June 24, 1958 J. O. BURMAN 2,840,369

STOCK-FEEDING APPARATUS

Filed Feb. 6, 1956 4 Sheets-Sheet 1

Fig. 1

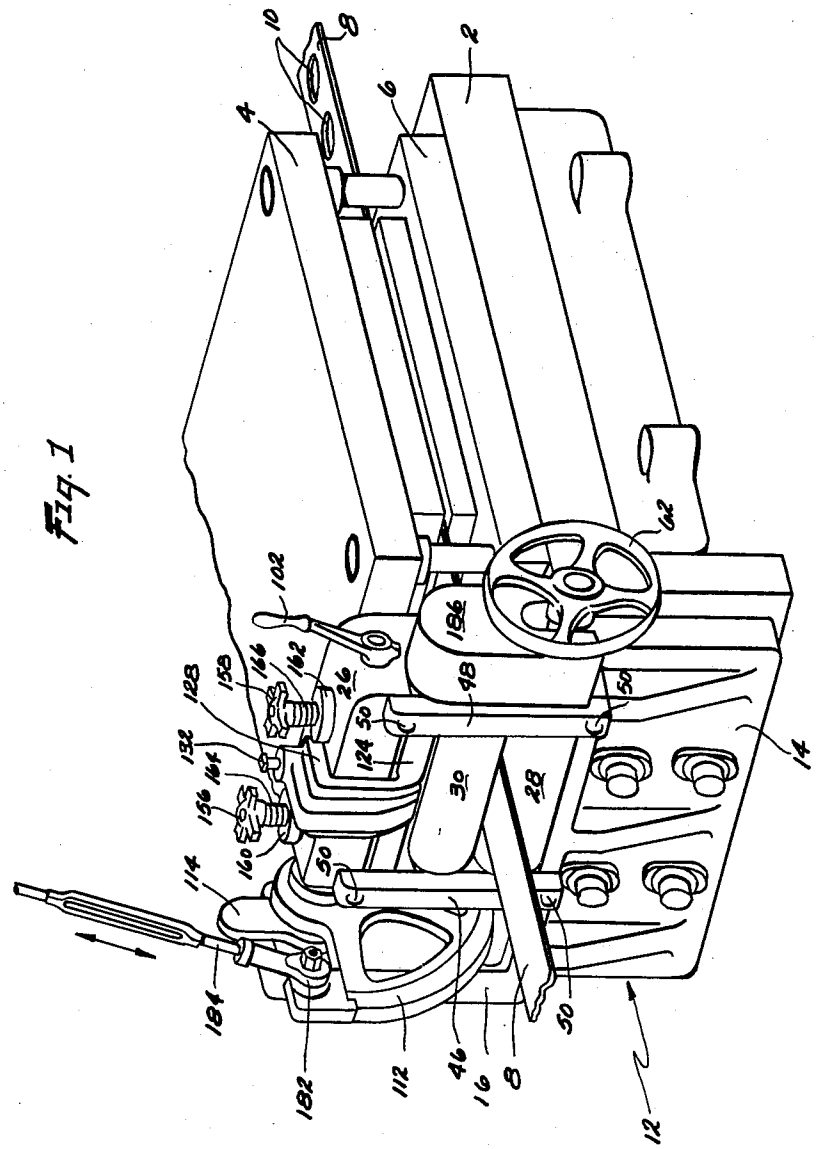


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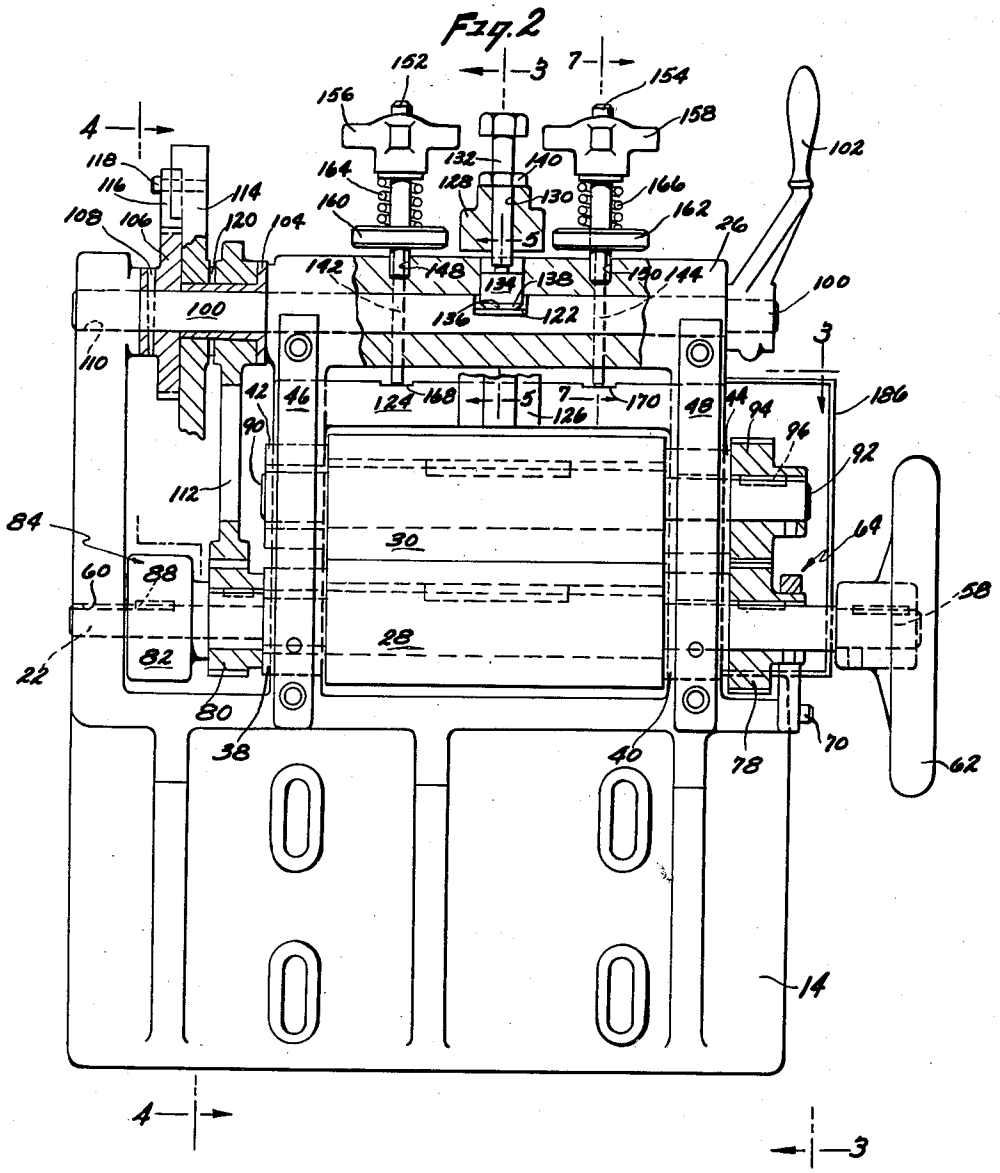
Fig. 2

