W. CAMERON.

SHEET FEEDING MECHANISM.

APPLICATION FILED MAY 25, 1917.

1,277,342.

Patented Aug. 27, 1918.

5 SHEETS—SHEET 1.

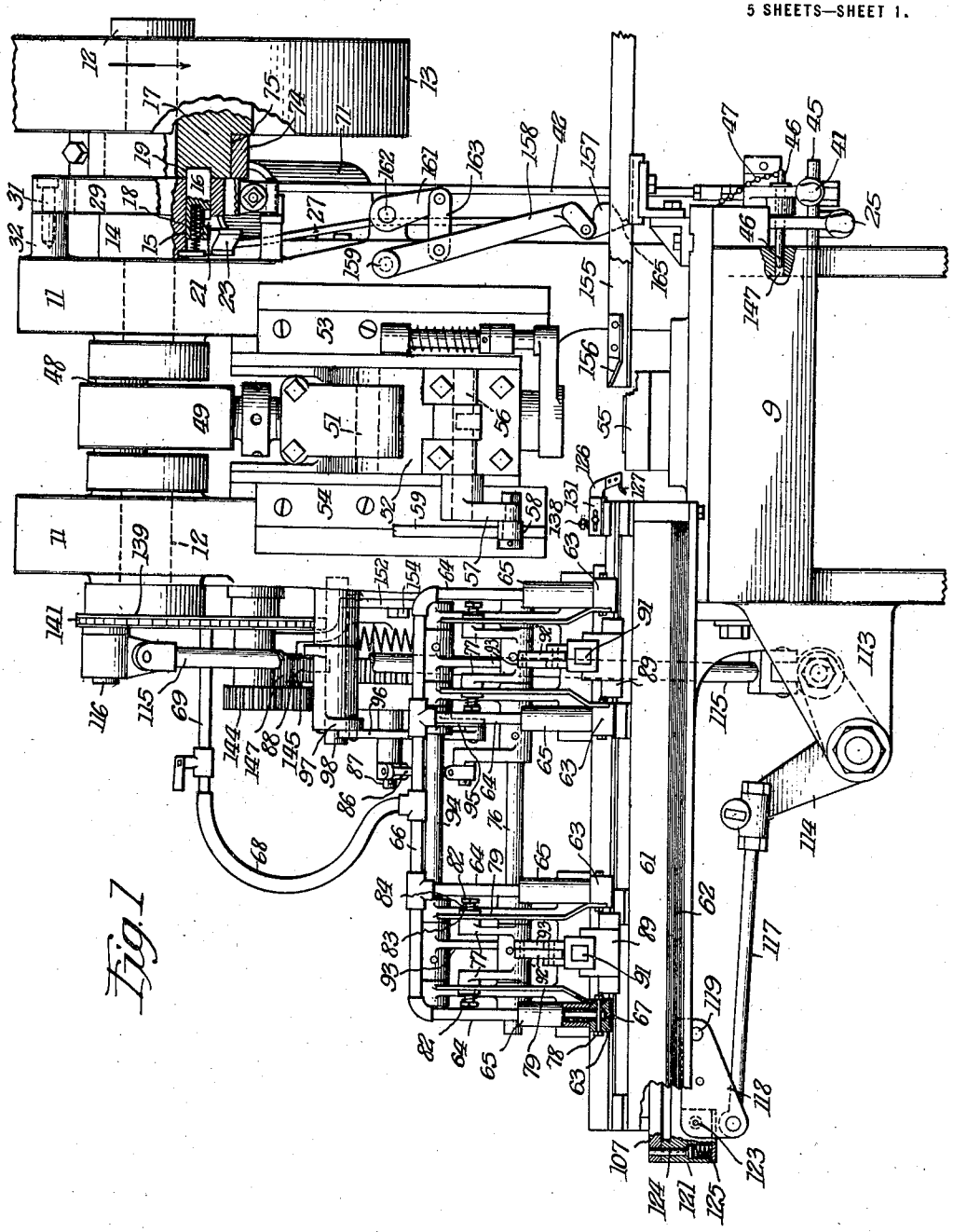

Fig. 1

WITNESS:

