Jan. 12, 1954 G. A. LYON 2,665,905

CONTINUOUS WEB FEEDING MECHANISM

Filed June 21, 1949 4 Sheets-Sheet 1

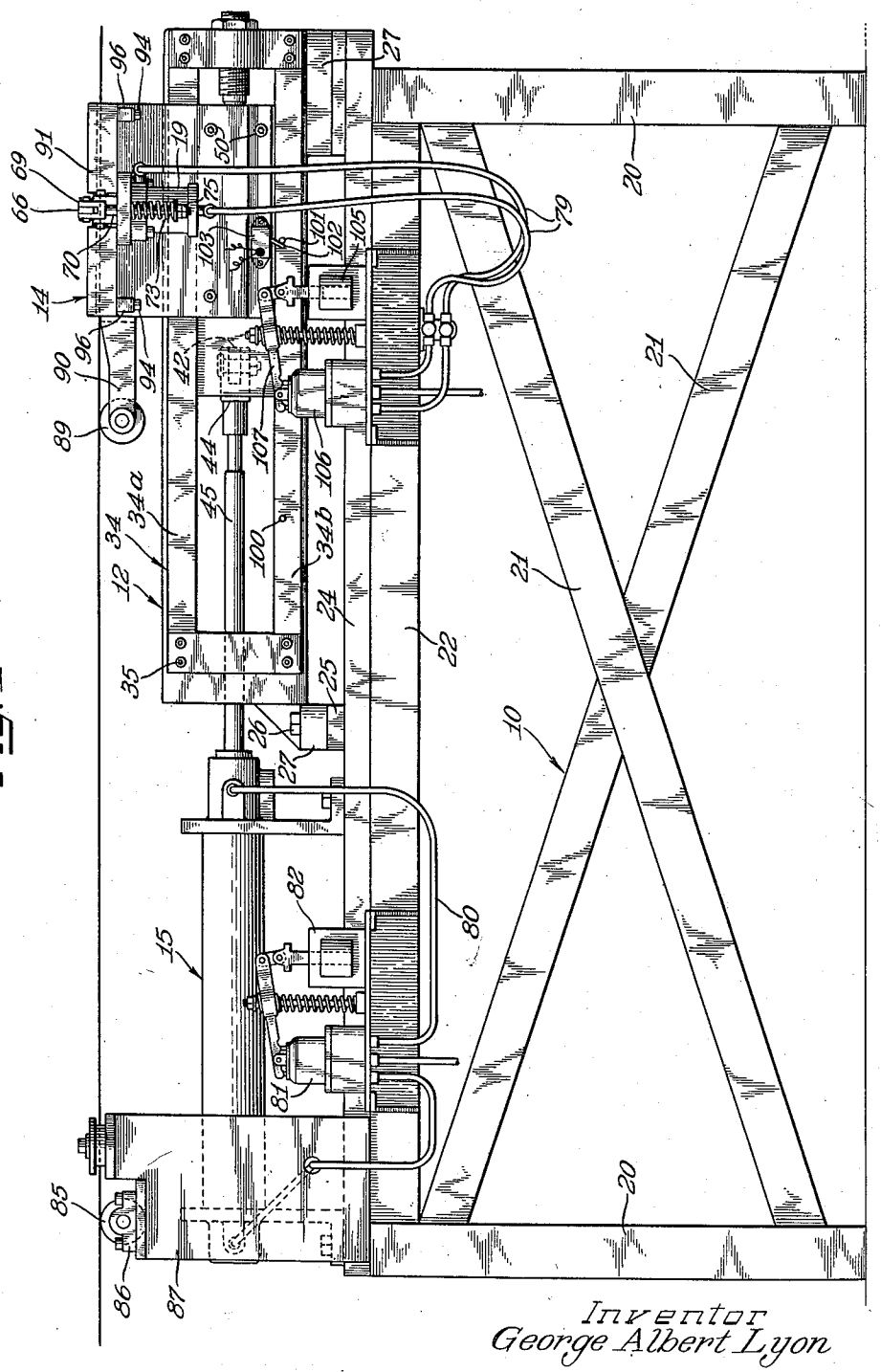


FIG. 1

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4 