Feb. 8, 1955 R. W. DANIELS, JR., ET AL 2,701,463

SAFETY DEVICE FOR LEATHER COMPACTING MACHINES

Original Filed Nov. 20, 1951 5 Sheets-Sheet 1

Fig.1

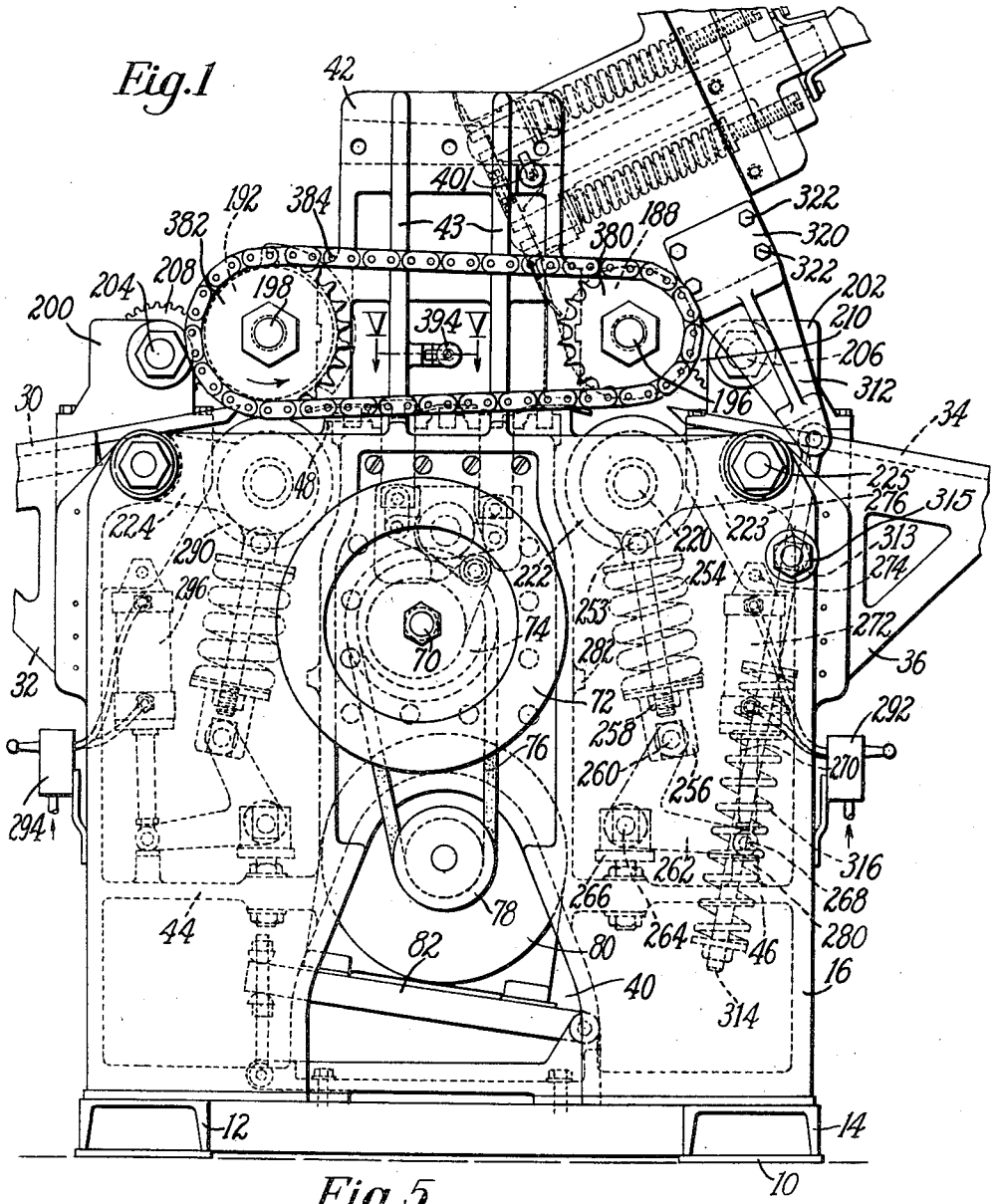
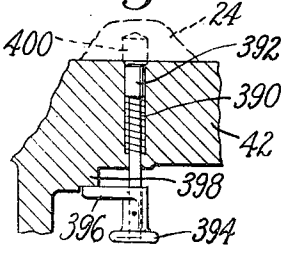