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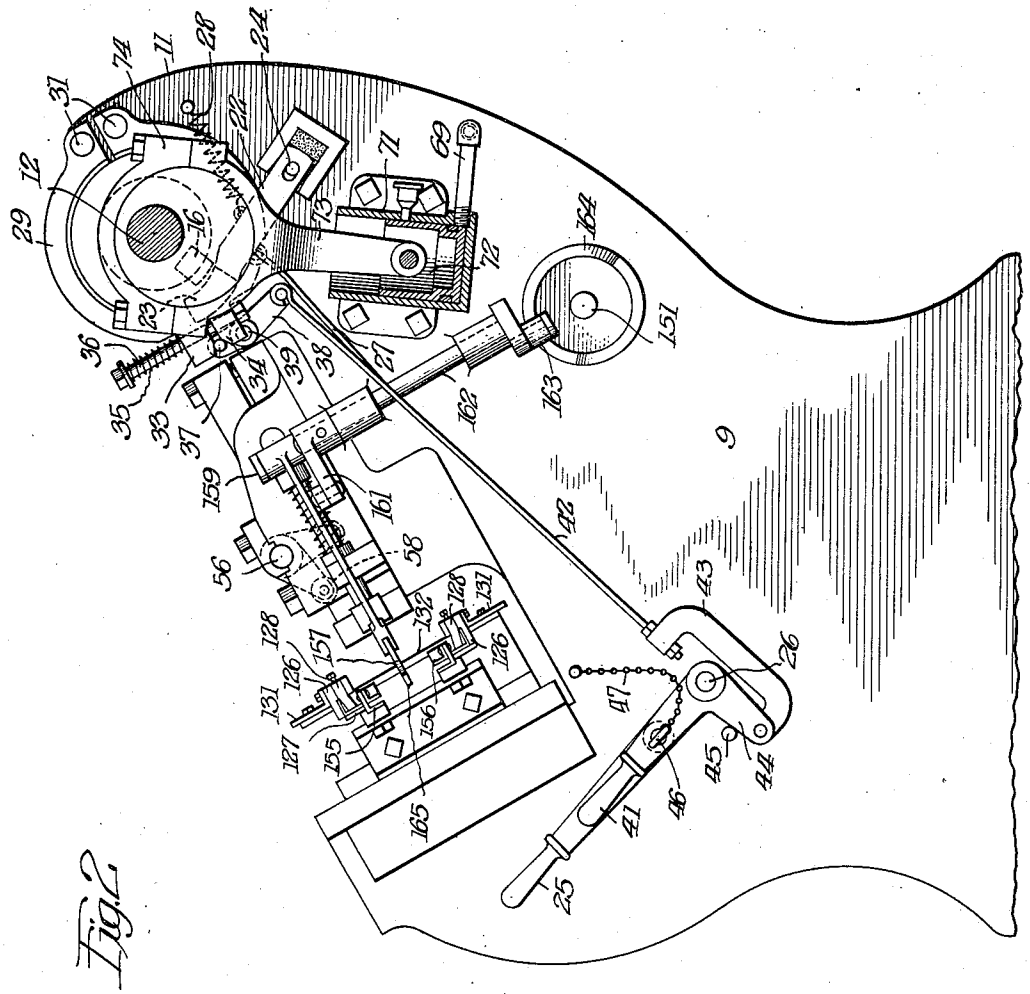

Fig. 2

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5 SHEETS—SHEET 3.

Fig. 4

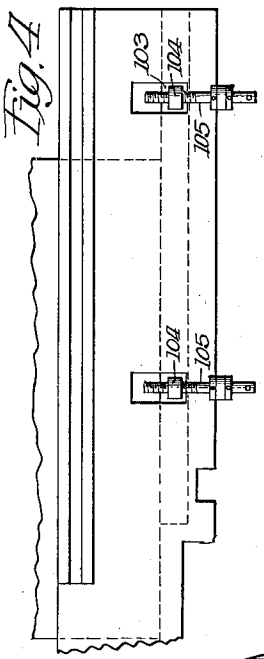

Fig. 3

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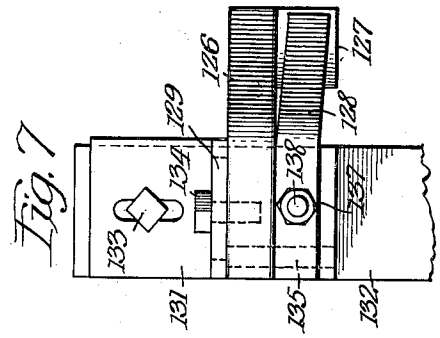
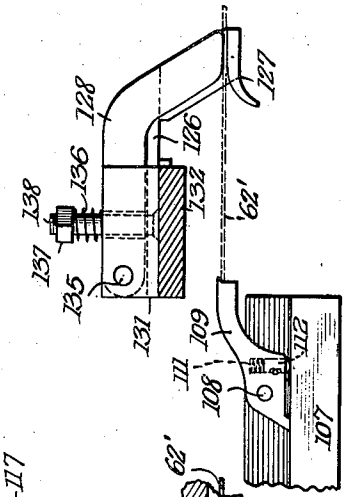