Sheets-Sheet 2

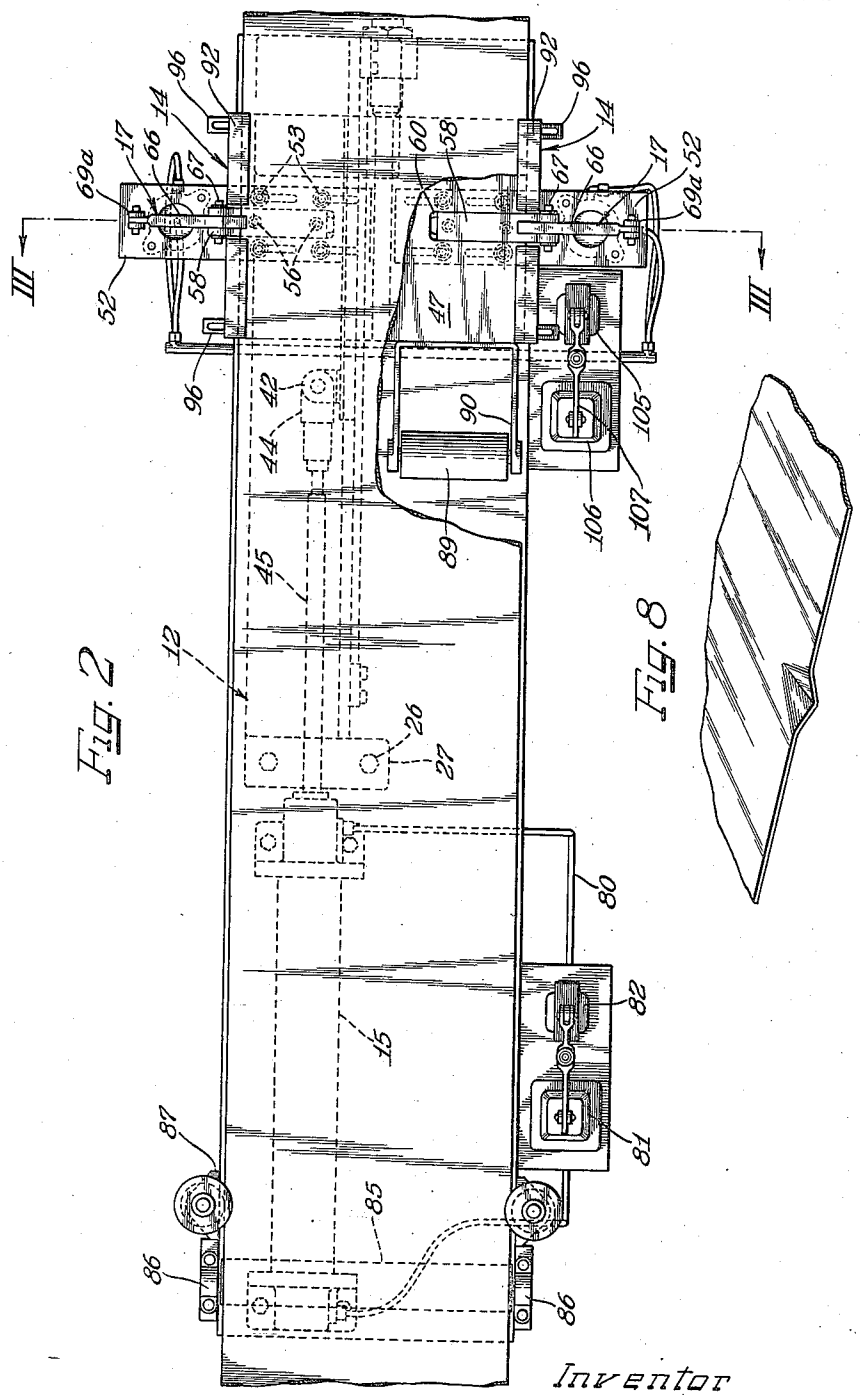


Fig. 2

Fig. 8

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CONTINUOUS WEB FEEDING MECHANISM