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STOCK-FEEDING APPARATUS

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Fig. 3

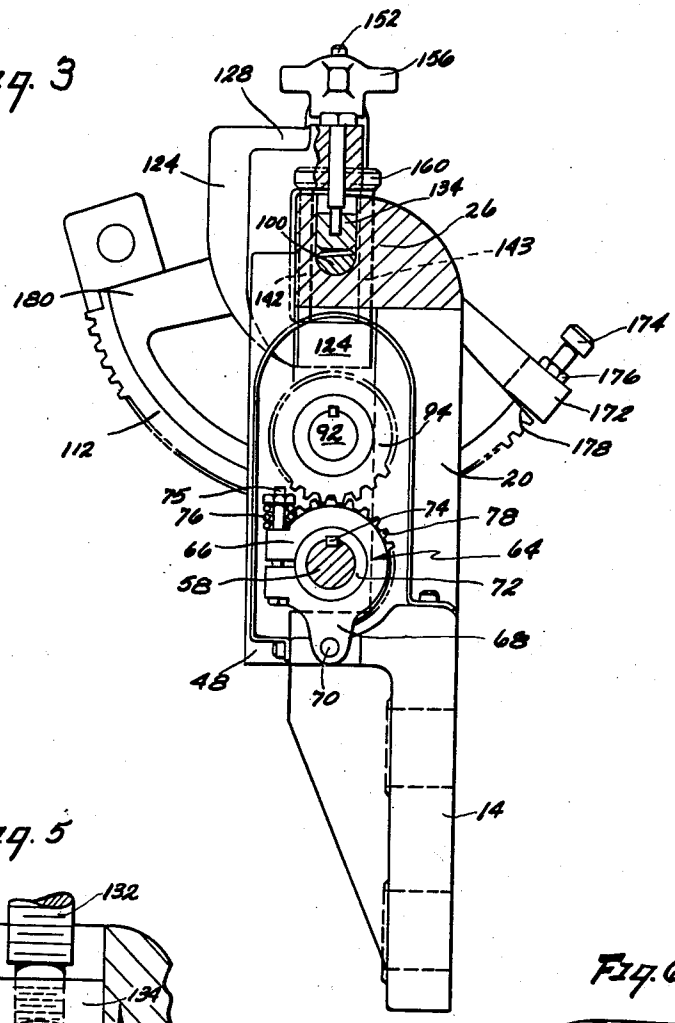



Fig. 5

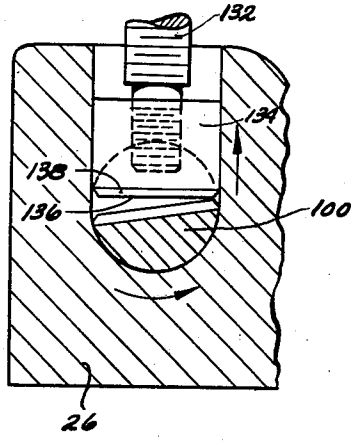
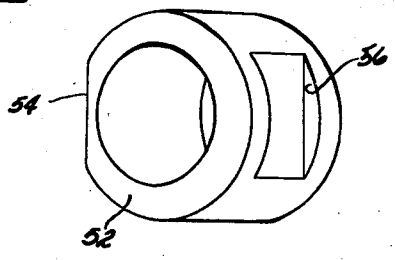



Fig. 6

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STOCK-FEEDING APPARATUS

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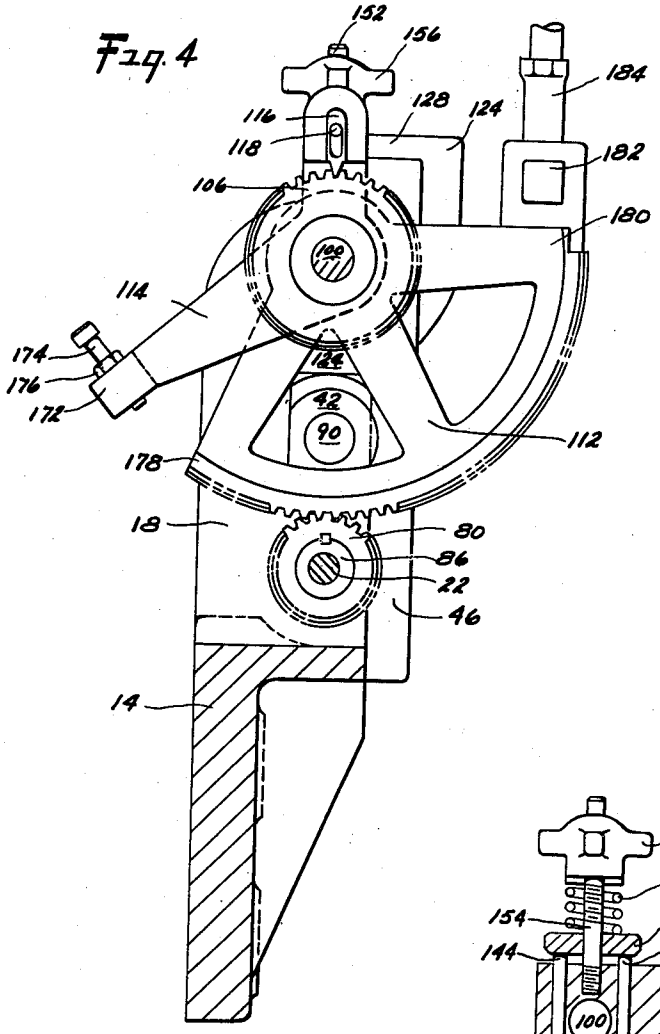
Fig. 4