Fig. 7



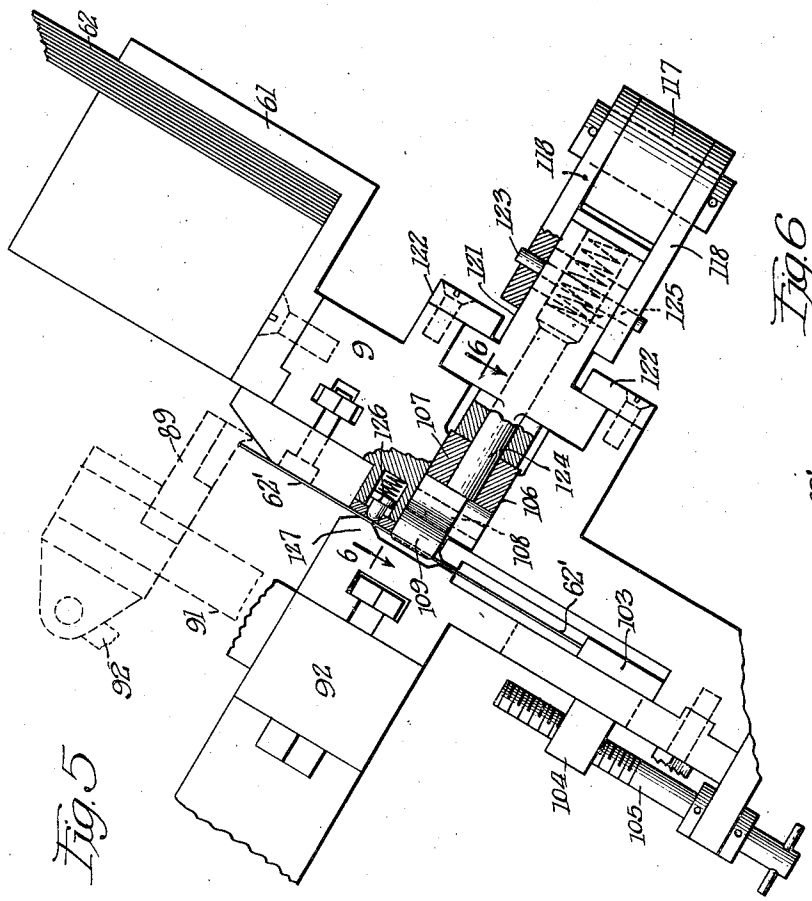


Fig. 5

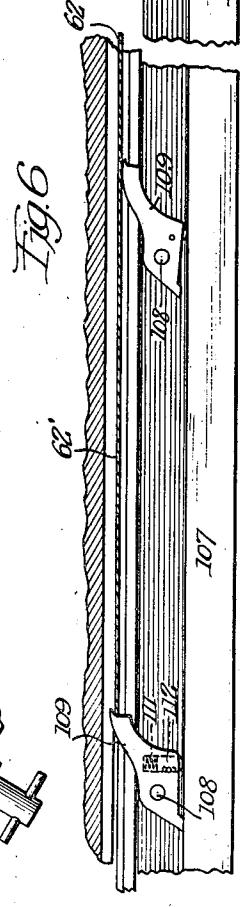


Fig. 6

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5 SHEETS—SHEET 5.

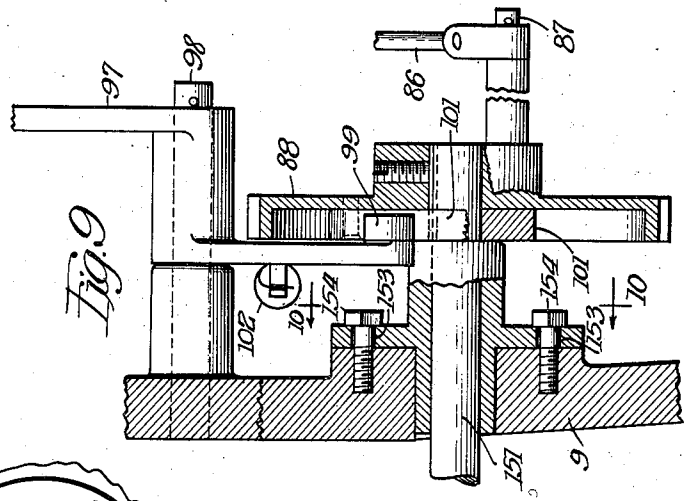

Fig. 9

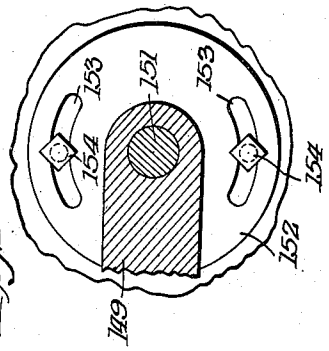

Fig. 10

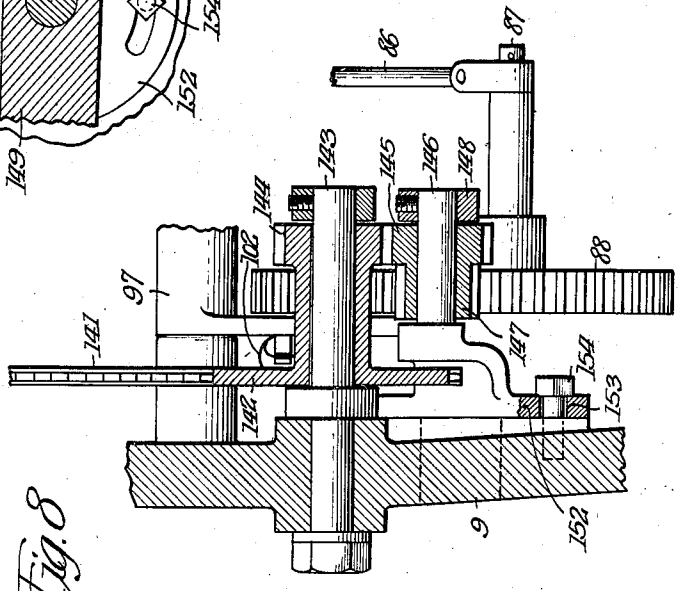

Fig. 8

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UNITED STATES PATENT OFFICE.

WILLIAM CAMERON, OF CHICAGO, ILLINOIS, ASSIGNOR TO TORRIS WOLD & COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SHEET-FEEDING MECHANISM.

1,277,342. Specification of Letters Patent. Patented Aug. 27, 1918.

Application filed May 25, 1917. Serial No. 170,838.

To all whom it may concern:

Be it known that I, WILLIAM CAMERON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Feeding Mechanism, of which the following is a specification.

This invention relates to automatic die presses, particularly of the type employed for punching out from sheet metal blanks the tops and bottoms of tin cans and other receptacles, the shape of the articles or objects produced by the press being of course dependent upon the size and shape of the punches and dies employed in the machine.

Presses of this general character have heretofore been equipped with pneumatic suction devices for picking up the metal blanks from the magazine and transferring them to the feeding mechanism, but the maintenance of a suction in the pick-up devices was directly dependent upon the operation of the press, so that when the press was stopped the suction would cease. One of the salient features of my present invention is the provision of a press in which the suction will be maintained in the vacuum pick-up devices irrespective of whether the press is in operation or not; consequently, any requisite adjustments of the pick-up devices may be made when the press is not running.

Another purpose of my invention is to provide novel and improved mechanism for operating the transferring devices which transfer the sheet metal blanks from the pick-up devices to the blank feeding mechanism.

Another object is to improve the construction and operation of the reciprocatory blank feeding mechanism by which the blanks are fed forwardly intermittently to the dies.

A further object is to provide novel holding clamps for holding the rear end of the blanks in the requisite position when the last punching operation is performed upon each blank.