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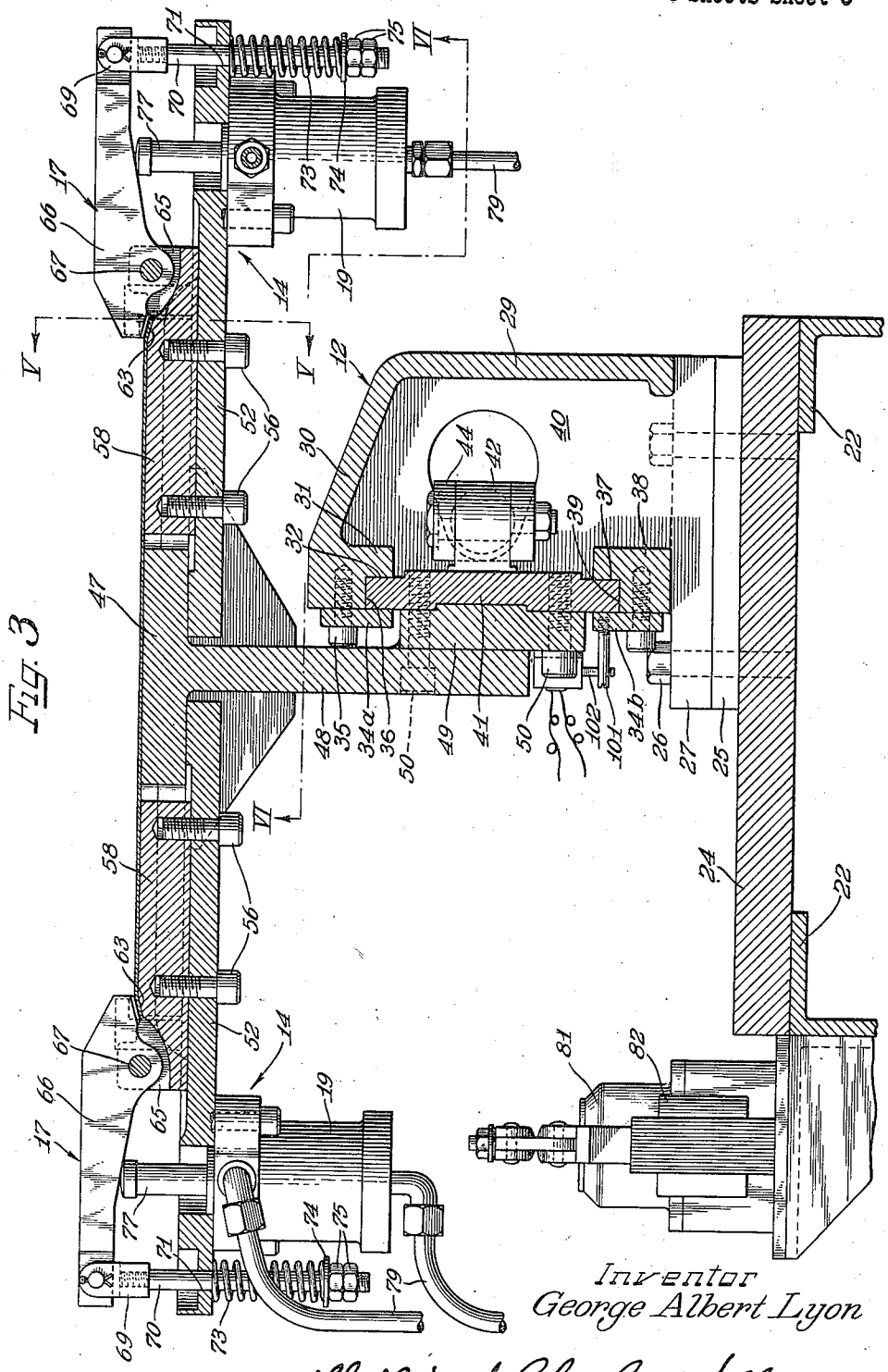


Fig. 3

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CONTINUOUS WEB FEEDING MECHANISM