Fig.5



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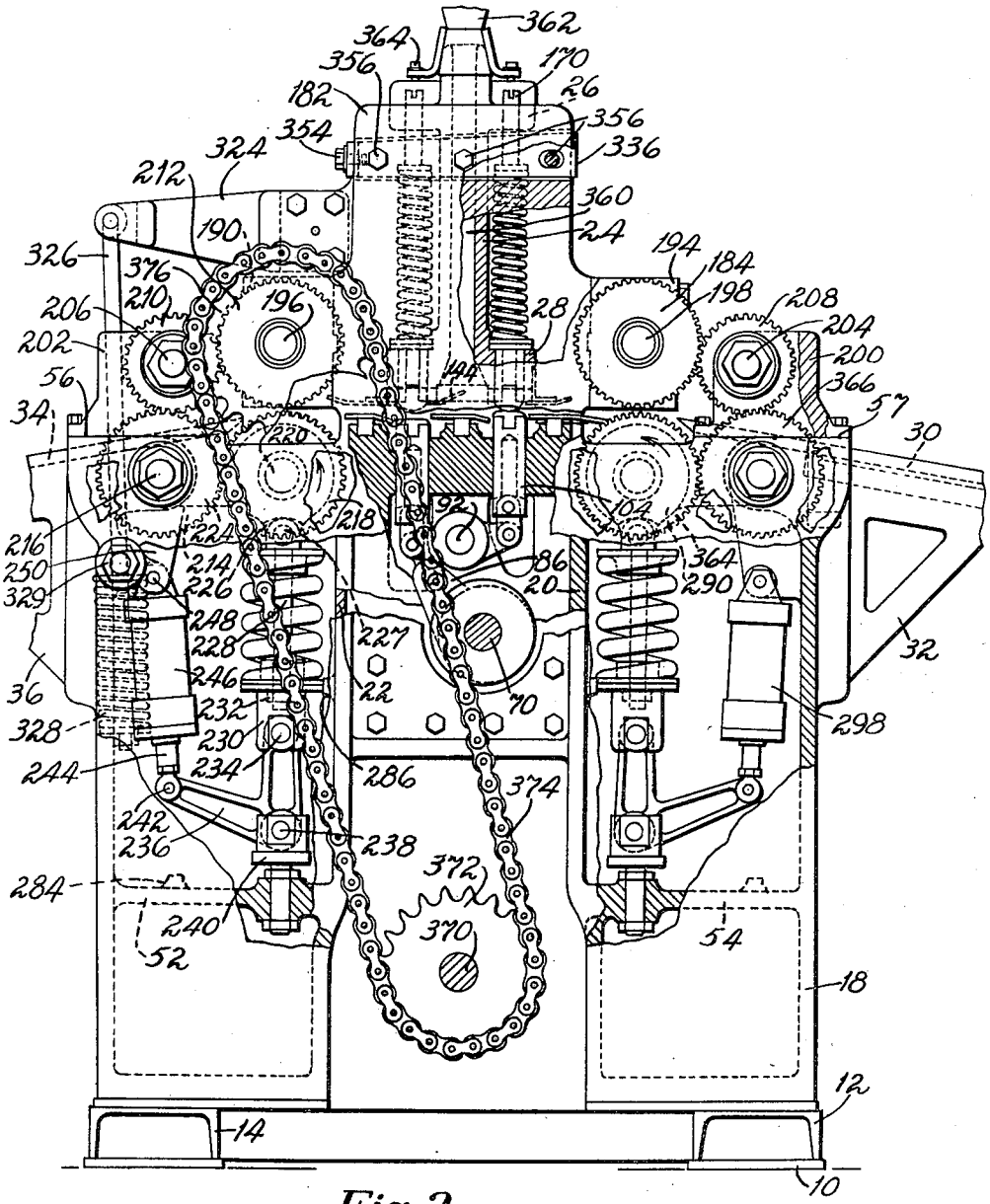