Still another object is to provide a novel safety lock which will preclude accidental starting of the press which might result in injury to an operator who is making repairs or adjustments on the machine.

Other objects and many of the inherent advantages of this invention will be readily appreciated by those skilled in the art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings. Referring to the drawings—

Figure 1 is a front elevation view of the operative parts of a die press embodying my invention;

Fig. 2 is an end elevation looking toward the left at Fig. 1, the drive wheel being removed and certain parts being shown in section;

Fig. 3 is an end elevation looking toward the right at Fig. 1;

Fig. 4 is a fragmentary detail view showing the manner of adjusting the back bar of the feed channel to accommodate the machine to blanks of various widths, this view being taken on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged view partially in section of certain parts shown in Fig. 3;

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 5, showing the construction and arrangement of the feed dogs and one of the sheet clamping members;

Fig. 7 is a plan view of the clamp shown in Fig. 6;

Fig. 8 is a detail sectional view on the line 8—8 of Fig. 3;

Fig. 9 is a similar view taken on the line 9—9 of Fig. 3; and

Fig. 10 is a transverse sectional view on the line 10—10 of Fig. 9.

On the drawings reference character 9 indicates generally the frame, or standard, of the machine upon which the various operating mechanisms are carried. At the rear the frame is formed to provide a pair of upstanding supports 11 in which the main power shaft 12 of the machine is journaled. A power pulley, or belt wheel, 13 is rotatably mounted upon one end of the shaft 12, and this wheel is continuously driven by a belt from any suitable source of power. A manually controlled clutch is employed for connecting the power pulley to and disconnecting it from the shaft.

This clutch may be of any preferred type which is so constructed that it will always throw out or disconnect when the shaft is in a predetermined position to leave the punching die and the pick-up devices, both of which will be later described, in elevated

or inoperative positions whenever the machine is stopped. One suitable and practical form of clutch is shown in Figs. 1 and 2, from which it will be observed that a collar or sleeve 14 fixed upon the shaft 12 is provided with a recess 15 adapted to receive a clutch pin 16 which is normally pressed toward the hub 17 of the belt wheel 13 by a coiled expansion spring 18 so that the clutch pin will engage in a depression 19 formed on the inner face of the hub 17 to rigidly lock the wheel to the shaft. The clutch pin 16 is provided on its outer face with a cam shaped slot 21, and a releasing member 22 having a wedge shaped end 23 is pivoted at 24 on the frame of the machine and extends into proximity to the path of travel of the clutch pin 16. The position of the controlling member 22 is controlled by means of a handle 25 pivoted to the frame on a stud 26 and connected to the member 22 by a link or rod 27. The connection between the link 27 and the lever 25 is similar to the connection between the brake and its operating lever, which connection will be later described. It is sufficient to state for the present that when the lever 25 is in the position shown in Fig. 2 the controlling member 22 will be disposed outside the path of travel of the clutch pin 16, but when the lever 25 is swung in a counterclockwise direction the controlling member 22 will be pulled by a coiled tractile spring 28 into the path of travel of the clutch pin so that the wedge-shaped end 23 will enter the cam-shaped recess 21 in the pin as the clutch pin is carried around by the shaft, with the result that the clutch pin will be moved toward the left, viewing Fig. 1, so as to withdrawn it from engagement with the hub of the pulley wheel, thereby disconnecting the wheel from the shaft and permitting the machine to stop while the pulley wheel continues to rotate.

To expedite the stoppage of the machine when the clutch is released I have provided a brake band 29 which surrounds the outer end of the collar 14 and is secured in place by bolts 31 passing through the brake band and into threaded bosses 32 projecting from one of the upright supporting members 11. This brake band is split at its forward side and is provided with forward extensions 33 and 34 which are normally forced together so as to bring the brake band into clamping relation with the collar 14 by means of an expansion spring 35 surrounding a bolt 36 which passes through both of the extensions 33 and 34, as shown in Fig. 2. The brake band is released by means of an expander pin 37 carried by a lever 38 in position to be forced between the chamfered ends of the extensions 33 and 34 when the lever is swung in a clockwise direction about its fulcrum 39. A brake lever or handle 41 mounted on the pin 26 together with the clutch lever 25 is connected with the lever 38 through a rod 42 and a yoke 43. Both the levers 25 and 41 have rearwardly extending arms 44 to which the yokes 43 are respectively pivoted. When the lever 41 is swung in a counterclockwise direction, viewing Fig. 2, the lever 38 will be similarly swung to withdraw the pin 37 from between the brake band extensions, thereby permitting the brake to engage the collar on the shaft under the influence of the spring 35. Similarly, when the lever 25 is moved in the same direction the clutch pin will be withdrawn by the controlling member 22, as previously explained. The frame of the machine is provided with a laterally projecting pin or boss 45 which limits the swinging movements of the levers 25 and 41 in both directions.

As it is frequently desirable to work on the machine when it is stopped, either to make repairs or adjustments I have made provision for insurance against accidental starting of the machine, which might result in injury to the man working on or about the machine. With this end in view, each of the levers 25 and 41 is provided with an alined aperture adapted to receive a pin 46 which is of sufficient length to project through both levers and into a socket 147 formed in the side of the main frame. When the pin is inserted through both levers and into this socket the levers are firmly locked against movement so that accidental starting of the machine is obviated. When the pin is not in use it is suspended in convenient position in proximity to the levers from a chain 47. It will thus be apparent that the clutch and the brake may be worked independently so that the brake may be released to permit the machine to be turned over by hand, if desired, without throwing in the clutch, and that they may be operated practically simultaneously, if desired, to throw out the clutch and apply the brake so as to bring the machine to a sudden stop without throwing off the belt, which continues to rotate the belt wheel 13 even when the machine is stopped.