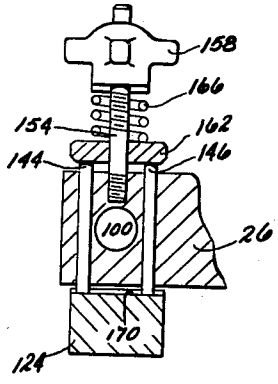




Fig. 7

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United States Patent Office 2,840,369
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2,840,369

# STOCK-FEEDING APPARATUS

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Application February 6, 1956, Serial No. 563,761

9 Claims. (Cl. 271—2.4)

This invention relates to stock-feeding mechanisms for presses, and in particular to mechanisms of this type which act to release the stock during an operation by the press thereon in order to prevent buckling of the stock.

It is often customary, in the operation of punch and forming presses designed for automatic operation, to feed the stock thereinto by automatic feed means, the feed means being actuated in predetermined manner by the press itself. For example, in a punch press, means consisting of rolls are often used to feed sheet or strip stock between the punch and die of the press, the rolls being connected mechanically to the ram of the press (or to the fly-wheel) for actuation thereby in a properly determined sequence with respect to the movements of the ram and punch.

However, it is often found, as to such means, that when the punch engages the sheet material to punch it, a backward buckling of the sheet stock is caused, this backward buckling then causing, upon release when the punch lifts, inaccuracies in feeding and indexing the next measured length of stock.

It is the general object of this invention, therefore, to provide a feed means for stock in which such buckling is prevented, this being done by instantly disengaging the feed means at the instant the punch engages the stock (or just prior thereto), this disengagement being maintained while the punch completes its punching operation. About the moment the punch thereafter clears the stock, the feed mechanism again is caused to engage the stock and feed the proper amount of stock into the die. The operation of the feed means both as to feeding and disengagement of the stock, is controlled in accordance with the operation of the punch itself.

Accordingly, among the several objects of the invention may be noted the provision of feed means for automatically feeding stock into a press and having means for temporarily releasing the stock while press operations are taking place thereon; the provision of means for feeding stock into a press, which measures as it feeds, and also provides the aforementioned releasing operation; the provision of feed means of the above classes in which the point of feed release is adjustable independently of the adjustment for the amount of stock fed; the provision of feed means of any of the classes aforementioned in which the adjustments for release and for feed may be quickly and accurately made; the provision of feed means of the aforementioned classes which is readily adaptable for use on nearly all kinds of presses; and the provision of feed means of the above classes which may be easily disassembled and put together for cleaning and repair, and which are economical to make and to maintain.

Other objects and advantages will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction and manipulation, and arrangements of parts which will be exemplified in the structure hereinafter described, and



the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, which illustrate one embodiment of the invention:

Fig. 1 is a perspective view of a conventional press bed and die subassembly showing an embodiment of the invention mounted thereon;

Fig. 2 is a front elevation of the embodiment, partly in section to show the construction of certain parts more clearly;

Fig. 3 is a sectional side view of the embodiment, taken in the direction of sight lines 3—3 on Fig. 2;

Fig. 4 is a sectional side view taken in the direction of sight lines 4—4 on Fig. 2;

Fig. 5 is an enlarged portion of the embodiment, given to show a constructional detail more clearly and taken in the direction of sight lines 5—5 on Fig. 2;

Fig. 6 is a perspective view of a bearing; and

Fig. 7 is a sectional view of a portion of the embodiment, taken in the direction of sight lines 7—7 on Fig. 2.

Throughout the drawings, similar reference characters indicate corresponding parts.

Referring now to Fig. 1, there is shown in perspective a portion of a press with the feed machine of this invention mounted thereon. Of the press, which may be of conventional type, only the bed 2 thereof is shown, the rest of the press being omitted, since it is conventional and of full knowledge to those skilled in the art. Mounted on the bed is the sub-assembly of die blocks 4 and 6, these also being of conventional and well-known structure. A strip of stock 8 is shown emerging from the said sub-assembly, with the holes 10 punched therein by the reciprocatory motion of the punch of block 4, the stock 8 being shown entering the said sub-assembly through the feed mechanism (indicated generally by numeral 12) which is the subject of this invention.