Fig. 2

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SAFETY DEVICE FOR LEATHER COMPACTING MACHINES

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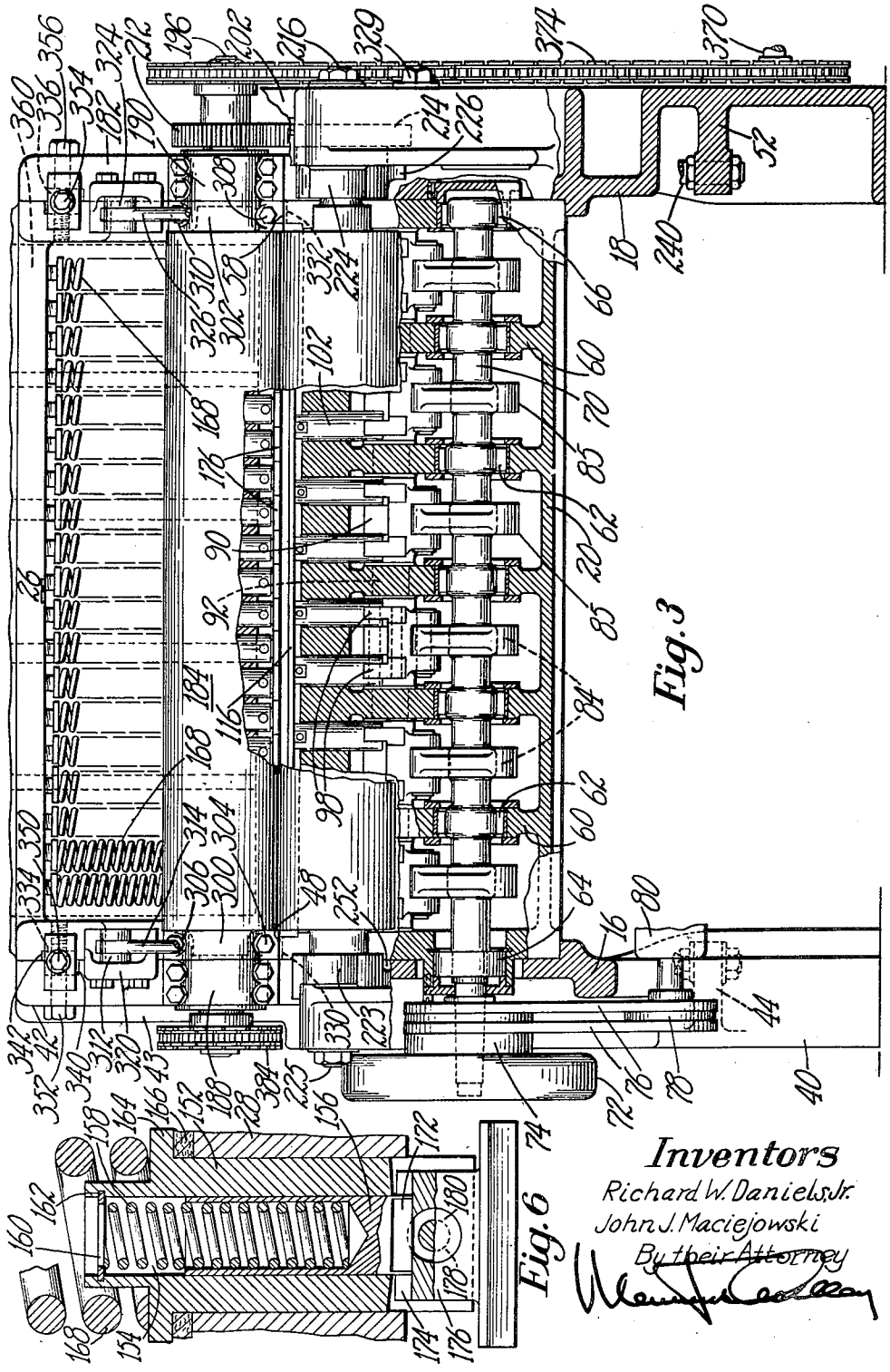