The shaft 12 is provided intermediate the supporting members 11 with a crank 48 embraced by the upper end of an adjustable connecting rod or member 49, the lower end of which is attached by a pivot pin 51 to the head 52, which is adapted to reciprocate between and be guided by guide members 53 and 54 secured to the frame of the machine, the head 52 carrying the movable die which is adapted to coöperate with the stationary die 55 to cut or punch out objects or articles from the sheet metal blanks in the usual manner, which are fed between the dies in a manner to be later described. In order to positively release the punched out articles from the reciprocatory die to which they have a tendency to cling the head 52 is provided with an internal knockout device (not

shown) which is actuated from a rock shaft 56 provided with a crank arm 57 which in turn carries an antifriction roller 58 adapted to travel over the stationary cam 59 mounted on the guide member 54, so that upon upward movement of the die-carrying head the knockout device is projected downwardly beyond the die face by actuation of the rock shaft 56 so as to free the punched out object from the die, and upon downward movement of the die the knockout device is retracted within the head in the usual manner.

The sheet metal blanks to be fed through the machine are stacked one upon another in a magazine 61 at the left side of the machine, viewing Fig. 1, the blanks being indicated on the drawing by reference character 62. These blanks are lifted or picked up, one at a time, by pneumatic lifters, which will now be described. These lifters consist of a plurality of (in the present instance 4) sucker heads 63 mounted upon the lower ends of pipes 64 which are mounted to reciprocate in fixed slide bearings 65 and are connected together at their upper ends by a header pipe 66. Each of the sucker heads is slightly cup-shaped on its lower surface and is provided with an aperture 67 through which suction is exerted upon the uppermost sheet or blank in the magazine when the sucker heads are depressed into engagement with the uppermost blank.

The header pipe 66 is connected through the intermediary of a flexible hose 68 and a stationary pipe 69 with a reciprocatory suction pump, designated generally by reference character 71 (Figs. 1 and 2). This suction pump, which may be of any well known reciprocatory type, is mounted upon the main frame of the machine inside the belt wheel 13 and the reciprocatory piston 72 thereof is continuously operated by means of a connecting member 73 pivoted at its lower end to the piston and provided at its upper end with an eccentric strap 74 surrounding the eccentrically formed portion 75 of the belt wheel hub 17. Since the belt wheel is continuously operated it will be manifest that the suction pump runs continuously even when the machine proper is stopped, with the result that a continuous suction is exerted upon the sucker heads 63 so that they will hold a blank in any desired position to permit of adjustments or regulations of various parts of the machine when the machine proper is stopped. The maintenance of this continuous suction is of material practical importance for the reason that in making adjustments on the machine it is often desirable to hold a blank, to which the machine is to be adjusted, in a certain position, and with the machines now in use, in which the suction pump stops when the machine is stopped, a blank cannot be so held by the suckers and the adjustments, consequently, cannot be as readily or as accurately performed.

The sucker heads are reciprocated between the extreme upper position in which they are shown in Figs. 1 and 3 to their extreme lower position which continually varies with the number of blanks in the magazine, by mechanism which will now be described. Referring to Figs. 1 and 3, it will be observed that rearwardly of the suction pipe 64 there is mounted in the frame of the machine a rock shaft 76 equipped with a number of forwardly projecting arms 77 equal in number to the sucker heads. To each sucker head there is pivotally attached by a bolt 78 an upwardly extending bar 79 provided with an elongated slot 81. Each arm 77 is connected with its respective bar 79 by a screw or bolt 82 passing through the slot 81 and threaded into the arm. A washer 83 loosely mounted on each bolt 82 is yieldingly pressed against the bar 79 by means of an expansion spring 84 interposed between the head of the screw 82 and the washer, so that each bar is frictionally but yieldingly clamped to its respective arm 77. The shaft 76 is also provided with a rearwardly extending arm 85 which is actuated to oscillate the shaft through a link 86 connected at one end to the arm 85 and at its other end to a crank pin 87 carried by the hub of a rotatable gear 88. At each revolution of the gear 88 the shaft 76 will receive one complete oscillation so that upon downward movement of the arm 77 the sucker heads will be moved downwardly into engagement with the uppermost blank in the magazine. Downward movement of the heads will then be stopped by engagement with the stack of blanks, but the arms 77 will continue a full stroke at each actuation, relative movement between the arms and the bars 79 being permitted by the fractional connection previously described. Upon return or upward movement of the arms the sucker heads will move upwardly carrying with them the uppermost blank until the sucker heads engage with the lower ends of the guideways 65, whereupon their upward movement will be arrested. The frictional connection between the arms 77 and the bar 79 will permit continued upward movement of the arms, however, after the upward movement of the sucker heads has been completed. With this construction the oscillating shaft 76 and its arms 77 will at each actuation of the shaft make a complete stroke while the sucker heads will travel a variable distance, depending upon the height of the stack of sheets in the magazine, but at each actuation will engage and lift the uppermost sheet into predetermined position from which it may be transferred to the feeding mechanism, as will be later explained.

From the elevated position to which the

uppermost blank has been lifted by the sucker heads, as shown by the blank indicated by reference character 62′, Fig. 3, the lifted blank is transferred edgewise into an inclined slot or guideway along which it is fed longitudinally to the operating dies. The transferring mechanism consists of a plurality, in the present instance two, of transferrers 89 mounted on reciprocatory rods 91 adapted to reciprocate in stationary bearings 92 parallel with the plane of the blank. These rods and transferrers carried thereby, are reciprocated by links 92 connected with curved arms 93 fixed upon a rock shaft 94 which is provided with a single actuating arm 95 actuated through a link 96 from a lever 97 fulcrumed on the main frame at 98 and provided at its rear end with a cam follower 99 which is held against the face of a cam 101 formed on the rear of the gear 88 by means of a tractile spring 102. The cam 101 is so designed that at each revolution of the gear 88 after the sucker heads have lifted a blank into the position shown in Fig. 3 this blank is transferred by the transferrers 89 into the feed slot, as shown in Fig. 5.

