by said mechanism.

2. In a blank feeding mechanism, means for supporting a blank, a feed member for engaging a blank and advancing it over said support, actuating means for imparting feeding movements to said feed member, said latter member being movable relatively to said actuating means upon excessive resistance to feeding movements thereof and means operable upon relative movement between said actuating means and said feed member to stop said actuating means.

3. In a blank feeding mechanism, means for supporting a blank a feed member for engaging a blank and advancing it over said support, actuating means for imparting feeding movements to said feed member, said latter member being movable relatively to said actuating means and means operable upon abnormal resistance to movements of said feed member to prevent further feeding of the blanks.

4. In a blank feeding mechanism, means for supporting a blank, a pivoted feed dog for engaging a blank to advance the blank from its position and means operable upon the occurrence of a blank of abnormal thickness to rock said feed dog about its pivot to cause it to be inoperative.

5. In a blank feeding mechanism, means for supporting a blank, a pivoted feed dog for engaging a blank to advance the blank from its position and a magnet operable upon the occurrence of a blank of abnormal thickness to rock said feed dog about its pivot to cause it to be inoperative.

6. In a blank feeding mechanism, means for supporting a blank, a feed bar for engaging substantially one entire edge of said blank to advance the blank and means for actuating said feed bar, said feed bar being releasably connected to said actuating means whereby relative movement between said bar and said actuating means may occur upon excessive resistance to movements of said bar.

7. In a can making machine, a conveyor and a blank feeding mechanism for delivering blanks to said conveyor comprising, a magazine for holding a stack of blanks, feed dogs for removing successively the lowermost blank of the stack and advancing them to an intermediate station, a reciprocating feed bar arranged to engage substantially one entire edge of said blank and advance the blank from said intermediate station toward said conveyor.

8. In a can making machine, a conveyor and a blank feeding mechanism for delivering blanks to said conveyor comprising a magazine for holding a stack of blanks, feed dogs for removing successively the lowermost blanks of the stack and advancing them to an intermediate station, a reciprocating feed bar arranged to engage substantially one entire edge of said blank and advance the blank from said intermediate station toward said conveyor, said feed bar being mounted to yield upon meeting excessive resistance to its movements.

9. In a can making machine, a conveyor and a blank feeding mechanism for delivering blanks to said conveyor comprising a magazine for holding a stack of blanks, feed dogs for removing successively the lowermost blanks of the stack and advancing them to an intermediate station, a reciprocating feed bar arranged to engage substantially one entire edge of said blank and advance the blank from said intermediate station toward said conveyor, said feed bar being mounted to yield upon meeting excessive resistance to its movements and means responsive upon yielding of said feed bar to stop the machine.

10. In a can making machine, a conveyor and a blank feeding mechanism for delivering blanks to said conveyor comprising a magazine for holding a stack of blanks, feed dogs for removing successively the lowermost blanks of the stack and advancing them to an intermediate station, a reciprocating feed bar arranged to engage one edge of said blank and advance the blank from said intermediate station toward said conveyor, said feed bar being mounted to yield upon meeting excessive resistance to its movements and means responsive upon yielding of said feed bar to cause said feed dogs to become inoperative.

11. In a can making machine, a conveyor and

a blank feeding mechanism for delivering blanks to said conveyor comprising a magazine for holding a stack of blanks, feed dogs for removing successively the lowermost blanks of the stack and advancing them to an intermediate station, a reciprocating feed bar arranged to engage one edge of said blank and advance the blank from said intermediate station toward said conveyor, said feed bar being mounted to yield upon meeting excessive resistance to its movements and means responsive upon yielding of said feed bar to interrupt the driving power of the machine and to cause said feed dogs to be inoperative independently of further operation of said machine after interruption of said power.

12. In an electrically driven can making machine, a motor for actuating said machine, a circuit including a relay having front and back contacts, said front contacts being arranged to control the supply of current to said motor, a blank feeding mechanism for delivering blanks to said machine, said mechanism being actuated from said motor, means controlled by the back contacts of said relay for causing said feeding means to become inoperative, said latter means being actuated in response to excessive resistance to movement of said feeding mechanism.

13. In a blank feeding mechanism, means for supporting a blank, a feed member for engaging a blank and advancing said blank, and a fixed gauge in the path of said blank to prevent the passage therethrough of a blank greater than a predetermined thickness.

14. In a blank feeding mechanism, means for supporting a blank, a feed member for engaging a blank and advancing said blank, and a fixed gauge in the path of said blank to prevent the passage therethrough of a blank greater than a predetermined thickness, said feed member being yieldable upon encountering excessive resistance to advancing the blank.

15. In a blank feeding mechanism, means for supporting a blank, a feed member for engaging a blank and advancing said blank, a fixed gauge in the path of said blank to prevent the passage therethrough of a blank greater than a predetermined thickness, said feed member being yieldable upon encountering excessive resistance to advancing the blank and means responsive to the yielding of said feed member to prevent the feeding of additional blanks.

16. In a blank feeding mechanism, the combination of a reciprocatory feed dog for feeding blanks in succession, a device for advancing the blanks fed by said dog, means for actuating said device, including a connection releasable by excessive resistance offered to movement of said device, and means controlled by said releasable connection for rendering said dog inoperative.

17. In a blank feeding mechanism, the combination of a member for feeding blanks in succession, a device for advancing the blanks fed by said member, means for actuating said device, including a connection releasable by excessive resistance offered to movement of said device, and means rendered operable by the release of said connection to prevent the feeding of blanks by said element.

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