Fig. 3

Fig. 6

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SAFETY DEVICE FOR LEATHER COMPACTING MACHINES

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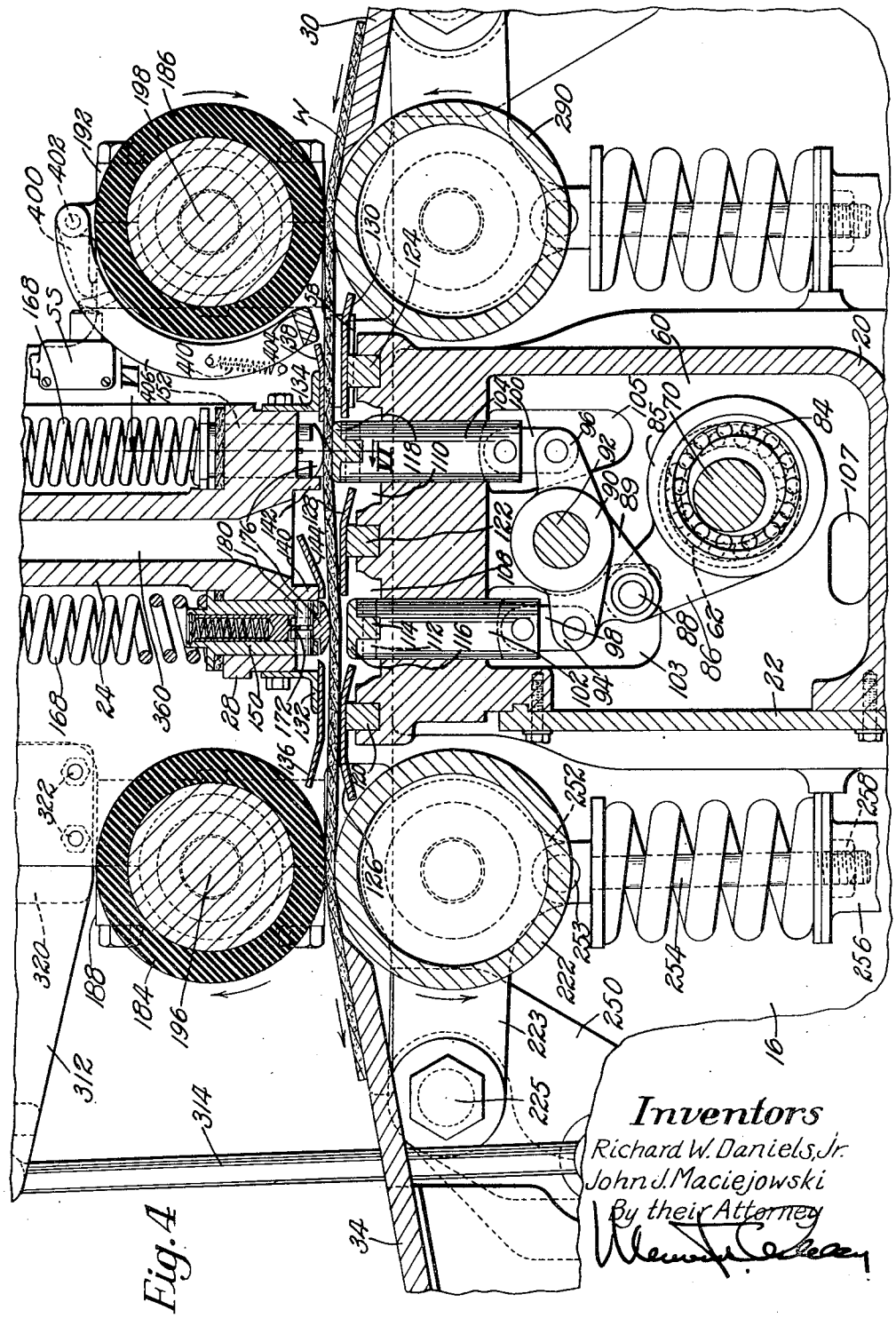