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Fig. 4

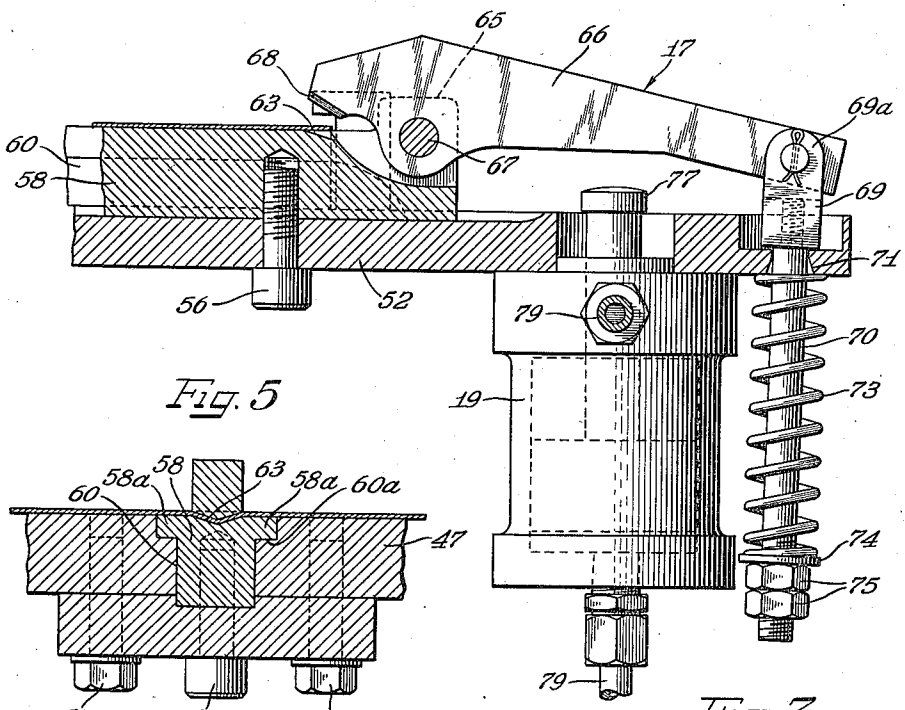


Fig. 5

Fig. 7

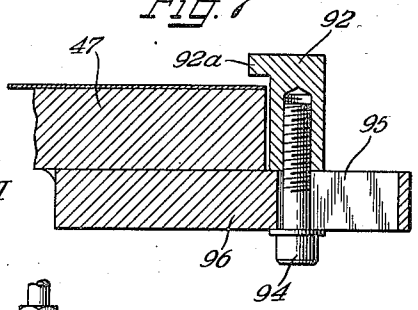
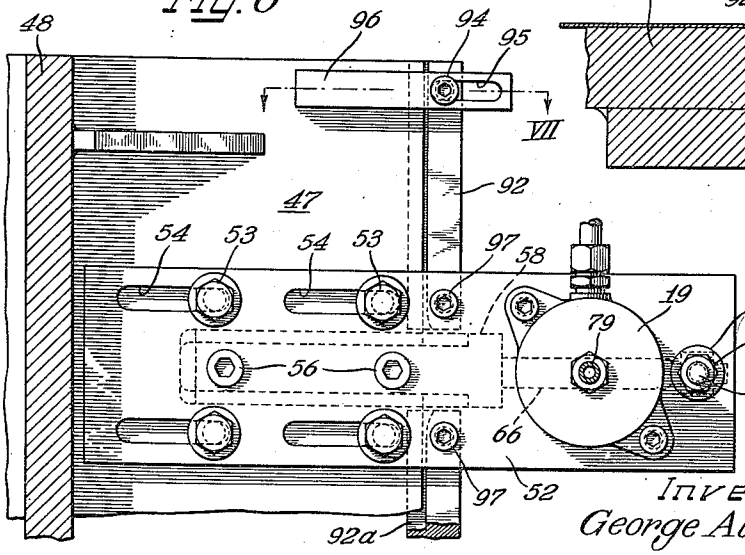


Fig. 6



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CONTINUOUS WEB FEEDING MECHANISM

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Application June 21, 1949, Serial No. 100,365

9 Claims. (Cl. 271—2.5)

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This invention relates to a stock feed mechanism. More particularly it has to do with a mechanism for intermittently feeding a sheet of material to a processing station, such as a bed of a hydraulic press, in accurately measured lengths.