The depth to which it will enter this slot is determined by a back bar 103 adjustably mounted in the bottom of the feed slot and provided with rearwardly disposed tapped bosses 104 adapted to receive adjusting screws 105 by means of which the height of the back bar may be manually adjusted and regulated. This construction will be readily apparent from Figs. 4 and 5, from which it will be seen that if narrow blanks are to be operated upon the back bar will be adjusted upwardly so that when the lower edge of a blank is resting on the back bar the blank will be in proper longitudinal alinement with the operating dies. If wider blanks are employed the back bar will be adjusted downwardly the requisite amount, and it should be manifest that by means of the adjusting screws disclosed the back bar may be adjusted and regulated to a fine degree of nicety.

After being transferred into the feed slot in the manner previously explained the blank is fed forwardly to the dies in a step-by-step movement by means of feeding mechanism, which will now be described. On the lower side of the feed slot the frame is formed to provide an elongated recess or guideway 106 shaped to accommodate a reciprocatory feed bar 107, Figs. 5 and 6. This feed bar is of substantially L-shape in cross section and is provided with a series of spaced pivot pins 108 threaded into or otherwise fixedly secured to the upwardly extending portion of the feed bar and projecting outwardly substantially flush with the opposite face of the bar. These pins are spaced apart a distance equal to the desired forward movement of a metal blank at each actuation so that the blank will be positioned between the dies between successive operations of the dies. The feed bar is reciprocated a uniform distance at each stroke by mechanism which will be later described and if a longer or shorter travel of the blanks is desired to conform to larger or smaller objects to be punched out from the blank at each operation of the dies, the feed bar is withdrawn longitudinally from its guide way and is replaced by a feed bar on which the pins 108 are spaced a greater or less distance apart in accordance with the requirements of the dies.

Upon each pin 108 there is pivotally mounted a feed dog 109 which is simply slipped onto the pin, where it is held when the feed bar is in operative position by the upper side wall of the feed bar guideway. Each feed dog is capable of a limited pivotal movement on its pin, and when disposed beneath a blank 62′ the dog assumes the position in which the central dog is shown in Fig. 6. When upon reciprocatory movement of the feed bar a dog is withdrawn from beneath the blank it is elevated so as to engage behind the rear edge of the blank as shown at the left in Fig. 6, this movement being effected by a small expansion spring 111 disposed in a socket formed in the dog and pressing at opposite ends against the bottom of the socket and a plunger 112 respectively, which projects from the socket into engagement with the laterally extending portion of the feed bar.

All of the feed dogs are spaced apart the same distance on any particular bar and all of the dogs are of the same length with the exception of the two end dogs. It is highly essential that successive blanks being fed to the dies shall not overlap or otherwise, if overlapping portions were presented between the dies, injury to the dies would result. Since the blanks are not all cut exactly evenly and of the same length, even if they were intended to be of uniform length, I have found it desirable to insure a slight separation of the ends of successive blanks from each other. To accomplish this purpose I make the last dog on the feed bar slightly longer than the others, as illustrated by the right hand dog shown in Fig. 6, so that when this dog engages the rear end of a blank being fed it will project this blank a little farther than the normal feeding movement by the other dogs. Furthermore, the first dog at the left hand end of the feed bar, which imparts the initial feeding stroke to the blank, is made a little shorter than the other dogs. The result is that even if the blanks are a little longer than the uniform length employed the last stroke on a blank being operated upon will carry it a little farther than the preceding strokes,

and the first stroke upon the succeeding blank will be a little shorter than the succeeding strokes. By this construction all liability of overlapping of the ends of succeeding blanks is eliminated. It should also be understood that the feed dogs are readily removable and interchangeable so that if short blanks are to be operated upon the short dog, which is normally at the extreme left hand end of the feed bar, is moved to the right a distance determined by the decrease in length of the blanks to be operated upon, so that this shorter dog is always employed to impart an initial feeding stroke to a blank.

The feed bar is reciprocated to feed the blanks forward intermittently by mechanism driven from the main shaft 21 so that at each revolution of this shaft a complete stroke of the feed bar is performed. Referring now to Figs. 1 and 3, it will be observed that upon a laterally projecting bracket 113 I have mounted a bell crank lever 114 which is oscillated by means of a link 115 connected at its lower end to one of the arms of the bell crank lever and at its upper end to a crank pin 116 carried by the end of the shaft 12. The other arm of the bell crank lever 114 is connected by a link 117 with a bifurcated releasing member 118 permanently pivoted by a pin 119 to a slide block 121 which travels upon suitable guideways 122 fixed to the main frame of the machine. In order to obviate injury to the machine in case the feed bar should become stuck for any reason whatsoever, the release member 118 is connected with the slide member 121 with a frangible pin 123. It will be obvious, therefore, that if upon feeding movement toward the right, viewing Fig. 1, the feed bar should catch or excessive strain should be imposed thereon, the frangible pin 123 would be sheared off, permitting the release member 118 to swing downwardly on its pivot pin 119. The machine will then continue to run and the release member will be swung back and forth idly on its pivot 119 until the machine is stopped, the difficulty is remedied, and a new frangible pin 123 is inserted.