Fig. 4

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SAFETY DEVICE FOR LEATHER COMPACTING MACHINES

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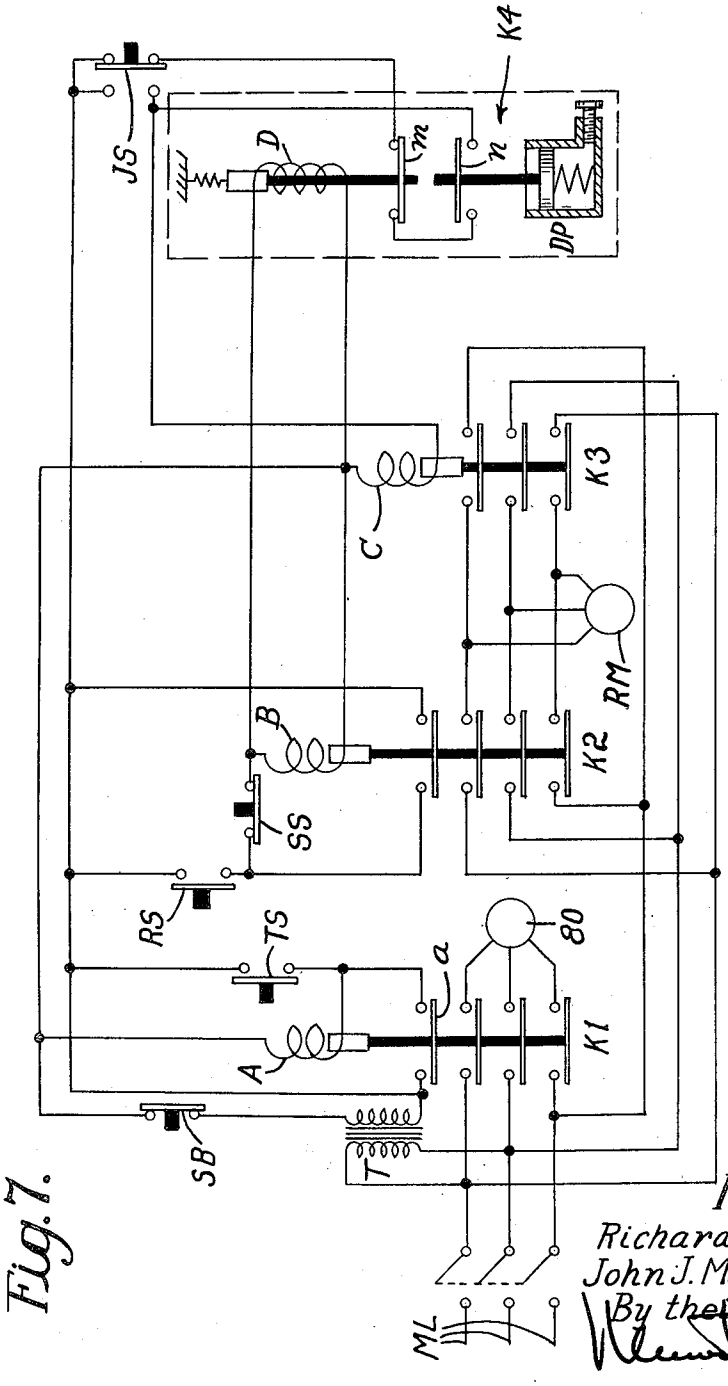


Fig. 7.

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United States Patent Office 2,701,463 Patented Feb. 8, 1955

2,701,463

SAFETY DEVICE FOR LEATHER COMPACTING MACHINES

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Original application November 20, 1951, Serial No. 257,336, now Patent No. 2,663,179, dated December 22, 1953. Divided and this application April 24, 1953, Serial No. 356,952

3 Claims. (Cl. 69—1)

This invention relates to a safety device, and more particularly to a safety device for use in leather compacting machines, the present application being a division of a copending application for Letters Patents for improvements in Leather Compacting Machines which was granted December 22, 1953, as United States Letters Patent No. 2,663,179. The invention is herein illustrated as embodied in a machine of the general type disclosed in United States Letters Patent No. 2,571,149, granted on October 16, 1952, in our names but it is understood that the invention is not, in its broader aspects, limited to use with this particular machine or to use with leather compacting machines.

In machines of the type wherein a work piece is fed through a work treating zone by a pair of feed rolls and preferably withdrawn from the work treating zone by a pair of discharge rolls, considerable harm can result to the machine elements if the work piece, in some manner, becomes fouled because of folds or creases therein so that it does not properly enter the work treating zone. This is particularly true in leather compacting machines of the type in which the present invention is embodied, more particularly because the leather work pieces which are to be compacted are of irregular shape and thickness and seldom lie flat.

It is an object of this invention to provide a safety device applicable to leather compacting machines of the type described which will prevent injury to the machine elements when a work piece fails properly to enter the work treating zone.

More particularly, and in accordance with the various features of this inventiton, a safety bar is suspended in the work treating zone and adjacent to a pair of in-feed rolls, being yieldingly held in a position above the normal path of movement of the work pieces. The in-feed rolls feed work pieces beneath the safety bar and into the work treating zone. When a work piece becomes fouled and fails properly to enter the work treating zone, it will buckle, due to the fact that the feed rolls are constantly rotating, and thereby raise the safety bar activating a safety switch mounted on the machine. When the safety switch is activated an electrical circuit is energized which, through the action of various electrical coils, causes the field current in a three phase motor driving the feed rolls to be reversed.. A dash-pot arrangement is incorporated in the electrical circuit for controlling the length of time which this reversed current is applied to the motor for driving the feed rolls. Depending upon the setting of this dash pot the feed rolls will either be dynamically braked or, if the current is applied for a sufficient time, the rolls will reverse their direction of rotation and the fouled work piece will be automatically fed from the machine. In either event the action is practically instantaneous so that the fouled work piece cannot cause damage to the machine elements. In this electrical circuit there is also provided a reversing switch which enables the operator of the machine to reverse the direction of the feed rolls at his own discretion and thereby extricate a fouled work piece.