At present it is customary in processing sheets of material, such as sheet metal, to feed the continuous sheet into the processing station by means of rollers which contact the opposite sides of the sheet and frictionally grip it to slide it over a support surface into the processing machine. A stop bar is usually employed on the machine to limit the feeding of the sheet therein.

Frictionally advancing sheet material is unsatisfactory due to the inherent inefficiency of the rollers which must be accurately adjusted to obtain a driving effect. Also, materials with exceptionally smooth, hard surfaces, such as stainless steel, do not lend themselves readily to frictional drive.

According to the teachings of the present invention, a sheet of material is supported in a substantially horizontal position on a table that is mounted for reciprocation on a support structure by means of a double acting pneumatic cylinder. A clamping arm is pivotally mounted on the side of the table and arranged, when pivoted to clamping position by means of a second double-acting pneumatic cylinder, to press a small side edge portion of the material into a groove in the upper surface of the table. The clamping arm thus positively grips the sheet and, as the table is moved forwardly, this gripping effect of the clamp causes the sheets to be indexed forwardly a distance equal to the length of the stroke of the piston in the pneumatic cylinder which reciprocates the table.

The air cylinder connected to each clamping device is controlled from a solenoid operated valve. When the table reaches the end of its forward feeding stroke, it trips a switch which actuates the solenoid to direct air under pressure to the opposite end of the pneumatic cylinder causing pivoting of the clamp to release position. While the press engages a portion of the sheet on the pad thereof, air under pressure is directed to the pneumatic cylinder connected to the table for retracting it to its initial position. When the press is ready for receiving the next section of the sheet, the pneumatic cylinders connected to the clamping arms are actuated to grip the sheet material onto the table, and the pneumatic cylinder connected to the table is energized to move the table forwardly in its feed stroke.

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It is therefore an object of the present invention to provide a mechanism for gripping a sheet of material and feeding it a predetermined distance into a processing station.

Another object of the present invention is to provide a feed mechanism for intermittently and positively feeding sheet stock to a processing machine.

A further object of this invention is to provide a machine for feeding material constructed and arranged to be adjustable for various widths of sheet stock.

An important feature of this invention is the provision of a clamping mechanism including a V-shaped notch on the top surface of the reciprocating table in which the edge of the sheet material is pressed by a V-shaped end portion of a pivoting clamp arm.

Another feature of this invention is the provision of a machine for feeding sheet stock which includes pneumatically operated cylinders for controlling the clamping and release of the sheet material on the table and the reciprocation of the table.

A still further feature of this invention is the provision of a mechanism for feeding sheet stock which employs a slidable reciprocating table for intermittently feeding the stock forwardly.

Another feature of this invention is the provision of an adjustable table which includes a fixed central portion and side table portions adjustable relative to the central portion.

Other and further features, objects and advantages of the present invention will be apparent to one skilled in the art from the following detailed description taken in connection with the accompanying drawings.

On the drawings:

Figure 1 is a side elevational view of a stock feeding mechanism constructed according to the teachings of the present invention;

Figure 2 is a top plan view, with a portion of the machine broken away to better disclose the mechanism of the stock feeding machine of Figure 1;

Figure 3 is a fragmentary vertical sectional view taken on line III—III of Figure 2;

Figure 4 is an enlarged fragmentary vertical sectional view of a portion of Figure 3 showing the clamping mechanism in a released, unclamping position;

Figure 5 is a fragmentary vertical sectional view taken on line V—V of Figure 3;

Figure 6 is a fragmentary horizontal sectional view looking upwardly at the bottom of the table

of the machine and taken substantially on line VI—VI of Figure 3;

Figure 7 is a fragmentary vertical sectional view taken on line VII—VII of Figure 6; and

Figure 8 is a fragmentary perspective view of a piece of material after it has been crimped by the clamping device of the present invention;

As shown on the drawings:

In Figures 1 to 3 the reference numeral 10 indicates a frame support structure on which is secured a housing 12. A table assembly 14 is mounted for sliding, reciprocating movements on the housing 12 when actuated by a double-acting pneumatic cylinder 15 which is mounted on the frame support structure 10. A clamp assembly 17, Figure 3, is mounted on either side of the table 14 for movements to clamping position by means of a double-acting pneumatic cylinder 19.