Referring now specifically to feed mechanism 12, it is fastened (as by bolts) to the edge of bed 2 by means of the upright apron 14, apron 14 being part of the basic supporting member for the working parts of the device. To this end, there are attached to, or formed integrally with (as by casting) the apron 14, the upright guide members or standards 16, 18 and 20, standard 16 being suitably bored to provide bearings for the ends of shafts 22 and 24. Standards 18 and 20 together with the top bar 26 form an open frame to receive the feed rolls 28 and 30, as well as other components. Preferably, the entire structure comprising the apron 14, the standards 16 and 18, and the top bar 26 are cast as a whole, but other means of construction may be utilized, if desired.

Each of standards 18 and 20 is relieved, as at 32, to provide guide channels 34 and 36 for bearing blocks 38, 40, 42, and 44. The bars 46 and 48 are fastened at the ends thereof by means of bolts 50 to the tops and bottoms of standards 18 and 20 to hold said bearing blocks in place.

A typical cylindrical bearing block 52 of the set 38, 40, 42, and 44 is shown in Fig. 6 and as shown has a flat surface 54 provided on one side, and the groove or channel 56 on the other side. In assembled position each bearing block has its flat side 54 lying against the inside edge of the respective standard and slidable thereagainst. The retaining bars 46 and 48 are sized to fit slidably the channels 56 and thus hold the bearings in place, each bearing thus being detachably held in the uprights.

Feed roll 28 is provided with the extending shafts 22 and 58, said shafts fitting (with a bearing fit) the respective cylindrical bearing blocks 38 and 40. Shaft 22 extends outwardly far enough to enter the bearing hole 60 which, as previously described, is suitably provided in standard 16. Shaft 58 extends far enough outwardly

(as shown) to receive on its end the hand-wheel **62**. Shaft **58** traverses a friction clutch member **64** comprising the split-ring part **66**, the mounting lug **68** by means of which (and bolt **70**) the structure is fastened to base **12**, and the inner friction hub **72** which is keyed to shaft **58** by means of spline **74**. A clamping bolt **75** is provided with compression spring **76** in order to adjust the amount of friction against the hub **72** exerted by ring **66**, and hence the degree of resistance of roll **28** to turning.

On shafts **22** and **58** are mounted the gear **78** and pinion **80**, gear **78** being keyed (as by a spline) to shaft **58**. Pinion **80** rotates freely on shaft **28**, but is connected to the shell or driving-member **82** of a conventional "one way" slip-clutch indicated generally by numeral **84**. The hub **86** of the clutch is rotated in only one direction by shell or driving-member **82**, and is keyed to shaft **22** by any means, such as the spline and key structure **88**. Thus rotation of pinion **80** in one direction will cause the roll **28** to rotate in the same direction, but rotation of pinion **80** in the opposite direction will not rotate roll **28**. As drawn in Fig. 4, rotation of pinion **80** counter-clockwise will rotate roll **28** the same way. Rotation of pinion **80** clockwise will not cause roll **28** to rotate.

It is to be noted that by the engagements of shafts **22** and **58** respectively in bearing hole **60** and clutch **64**, roll **28** is anchored, together with its bearing blocks **38** and **40** securely at the bottom of the frame provided by the standards **18** and **20**, and top bar **26**.

The other feed roll **30** is also provided with shafts **90** and **92** at each end thereof. Shaft **90** rotatably fits bearing block **42**, and shaft **92** rotatably fits block **44** and extends to the right thereof (as drawn in Fig. 2) to receive thereon the gear **94** which is keyed to shaft **92** in conventional manner as by key **96**. Gear **94** engages gear **78** and is driven thereby. Thus intermittent motion of roll **28** (as described above) will drive roll **30** to the same extent by means of gears **78** and **94**.

It is to be noted, at this point, that roll **30** is free to move up and down because of the slidability of blocks **42** and **44** in the standards **18** and **20**. The extent of the permissible motion is determined by the engagement of the teeth of the respective gears **78** and **94**.

Top bar **26** is bored longitudinally to receive rotatably the cam-shaft **100** which projects outwardly as shown from each end of the top bar. At one end of cam-shaft **100** is the quick-release handle or trip-lever **102** which is fastened to shaft **100** by conventional means and is thereby adapted to turn the shaft by manual actuation of the lever. On the other end of shaft **100** is mounted the sleeve **104** and the toothed ratchet-gear or pinion **106**. Sleeve **104** is rotatable on shaft **100**, but pinion **106** is attached to the shaft in conventional manner, as by the pin **108**. The end of shaft **100** is rotatably received in the bearing hole **110** suitably provided in standard **16**.