The above and other features of the invention, including various novel details of construction and combinations of parts will now be more particularly described by reference to the accompanying drawings and pointed out in the claims.

In the drawings,

Fig. 1 is a view in elevation of the right side or end of a machine in which the present invention is embodied, the head or anvil supporting member of the machine being shown as moved or pivoted into its inoperative position and the feed rolls of the machine placed in their ineffective or open positions;

Fig. 2 is a view in elevation of the left side or end of the machine shown in Fig. 1 with portions being cut away for ease of illustration and the anvil supporting member or head of the machine being in its operative position and with the feed rolls closed;

Fig. 3 is a rear view of the machine with portions omitted or broken away showing internal details of the construction;

Fig. 4 is a sectional view drawn to a larger scale showing in greater detail the construction as brought out in Fig. 2;

Fig. 5 is a sectional view along the line V—V of Fig. 1 drawn to a larger scale and illustrating a locking means for the head of the machine;

Fig. 6 is a sectional view drawn to an enlarged scale along the line VI—VI of Fig. 4; and

Fig. 7 is an electrical diagram showing suitable circuits for the control of the work feeding rollers of the machine.

Because of the nature of the work performed the machine as herein illustrated and in which the invention is embodied is rugged and substantially built. A base is provided which conveniently comprises a horizontal plate **10** (Figs. 1 and 2) and channel bars **12** and **14** the flanges of which rest upon the plate **10**. The machine proper comprises two end castings **16** and **18** which are adapted to rest upon the channels **12** and **14**. The end castings **16** and **18** are joined by a horizontal box-like casing **20** (Figs. 2, 3 and 4) which is heavily constructed and the ends of which are bolted to the end castings **16** and **18**. One side of the casing **20** (toward the rear of the machine and to the left as shown in Fig. 4) is provided with an opening over which is bolted a cover **22**. Above and spaced from the casing **20** is a horizontal head casting **24** (Figs. 2 and 4) which includes a top horizontal portion **26** (Figs. 2 and 3) and a lower horizontal portion **28** (Fig. 4). The head casting **24** is adapted to be supported on the end castings **16** and **18** but is conveniently arranged to be moved relative thereto as will be further described.

The front of the machine (to the left in Fig. 1) is provided with a shelf **30** supported on brackets **32** joined to the end castings **16** and **18**. A similar shelf **34** is provided on the rear of the machine and is supported by means of brackets **36** joined to the end castings **16** and **18**.

The end casting **16** is provided with an opening **40** (Figs. 1 and 3) in its lower portion and an upstanding projection **42** on its top. The projection **42** is suitably ribbed at **43** to insure adequate strength. The end casting **16** also is provided with horizontal and integral webs **44** and **46** (Fig. 1) as well as a horizontal flat shoulder **48** (Fig. 3).

The end casting **18** is provided with horizontal webs **52** and **54** (Fig. 2) and three flat horizontal surfaces **56**, **57** (Fig. 2) and **58** (Fig. 4). The two shoulders **48** and **58** of the end castings **16** and **18** respectively are adapted to cooperate as will be further explained. The relative positions of these two shoulders are illustrated in Fig. 3.

The casing **20** is of cast construction with five webs or partitions **60** therein as depicted in Fig. 3. Each web **60** is provided with a roller bearing **62** and end bearings **64** and **66** are mounted in the end walls of the casing **20**. The seven bearings **62**, **64**, and **66** rotatively support a shaft **70** which runs full length of the casing **20** and protrudes through the end casting **16** to support a flywheel **72** keyed thereto with its hub or pulley **74**. Belts **76** are mounted upon the pulley **74** and are driven from a pulley **78** joined to the shaft of a motor **80**. The motor **80** is suitably mounted on a pivoted platform **82** (Fig. 1) which is so mounted that it may be moved up or down to vary the tension in the belts **76**. Alternating with the bearings **62** on the shaft **70** are six roller bearings **84** and each of these are eccentrically mounted on the shaft **70** to support an eccentric member **85** which has an arm **86** (Fig. 4) pivoted at **88** to a depending and

bifurcated portion 89 of a rocking member 90. A shaft 92 is non-rotatably supported in the webs 60 and each of the rocking members 90 is mounted on the shaft 92 to rotate or oscillate thereon. Each rocking member 90 has oppositely extending arms 94 and 96 to which are pivoted short links 98 and 100, respectively. There are two links 98 and two links 100 for each rocking member 90. The upper ends of the links 98 and 100 are pivoted to the lower ends of vertically extending plungers 102 and 104 respectively which are adapted to reciprocate vertically in the upper or horizontal wall of the casing 20. There are two plungers 102 and two plungers 104 to each of the six eccentric members 85. There are, therefore, twelve plungers 102 and twelve plungers 104. These plungers are directly opposite each other with respect to the shaft 92 and are not in staggered relation although such arrangement is permissible. Openings 103, 105 and 107 are formed in the webs 60 to permit assembly of the parts described above and also to permit an adequate circulation and distribution of a lubricant within the casing 20.