The support structure 10 comprises four upright leg members 20 suitably secured together on each side of the machine by cross bracing members 21. Longitudinal braces 22 extend along each side of the machine, are connected to the end legs 20 by any suitable means, as by welding, and have, as seen in Figure 3, an angular cross section. A flat substantially rectangular table top member 24 is suitably supported on the longitudinal members 22 and on the top surface of the upright legs 20.

The housing 12 may be of any suitable open frame construction and, as herein illustrated, comprises a foot member 27 at either end positioned on spacer blocks 25 and secured to the table top member 24 by means of bolts 26.

The housing 12 has an upstanding rear wall 29, an overhanging top plate 30 and a longitudinal flange 31 which depends from the top plate 30. A longitudinal recess 32 is provided in the depending flange 31 and cooperates with an upper flat strap portion 34*a* of a rectangular frame member 34 which is secured to the housing 12 by a plurality of cap screws 35 to define a guide slot 36 (see Figure 3). A lower flat strap 34*b* of the frame member 34 cooperates with a longitudinal recess 37 in a longitudinally extending bar 38 to define a second guide slot 39 directly opposite slot 36. The bar 38 may be formed integral with the wall member 29 and with reinforcing web plates 40 which are spaced along the length of the housing.

A sliding plate 41 of substantially rectangular configuration is disposed in the housing 12 in an upright position having its upper and lower ends slidably engaged in the slots 36 and 39.

An ear member 42 is secured to one face of the plate 41 extending into the housing 12 for pivotal connection to the bifurcated end of a connector 44 (Figure 2). The connector 44 is connected to the piston rod 45 which extends from the double-acting pneumatic cylinder 15.

Thus the sliding plate 41 is mounted for reciprocating sliding movement in slots formed in the housing 12 under the control of the pneumatic cylinder 15.

The table assembly 14 comprises a flat rectangular portion 47 disposed in a substantially horizontal plane and a longitudinally vertical rib member 48 formed integral with the member 47 and extending alongside of the housing 12. The web member 48 has an offset spacer portion 49 which holds the web 48 spaced from the housing 12. The web 48 is connected by means of cap screws 50 to the sliding plate 41. As the sliding plate 41 is reciprocated through the action of the double-acting pneumatic cylinder 15, the table is of course moved in a reciprocating stroke.

In addition to the central portion 47, the table 14 is provided with two plates which extend to the side of the central member 47 and form the supports for the clamping members 17. These side plates 52, as seen in Figure 6, which is a bottom plan view, are adjustably attached to the bottom surface of the center member 47 by means of a plurality of cap screws 53 which extend through slots 54 in the plate 52. On the top surface of each side plate 52 there is attached, as by means of cap screws 56, a replaceable insert 58 of hardened material which is of an elongated rectangular configuration and extends laterally along the plate for disposition in a lateral groove 60 in the central table member 47. This groove 60 is best shown in Figures 5 and 2. The insert 58 may conveniently have extending flange portions 58*a* disposed on recess shoulders 60*a* of the groove or slot 60. The insert 58 is further provided with a substantially V-shaped notch 63 on its outer marginal edge. A pair of spaced ear members 65, integrally formed at the outer margin of the insert 58, define a slot in which a portion of a pivoting lever 66 is disposed for pivoting on a pin 67 which extends between the ears 65.

The clamping assembly 17 includes the pivoting lever 66 which has at its inner end a substantially V-shaped crimping end portion 68. At its outer end the lever 66 is pivotally connected between the bifurcated end 69*a* of a connector 69 which is threadingly connected to a rod 70 extending through an opening 71 in the plate 52. A spring 73 is disposed about the rod 70 between the lower edge of the plate 52 and a washer 74 which is adjustably held on rod 70 by means of lock nuts 75. The spring 73 is a compression spring and tends at all times to urge the rod downwardly for pivoting the lever 66 in a clockwise direction about the pivot pin 67 as seen in Figures 3 and 4. This pivoting action is of course toward the unlocked clamp-releasing position.

The clamping lever 66 is moved to clamping position by means of a piston rod 77 which projects from the pneumatic cylinder 19 which is secured to the bottom surface of the plate 52. Air under pressure is supplied to this cylinder by means of a line 79. When air is directed to the lower end of the cylinder the piston rod 77 moves out of the cylinder 19 and engages the lower surface of the lever 66 and causes counter-clockwise rotation of the lever 66.