Mounted rotatably on sleeve **104** is the gear or ratchet-segment **112** and the pawl-bearing adjusting lever **114**, this lever carrying on its face the adjustable pawl **116**, which is held thereto by the bolt **118**. This same face of lever **114** bears against the face of pinion **106**, and pawl **116** is positioned to engage the teeth of the pinion to lock the pinion and lever together against rotation one with respect to the other.

A spacing washer **120** is provided to give a nice fit of these several parts between the ends of standard **16** and top bar **26**.

Shaft **100** is provided with a cam-surface, in this instance the flat **122**, at approximately where the center of top bar **26** aligns with the shaft, as shown. The purpose of this flat will be described below.

Between top bar **26** and roll **30** there is positioned the presser-bar **124**, which comprises a bar of rectangular cross-section long enough to extend into the channels **34** and **36** formed by the relief portions **32** of the standards **18** and **20** and the retaining bars **46** and **48**. Presser-bar



**124** is slidable up and down in the said channels, and its ends bear on the bearing blocks **42** and **44** to exert a force thereon and thus force roll **30** toward roll **28**. Bar **124** is formed with an upwardly extending bracket or lift means **126** attached thereto, either integrally or separately, said bracket having an arm **128** extending over the top-bar **26** at about the center thereof and in line with flat **122**. Arm **128** has a threaded hole **130** therein vertically in alignment with flat **122**, and hole **130** receives therein a threaded stud **132**. Shaft **132** terminates in a reduced end section as shown, and this engages an enlarged plug **134** which slidably fits a hole **136** provided in top-bar **26** and intersecting the bearing hole of shaft **100**. The lower face **136** of plug **134** is chamfered as shown at **138**, and engages the flat **122** on shaft **100**. Because of this engagement, turning of shaft **100** serves to lift upwardly the stud **132**, which in turn (by means of bracket **126**) lifts pressure-bar **124** away from roll **30**, and thus permits roll **30** to move away from roll **28**. Fig. 5 illustrates cam-shaft **100** being turned slightly to cause the aforesaid upward motion. A lock-nut **140** serves to hold stud **132** in adjusted position in hole **130**.

Top bar **26** is suitably bored to provide four holes extending vertically therethrough which receive four thrust-pins **142**, **143**, **144**, and **146**, these being symmetrically located with two on one side of shaft **100**, and two on the other. Located in the top bar **26** between each pair of thrust pins are the threaded holes **148** and **150** into which are screwed, respectively, the guide rods **152** and **154**. Guide rod **152** is thus between pins **142** and **143**, and guide rod **154** is between pins **144** and **146**. The guide rods are threaded for at least a portion of their lengths, which threaded portions receive the threaded adjusting knobs **156** and **158**. Collars **160** and **162** slide on guide-rods **152** and **154** and each bears against the ends of the respective thrust pins associated with that guide rod. Compression springs **164** and **166** are mounted between the respective collars and adjusting knobs to cause the collars to exert a resilient force downwardly on the thrust-pins.

The lower end of each of said thrust-pins bears against the top surface or face of presser-bar **124**, the latter being preferably machined smooth, as indicated at numerals **168** and **170** to receive these ends.

By this construction, therefore, the force tending to bias roll **30** toward roll **28** may be adjusted by means of the knobs **156** and **158**, and this force may be counteracted by turning cam-shaft **100** to lift stud **132** and thus the presser-bar.

The end **172** of lever **114** is provided with the adjustable stop-screw **174** which is locked in place by conventional means, as by lock-nut **176**. End **172** is angled so that adjustable stop-screw **174** is brought into the line of travel of the end **178** of ratchet-segment **112**, and will be struck thereby at one end of the ratchet's travel. At the other end **180** of the ratchet-segment there is provided a conventional pivoted connection **182** for the thrust-rod **184**, which is adapted to be connected to a portion of the press which will impart reciprocatory up-and-down motion to the bar, and thus swing the ratchet-segment back and forth about shaft **100**. (The aforesaid connection is not described in detail, since it should follow commonly accepted practices, for example, by being attached to the main press shaft by eccentric sleeve-and-follower, or by eccentric cam, or it may be actuated by the motion of the press ram.)