The feed bar is connected with the slide member 121 by a spring bolt or pin 124 which is carried by the slide member 121 and yieldingly projected upwardly above the member by an expansion spring 125 into an aperture designed to receive the pin and formed in the outer end of the feed bar. Whenever it is desirable to replace one of these feed bars by another it is only necessary to depress the pin 124 out of engagement with the feed bar, whereupon the bar can be withdrawn longitudinally from its guideway.

For the purpose of preventing return movement of the blanks in the feed slot with the feed bars I have provided a series of yielding holding devices each consisting, as shown in Fig. 5, of a spring-pressed pin 126 projecting upwardly from the lower face of the feed slot into engagement with a blank in the slot, and these pins, urging the blank against the opposed face of the feed slot formed by a member 127 shaped as shown in Fig. 5, serve to yieldingly clamp the blank so as to prevent any retrograde movement thereof.

For the purpose of securely holding the blank adjacent to the dies and particularly for the purpose of holding the rear end of a blank during the last operation on the blank I have provided a pair of clamping members located at the delivery end of the feed slot and in proximity to the dies, which serve to firmly clamp and hold the feed blank in the requisite position during the operation of the dies. These clamps, best shown in Figs. 1, 2, 6 and 7, each comprise a stationary member 126 provided with a downwardly curved shoe 127 over which the blank travels and by which it is supported, and a movable clamping member 128 adapted to coöperate with said shoe to clamp and hold the blank. The member 126 is secured so as to be capable of longitudinal adjustment to a vertical web 129 of a bracket 131 which is in turn adjustably mounted for lateral adjustment upon a stationary bar 132. The bracket is secured to the bar by a bolt 133 passing through a slot in the bracket, and the member 126 is secured to the vertical web of the bracket by a bolt 134 extending through a horizontal slot in the web. The adjustability provided by these slotted mountings permits the brackets to be adjusted toward and from each other to accommodate the clamps to blanks of various widths and also permits the clamps to be adjusted toward and from the dies. The clamping member 128 is pivoted to the stationary member 126 upon a pivot pin 135 and is yieldingly depressed so that its downturned end is urged toward the shoe 127 by an expansion spring 136 interposed between the top of the clamping member and an adjustable nut 137 threaded upon an upwardly projecting bolt 138 which is anchored in the base of the bracket 131 and passes loosely upwardly through the clamping member. It will be apparent from Fig. 6 that as a blank is fed forward it passes between the shoes 127 and the clamping members 128 by which it is firmly clamped and held in requisite position with respect to the dies.

It has previously been explained that the dies and feed bar are reciprocated at each revolution of the main shaft 12, but it is obvious that a new blank should be fed from the magazine into the feed slot only

after the preceding blank has been fed forward a sufficient distance to clear the new blank. The lifting suckers and the transferrers are therefore required to operate only after a predetermined number of operations of the dies and feed bar. The gear wheel 88, from which both the sucker heads and the transferrers are operated in synchronism, is driven from the main shaft 12 in the following manner: The drive shaft 12 is provided adjacent the crank pin 116 with a sprocket wheel 139 which drives through the intermediary of a chain 141 a sprocket wheel 142 mounted upon a stub shaft 143, as shown in Fig. 8. The hub of the sprocket wheel 142 is provided with a gear 144 which meshes with an idler pinion 145 mounted upon an adjustable shaft 146 and formed integrally with a pinion 147 which in turn meshes with and drives the gear 88. The integrally formed gears 145 and 147 which will hereafter be referred to as the intermediate gear, is removably mounted upon the shaft 146 and may be secured thereon by a lock collar 148, or other preferred holding means. The shaft 146 is carried upon the outer end of an arm 149 which is mounted concentrically with the shaft 151 upon which the gear 88 revolves. Referring to Figs. 3, 9 and 10, it will be observed that the arm 149 is provided with an enlarged circular base 152 adapted to lie against an opposed face formed on the main frame 9 and equipped with arcuate slots 153 through which bolts 154 are passed and threaded into the main frame to adjustably clamp the arm in position.

When it is desirable to change the timed relation of the pneumatic lifting heads and the transferrers with respect to the dies and the feed bar the intermediate gear is removed and replaced by a gear having either a larger or smaller gear portion 145, depending upon whether a slower or faster speed of the gear 88 is required. The gear 147 must of course be always of a uniform size, since the shaft 146 is a predetermined distance from and mounted concentrically with the gear 88, and it may be desirable in many instances to construct the gears 145 and 147 independently of each other and make provision for detachably connecting them together so that the gear 145 may be changed without removing the gear 147.

After the blank has been operated upon by the dies it passes along a guideway 155, preferably provided with guide members 156 positioned to aline the blank in its travel, and when a predetermined number of die operations have been performed upon the blank the blank is ejected from the machine by an ejector finger 157 pivoted upon the end of an arm 158 which is mounted to swing upon a pivot 159 from the machine frame. This arm is oscillated at regular intervals from an arm 161 mounted on a rock shaft 162 and connected with the arm 158 by a link 163, all as shown in Figs. 1 and 2. The rock shaft 162 is provided with a cam follower 163 which engages the face of a cam 164 mounted upon the shaft 151 which carries at its other end the gear 88. The cam 164 is so shaped that at each revolution thereof the arm 158 is given a quick throw to the right, viewing Fig. 1, so as to discharge the scrapped blank from which the objects have been formed by the dies. The finger 157 permits the blank to travel beneath it and the projecting end 165 of the finger will drop into the holes formed by the removal of the objects punched out by the dies, so that upon movement of the finger to the right by the arm 158 the finger will carry with it the scrapped blank and discharge the same from the machine. The objects punched out by the dies drop into a chute or a suitable receptacle positioned beneath the dies.

My invention and its mode of operation should be understood from the foregoing without further description, and it should be obvious that the various structural details shown and described should be capable of considerable modification and variation within the scope of the appended claims.