The upper portion of the casing 20 is provided with a groove 108 (Fig. 4) into which the tops of twelve plungers 102 extend. The casing 20 is also provided with a groove 110 into which the tops of the plungers 104 extend. Each plunger 102 is pivoted by a pin 112 to a depending rib 114 of a horizontal bar 116 which runs the full length of the row of plungers 102. The plungers 104 are similarly pivoted to a bar 118. It will be understood that the bar 116 and the twelve plungers 102 are adapted to move as a unit and that the same is true of the bar 118 and the twelve plungers 104. The top surfaces of the bars 116 and 118 are smoothly contoured as seen in Fig. 4.

Recessed into and attached to the top of the casing 20 are three bars 120, 122 and 124 to which are attached work guiding plates 126, 128 and 130 respectively.

The bottom portion 28 of the head casting 24 is fitted with angle bars 132 and 134 (Fig. 4) to which are attached guide plates 136 and 139. Beneath and along the center of the head casting 24 are flanges 140 and 142 and to the flange 140 a central work deflecting and air restricting plate 144 is attached. The plate 144 cooperates with the plates 136 and 138 to provide under surfaces which define with the aid of the upper surfaces of the plates 126, 128 and 130 a shallow work passage. These guide plates (six in number) are mounted contiguous to the work treatment zone and to the path through which the work is to be fed and the plates 128 and 144 are interposed between and immediately above the two rows of plungers 102 and 104.

A row of anvils 150 (nineteen in number) are mounted for vertical motion through the bottom portion 28 of the head casting 24 and are placed in cooperative relation with the row of plungers 102. A second row of anvils 152 are provided in the head casting 24 and are placed to cooperate with the row of plungers 104. The anvils 150 are similar in all respects to the anvils 152 and only the anvils 152 are therefore specifically described.

Fig. 6 clearly depicts the construction of each anvil 152 (similar to each anvil 150) which is bored at 154 to accommodate a spring loaded plunger 156. A coil spring 158 is provided within the plunger 156 and is retained in place by a spring washer 160 retained in a groove 162 formed in the main body of the anvil 152. The anvil 152 is also provided with a shoulder portion 164 which is adapted to rest upon a top surface of the lower portion 28 of the head casting 24 with a shock absorbing or resilient material 166 interposed. A coiled spring 168 is arranged normally to maintain each of the anvils 152 in firm engagement with the shock absorbing material 166 and the upper end of each of the springs 168 is held downwardly with the proper compression by means of a headed screw member 170 (Fig. 2) which is threaded into the upper portion 26 of the head casting 24. The bottom of the spring-loaded plunger 156 is provided with a web 172 (Figs. 6 and 4) which is arranged to project into a slot 174 of a tiltable work contacting anvil member 176 as well as into a groove 178 (Fig. 6) of a pin 180 which is utilized to pivotally attach the anvil member 176 to the main body of the anvil 152. It will be noted that the work contacting portion 176 is curved in the direction of the pin 180 but is provided with flat and vertical ends which (Fig. 3) are placed in substantially abutting relation with the adjacent anvil

portions 176. The arrangement of each anvil portion 176 with respect to the main body of its anvil 150 or 152 is such that a slight pivoting motion of the portion 176 about the pin 180 is permitted.