A cover **186** may be provided, if desired, for the gears which are on the hand-wheel **62** side of the machine.

*Operation*

The operation of the invention will now be described:

The sheet stock is introduced between the feed rolls **28** and **30** by turning the rolls by means of the hand wheel in such direction as to draw the end of the sheet stock between the rolls. It will be observed that the

action of the slip-clutch **84** is such as to permit roll **28** to be thus turned without the pinion **80** (and hence without the ratchet-segment **112** being actuated). If desired, material **8** may be introduced between the rolls, by removing the pressure on roll **30** by rotation of the trip-lever **102** in such direction as to rotate shaft **100** and thus cause stud **132** to lift presser-bar **124**.

By either method, stock **8** is brought between the rolls **28** and **30**, and between the upper and lower die blocks. Die block **4** is brought downward until the punch thereof is about to strike the sheet stock **8**. The block is then moved by turning the press-fly-wheel by which, for example, is actuated the thrust rod **184**. The latter in turn actuates the ratchet-segment **112** to turn pinion **80** and thus rolls **28** and **30**. During this motion of the die-block downward and the ratchet-segment about shaft **100**, the pawl **116** has been manually lifted out of engagement with the pinion **106** so that the adjusting lever **114** is free to rotate about shaft **100**, with the end of stop-screw **174** resting against end **178** of the ratchet-segment. At the aforesaid point where the punch of the top die block is about to strike the stock **8**, the pawl **116** is set to engage the pinion **106** and is locked in place by means of bolt **118**. This gives a coarse adjustment of the angular position of the ratchet-segment with respect to pinion **106** and thus shaft **100**. A fine adjustment is provided by means of the stop-screw **174** which is now adjusted so that a continued further downward motion of the punch of die-block **4** will cause thrust rod **184** to move ratchet-segment **112** and thus lever **114**, pinion **106** and shaft **100** just enough so that when the aforesaid punch has met the stock with sufficient pressure to hold it without slipping, the shaft **100** has been turned enough to lift presser-bar **124** and relieve the pressure on roll **30**.

This means that the rolls **28** and **30** no longer grip the stock **8**, or grip it with a minimum of force. When the punch now enters the stock, any backward or forward motion of the stock **8** due to the action of punching can take place without the restraint of the rolls **28** and **30**.

After the punching action, the press withdraws the punch, and in so doing lifts thrust-rod **184** upward. This rotates the ratchet-segment **112** counter-clockwise (as drawn in Fig. 4), and the latter therefore releases the lever **114** and shaft **100** to enable presser-bar **124** to force roll **30** again in engagement with the stock **8**. However, due to the release action of clutch **82**, the roll **28** does not turn with this counter-clockwise motion of the ratchet-segment.

When the upper die-block is again moved downward, as first described, the clockwise motion of the ratchet-segment now turns the rolls **28** and **30** (via clutch **84**) to advance the stock into the die-blocks for the next punching action, the roll pressure (and thus stock-feed) being released at the proper moment, as aforesaid, by means of the end **178** striking and moving lever **114** to turn shaft **100**.

Thus it is seen that means are provided whereby the forces gripping the stock are released automatically at the point of the punch operation where it is desired to release the stock to accommodate any backward motion thereof. Thus buckling of the stock is avoided, and more accurate feed and indexing thereof are accomplished.

It is also to be noticed that the roll pressure can at any time be manually released by means of the trip-lever **102**; and stock can be independently fed into the press at any time by means of the hand-wheel **62**. Adjustments are quickly and easily made.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results obtained.

As many changes could be made in the above embodiment without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.



I claim:

1. Apparatus for feeding stock into a press, comprising a base; standards mounted on said base; a pair of rolls mounted in bearings in said standards, the bearings of one roll being fixed in said standards and the bearings of the other roll being movable in said standards to enable said other roll to be moved toward and away from said one roll, the axes of said rolls lying in a common plane; a clutch mounted on said one roll and adapted to turn the latter in one direction but not the other; a gear attached to said clutch for turning the latter and thus said one roll; a reciprocable rack engaging said gear and by its motion adapted to rotate said gear in opposite directions; pressure means biasing said other roll into engagement with stock between said rolls; and means actuated by said rack periodically to relieve the engagement of said stock by said other roll whereby said stock is enabled to move in a direction opposite to that imposed by said rolls.