I claim:

1. In a machine of the character described, the combination of a continuously operating member, a reciprocatory pneumatic sheet-engaging device, a suction-creating device arranged to apply suction to said sheet-engaging device, driving connections between said devices and said continuously operating member, and means whereby one of said devices may be disconnected from said member at will without affecting the operation of the other device.

2. In a machine of the character described, the combination of a continuously driven member, a shaft adapted to be connected thereto at will, a pneumatic blank lifting device, mechanism operated by said shaft for reciprocating said device, means operated by said continuously operating member for applying suction to said lifting device irrespective of the operation of said shaft and means actuated from said shaft for operating upon blanks which have been lifted.

3. In a machine of the character described, the combination of a continuously operating member, a shaft, a manually controlled clutch for connecting said shaft to said member, a brake independent of said clutch adapted to operate upon said shaft independently of the operation of said clutch, a continuously driven suction pump operated from said continuously operating member, a suction device to which said suction pump

is connected, and mechanism operated from said shaft for reciprocating said suction devices.

4. In a machine of the character described, the combination of a shaft, blank feeding mechanism connected to said shaft, a power operated member, a clutch adapted to connect said shaft to said member, a manually operable lever for controlling said clutch, a brake operable upon said shaft, a manually operable lever for controlling said brake, and means for locking both of said levers to prevent accidental operation of said mechanism.

5. In a machine of the character described, the combination of a drive shaft, a sprocket wheel mounted thereon, a second sprocket wheel, a chain connecting said sprocket wheels, a gear connected with said second sprocket wheel, a driven gear, means including a changeable gear for driving said driven gear from said first mentioned gear, blank lifting and blank transferring mechanism operated from said driven gear, and blank feeding mechanism connected directly to said driving shaft.

6. In a machine of the character described, the combination of a driving shaft, blank feeding mechanism operated thereby, a driven gear, driving connections between said driving shaft and said driven gear including a changeable gear whereby the speed of said driven gear may be varied, blank lifting devices, a cam on said driven gear, means operated by said cam for actuating said lifting devices, blank transferring mechanism, and means operated from said driven gear for actuating said transferring mechanism.

7. In a machine of the character described, the combination of a driving shaft, a driving gear operated therefrom, a driven gear, an arm mounted concentrically with said driven gear, a pair of connected gears carried by said arm, one of said connected gears meshing with said driving gear and the other with said driven gear, means for connecting said arm to the frame in various adjusted positions to permit one of said connected gears to be changed, blank lifting and blank transferring mechanisms operated from said driven gear and blank feeding mechanism operated from said driving shaft.

8. In a machine of the character described, the combination of reciprocatory blank lifting devices, an oscillatory shaft, means for oscillating said shaft, a yieldable connection between said shaft and said lifting devices whereby said lifting devices are moved through varying distances upon uniform movement of said shaft to lift a blank from stacks of various heights into a predetermined position, blank feeding mechanism, and means for transferring a lifted and positioned blank to said feeding mechanism.

9. In a machine of the character described, the combination of a reciprocatory lifting device, a rock shaft, a yieldable connection between said rock shaft and said device, means for oscillating said rock shaft a predetermined uniform distance at each actuation, said yielding connection permitting a variable movement of said lifting device from the uniform movement of said rock shaft to lift a blank from stacks of various heights into a predetermined position, blank feeding mechanism, and means for transferring a positioned blank to said feeding mechanism.

10. In a machine of the character described, the combination of a blank lifting device, a slotted bar connected thereto, a rock shaft, an arm extending from said rock shaft into proximity to said bar, a yielding frictional connection between said arm and said slotted bar, means for imparting a uniform movement to said rock shaft at each actuation, said frictional connection permitting the lifting device to lift a blank from a stack of varying height into a predetermined vertical position, blank feeding mechanism, and means for transferring a positioned blank to said feeding mechanism.

11. In a machine of the character described, the combination of a blank lifting device, a reciprocatory blank transferring device movable at right angles to said lifting device, feeding mechanism adapted to receive a transferred blank, a driven gear, a cam and a crank pin mounted thereon, mechanism operated from said cam for reciprocating said transferring device, and mechanism operated from said crank pin for operating said lifting devices.

12. In a machine of the character described, the combination of a continuously operating member, a suction creating device continuously operated thereby, a sucker head, a connection between said device and said head, means for reciprocating said head, and mechanism whereby said reciprocating means may be connected to and disconnected from said continuously operating member at will.

13. In a machine of the character described, the combination of a continuously operating driving member, a pneumatic blank lifting device, a suction pump communicating with said blank lifting device and directly connected with said member so as to be continuously operated thereby, whereby a continuous suction is applied to said blank lifting device, means for reciprocating said blank lifting device, and mechanism for connecting said means to said driving member at will.

14. In a machine of the character described, the combination of a rock shaft, an arm projecting therefrom, a reciprocatory sheet lifting device, a bar attached to said device and having a sliding frictional connection with said arm, and means for oscillating said shaft, said frictional sliding connection between said arm and said bar being adapted to permit a variable movement of said lifting device to be obtained from a uniform movement of said arm.

15. In a machine of the character described, the combination of a continuously operating fly wheel, a suction pump continuously operated by said fly wheel, a pneumatic sheet pick-up device, a connection through which suction is continuously applied to said device by said pump, mechanism for bodily moving said device, and means whereby said mechanism may be connected to and disconnected from said fly wheel at will.

16. The combination of a pneumatic sheet pick-up device, a continuously operating suction creating apparatus for applying suction to said device, means for reciprocating said device, a power actuated driving means for both said suction creating apparatus and said reciprocating means, and means whereby the reciprocation of said device may be started and stopped at will without affecting the operation of said suction creating apparatus.

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