It will, of course, be understood that the clamping assemblies 17 and the pneumatic cylinders are identical on either side of the machine as are also the adjustable side plates 52.

The double-acting pneumatic cylinder 15 is supplied with air under pressure by means of air conduits 80 (Figure 1), the flow of air through the conduits 80 being controlled by a suitable valve 81 which is actuated by a solenoid assembly 82. It will, of course, be understood that the actuation of the valve 81 for directing air under pressure selectively to either end of the cylinder 15 is effected through a suitable timing mechanism coordinated with the operation of a press so that material will be fed to the processing station of the press at the proper time, such as the upstroke of the plunger.

The sheet material is supported as it passes over the feeding mechanism by means of a roller 85 which is journaled in bearings 86 secured at the upper surface of upright support members 87. The roller 85 extends entirely across the

feeding machine. A second roller 89 (Figure 2) is journaled at either end in a bracket 90 which is secured, as by welding, to the housing 14. The sheet material is supported on the two rollers and, of course, on the upper surface of the center table member 47.

Extending along the marginal edges of the table 47 a pair of guides 92 is provided which have flange portions 92a overhanging the stock as it rests on the table 47. The inner side walls of these guide members 92 guide the edges of the sheet material as it passes over the table.

As best seen in Figure 6 each side guide member 92 is adjustably mounted relative to the center table member 47 by means of screws 94 which extend through slots 95 in bars 96 which are welded to the bottom of the member 47. The guide members 92 are secured to the side plates 52 by means of a plurality of cap screws 97 and therefore the guide members 92 will be moved laterally with the plate 52 when the plate 52 is adjusted to accommodate different sizes of sheet material.

As previously mentioned, the clamping levers 66 engage the sheet material just before the pneumatic cylinder 15 begins its forward feeding stroke and releases the sheet material just before the cylinder 15 returns the table to its initial position. This coordination of the clamping action with the feeding stroke is effected by means of a pair of pins 100 and 101 (Figure 1) which are secured to and project away from the lower bar member 34b of the frame assembly 34. These pins 100 and 101 are spaced from each other and are arranged to contact a trip lever 102 which depends from a switch 103 secured to the side of the spacer portion 49 of the vertical rib 48 of the table. As seen in Figure 1, the table 14 is at the end of the forward feeding stroke and the lever 102 has been tripped by the pin 101 to cause de-energization of a solenoid 105 which controls, through a spring-pressed lever 107, an air valve 106 connected to the lines 79 of both of the clamp-actuating cylinders 19 (see Figures 1 and 2). Thus, air has been directed to the top of each of the cylinders 19 to retract the piston rod 77 therein and permit the spring 73 to pivot the associated clamping lever 66 out of clamping position. When the pneumatic cylinder 15 retracts the table 14 to its initial position, the lever 102 will contact the pin 100 and be tripped in an opposite direction to energize the solenoid 105 and actuate the valve 106 to direct air to the lower end of the cylinders 19 to cause the piston rods 77 to pivot the levers 66 into a clamping position.

From the foregoing description it will be seen that there is provided in this invention a simple efficient mechanism for positively gripping sheet material at its marginal edges and feeding it forwardly to a processing table an accurate predetermined distance. It is within the scope of this invention to vary the feeding stroke of the table 14 by changing the effective stroke of piston rod 45 of the cylinder 15 or substituting a different cylinder 15 with a different length of stroke.

This feeding machine effects its positive feeding movement by actually indenting the edges of the sheet material and locking it in a notch of a plate so that in the forward feeding stroke of the table there is no possibility of slippage. By a novel arrangement of an adjustable side plate on which the clamping device is mounted, there is provided in this invention means for adapting the table to various widths of sheet stock. The stock feeding mechanism is extremely simple in operation and is particularly adapted to automatic feeding of stock to a processing station.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention, and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

I claim as my invention:

1. A feed mechanism for sheet stock comprising a support structure, a housing mounted longitudinally on said support structure having a pair of spaced guide grooves, a slide disposed in said guide grooves for movement relative to said housing, power means for reciprocation of said slide in said grooves, a table secured to said slide having a flat top portion for supporting the sheet stock, said top portion having laterally extending slots at the side margins thereof, removable inserts disposed in said slots, means for clamping the sheet material against said inserts, and power means for applying said clamping means.