2. Apparatus for feeding stock into a press, comprising a base; standards mounted on said base; a top-bar connecting the tops of said standards; a pair of rolls mounted on bearings in said standards, the bearings of one roll being relatively fixed in said standards and the bearings of the other roll being movable in said standards to enable said other roll to be moved toward and away from said one roll, the axes of said rolls lying in a common plane; a one-way slip-clutch mounted on the bearing shaft of said one roll, rotation of the driving member of said clutch being adapted to rotate said one roll in one direction to feed stock into the press and to free said roll for free rotation in the opposite direction; a pinion rotatably mounted on said shaft and attached to said driving member to rotate the latter and thus said one roll; a cam shaft rotatably supported in said top bar and having its axis in the plane of the axes of said rolls, said shaft having a cam surface thereon; pressure means biasing said other roll toward said one roll; means connecting said cam surface with said pressure means whereby rotation of said shaft causes said cam surface to counteract the bias of said pressure means; a ratchet-segment rotatably mounted on said shaft and engaging said pinion to rotate the latter; a second pinion mounted on said cam shaft and fixed thereto; a trip-lever rotatably mounted on said second shaft and having a portion thereof adapted to be engaged by said ratchet-segment for a portion of the latter's motion; a pawl carried by said trip-lever and engaging said second pinion; and adjustable means on said trip-lever whereby the motion of said trip-lever by said ratchet-segment may be varied.

3. The apparatus of claim 2 wherein the shafts of each of said rolls carries a gear which meshes with the gear of the other roll, whereby rotation of said one roll also rotates the said other roll.

4. The apparatus of claim 2 wherein said adjustable means comprises a screw on the end of said lever adjustable with respect thereto, to vary the point at which said ratchet-segment first moves said lever during a cycle of said apparatus.

5. The apparatus of claim 2 in which said pressure means comprises a presser-bar slidable in said standards and having its ends bear against the movable bearings of said other roll, at least two pins slidable in said top bar with two of their ends pressing said presser-bar toward said one roll, and their other ends extending above said top bar; adjustable spring-driven means biasing said pins toward said presser-bar; lift means attached to said presser-bar and extending over said top-bar and said cam-shaft; and means slidable in said top-bar and supporting said presser-bar, said means engaging said cam-

surface to lift said presser-bar against the bias of said spring-driven means when said cam-shaft rotates.

6. Apparatus for feeding stock into a press, comprising a base, standards mounted on said base; a pair of rolls mounted in bearings in said standards, the bearings of one roll being relatively fixed in said standards and the bearings of the other roll being movable in said standards to enable said other roll to be moved toward and away from said one roll, the axes of said rolls lying in a common plane; reciprocable means connected to at least one of said rolls for rotating the latter intermittently; pressure means biasing said other roll toward said one roll; cam means actuated by said reciprocable means periodically to counteract the said bias of said pressure means whereby stock between said rolls is enabled to move in a direction opposite to that imposed by said rolls, said cam means comprising a shaft rotatably mounted in said standards and having its axis lying in the plane containing the axes of said rolls, a cam surface being provided on said shaft and rotatable therewith, said cam surface being connected to said pressure means whereby rotation of said shaft moves the pressure means against its bias; and a lever connected to said shaft and positioned to be actuated during a portion of the motion of said reciprocable means.



7. The apparatus of claim 6 in which said reciprocable means comprises a pinion attached to said one roll and adapted to rotate the latter, and a reciprocable rack engaging said pinion for rotation thereof.

8. The apparatus of claim 6 in which said pressure means comprises a presser-bar and at least one spring bearing thereagainst, said pressure bar engaging by its ends the movable bearings of said other roll, and said spring biasing said pressure bar and thus said other roll toward said one roll.

9. The apparatus of claim 6 in which said pressure means comprises a presser-bar slidable in said standards and having its ends bear against the movable bearings of said other roll, adjustable spring means pressing said bar and thus said other roll toward said one roll, and lift means attached to said bar and actuated by said cam means to lift said bar away from said one roll.

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