2. A stock feed mechanism comprising a support structure, a housing mounted on said support structure having a pair of spaced guide grooves, a slide disposed in said guide grooves for movement relative to said housing, power means for reciprocating said slide in said groove, a table secured to said slide having a top portion supporting the stock and having laterally extending slots at the side margin thereof, replaceable inserts disposed in said slots having spaced upstanding ear members, a clamp pivotally mounted between each set of ear members, and power means for pivoting said clamps to lock said stock onto said inserts.

3. A stock feed mechanism comprising a support structure, a housing on said support structure, a slide reciprocably mounted on said housing, power means for reciprocating said slide, a table secured to said slide for movement therewith, replaceable inserts connected to said table having V-shaped grooves in the upper surface thereof, a clamp pivotally mounted on each replaceable insert, and power means for pivoting said clamps to lock a sheet of material in the V-shaped grooves in said replaceable inserts.

4. A stock feed mechanism comprising a support structure, a housing disposed on said support structure, a slide reciprocably mounted on said housing, a table secured to said slide for movement therewith having a horizontal central portion and side portions adjustably mounted on said central portion, a replaceable insert on each adjustable side member, a clamp mounted on each insert for locking a sheet of material against said side member of said table, and a power cylinder depending from each adjustable side member and in abutting contact with said clamping member for moving said clamping member into locking position.

5. A stock feed mechanism comprising a support structure, a table slidably mounted on said support structure, a lever pivotally mounted on said table for positively pressing the sheet material against said table, electrically operable means for pivoting said lever to and from clamping position, power means for reciprocating said table, spaced pins mounted on said support structure, and a switch for actuating said electrically operable means mounted on said table and having a

switch actuating lever depending therefrom, said pins being in the path of travel of said switch actuating lever as said table is reciprocated, for tripping said switch to actuate said means for pivoting said clamping lever.

6. A stock feed mechanism comprising a support structure, a table slidably mounted on said support structure, a lever pivotally mounted on said table for locking the sheet material against said table, a pneumatic cylinder secured to said table and operable on said lever to pivot same, lines for supplying air under pressure to either end of said pneumatic cylinder, a solenoid control valve mounted on said support structure and controlling flow of air under pressure through said lines, a switch on said table having a lever depending therefrom, a pair of spaced pins on said support structure in the path of travel of said depending lever as said table is reciprocated, one of said pins being effective to trip said lever for energizing said solenoid control valve for directing air to one end of said pneumatic cylinder to pivot said clamping lever and lock the sheet material on said table.

7. A clamp comprising a base member, an insert removably attached to said base member having a notch in the upper surface thereof and spaced ear members, a pin disposed between said ear members, a lever pivotally mounted on said pin having a forward material-engaging V-shaped edge movable into said notch on said removable element, a power cylinder secured to said base having a rod movable against said lever

to pivot the lever into material-engaging position, and spring means for pivoting said lever to disengage said material.

8. A stock feed mechanism comprising a support structure, a sheet support member movable on said support structure, means for motivating said member, replaceable inserts connected to said member and having recesses therein, and a clamp mounted on each insert movable into the recess to lock an engaged sheet of material therein.

9. Mechanism for clamping sheet material to a table comprising a pair of aligned grooves on opposite marginal portions of said table, a pair of levers having portions movable into said grooves, means secured to said table supporting said levers for pivotal movement on axes transverse to said grooves and outward from said opposite marginal portions, and means for pivoting said levers.

GEORGE ALBERT LYON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
763,195	Merz	June 21, 1904
896,170	Stout	Aug. 18, 1908
1,344,492	Edgar	June 22, 1920
1,622,590	Jolstad	Mar. 29, 1927
2,096,073	Spencer	Oct. 19, 1937
2,175,169	Esch	Oct. 10, 1939
2,468,236	Rue	Apr. 26, 1949
2,510,559	Daly	June 6, 1950