The end casting 18 is provided with an upstanding portion 182 (Figs. 2 and 3). This portion cooperates with the upstanding portion 42 of the end casting 16 to aid in holding the head casting 24 and two rubber covered feed rolls 184 and 186 (Fig. 4) in position. Bolted and dove-tailed to the upstanding portions 42 and 182 are four bearing blocks 188 (Fig. 3), 190 (Fig. 3), 192 (Fig. 1) and 194 (Fig. 2). These bearing blocks are not split but are so made as to be slipped over the ends of their respective shafts (to be referred to) during the assembly of the machine. The bearing blocks 188 and 190 serve to support a shaft 196 of the rubber covered roll 184. The bearing blocks 192, 194 support a shaft 198 which is part of the roll 186. Located on shoulders of the end casting 18 are two bearing blocks 200 and 202 (Figs. 1 and 2) which serve to support stub shafts 204 and 206 respectively. The stub shaft 204 bears a gear 208 mounted to rotate thereon and the stub shaft 206 carries a gear 210 for rotation relative thereto. The gear 210 is in mesh with a gear 212 keyed to the shaft 196 and also with a gear 214 mounted on a stub shaft 216 supported on the end casting 18. The gear 214 is mounted to drive a gear 218 which is keyed to the shaft 220 of a lower steel feed roll 222. The latter roll with its shaft 220 is mounted to rotate on bearings in the inner ends of two pivoted arms 223 and 224. The stub shaft 216 is of sufficient length to support the arm 224 for pivotal action as well as the gear 214 and the arm 223 is pivoted to the end casting 16 by means of a bolt 225. The end of the arm 224 (Figs. 2 and 3) is provided with a depending lug 226 which is pivoted by means of a pin 227 to the upper end of a rod 228 and the lower end of the rod 228 (Fig. 2) passes freely through the top of a casting 230 and is threaded and supplied with a stop nut 232. The casting 230 is pivoted by means of a pin 234 (Fig. 2) to one end of a two-armed lever 236 and the latter is pivoted at 238 to a special fitting 240 supported on the horizontal web 52. The other end of the two-armed lever 236 is pivoted at 242 to the lower end of a piston rod 244 which is part of a hydraulic motor 246. The latter is pivoted by means of a pin 248 to a depending portion 250 of the end casting 18. At the other side of the machine, the pivoted arm 223 bears a depending lug 252 to which is pivoted at 253 (Fig. 4) a depending rod 254, the lower end of which is threaded and passes through a casting 256 and bears a stop nut 258 (Fig. 1). The casting 256 is pivoted at 260 to one end of a two-armed lever 262. The lever 262 is pivoted at 264 to a special fitting 266 supported on the horizontal web 46 of the end casting 16. One end of the lever 262 is pinned at 268 to the lower end of a piston rod 270 which is part of a fluid pressure motor 272 and the latter is pivoted at 274 to a depending portion or web 276 of the end casting 16.

A stop member 280 is made an integral part of the web 46 and placed to conform to one end of the two-armed lever 262, as shown in Fig. 1. A stop member 282 (Fig. 1) is also made a part of the end casting 16 and is in position to limit the movement in one direction of the special casting 256. Similar stops 284 and 286 are provided on the end casting 18, as seen in Fig. 2.

A second steel feed roll 290 is provided and is mounted beneath and parallel with the rubber covered roll 186. The mounting of this roll 290 is not specifically described as it is clearly shown in the drawings and the mounting is similar in all respects with that of the roll 222 except that the swinging of the roll in coming into effective feeding relation is opposite to that of the roll 222 (clockwise instead of counterclockwise as viewed in Fig. 4).

A valve 292 (Fig. 1) is placed on the back of the machines and on the end casting 16 and this valve is connected in a well-known manner to control the operation of the two fluid motors 246 and 272. A second valve 294 is mounted on the front of the machine on the end casting 16 and similarly controls the tow motors 296 and 298 utilized for opening and closing the roll 290.

The head casting 24 is adapted to be rotated with respect to the rubber covered roll 186 and therefore away from and toward its normal and operative position by virtue of its mounting in the bearings 300 and 302 (Fig. 3). One-half of each of these bearings constitutes a

portion of the head casting **24** and each bearing is split with the outer half being joined to the casting **24** by means of bolts. The bearing **300** utilizes bolts **304** and **306** and the bearing **302** employs bolts **308** and **310**. The bearing **300** is interposed between the bearing block **188** and one end of the main portion of the rubber roll **184**, and the bearing **302** is interposed between the other end of the main portion of the roll **184** and the bearing block **190**. Supported on one end of the head casting **24** is a bifurcated arm **312** to the end of which is pivoted a depending rod **314** which is part of a counterbalancing unit (Fig. 1) made up of a concentric coiled spring **316**, expansive force of which (when the head casting **24** is at or less than 45° from its normal or operating position) is utilized in a conventional manner to pull downwardly on the arm **312**. A bracket **313** is attached to the end casting **16** by a stud and nut **315**. The rod **314** is free to slide and pivot in passing through the bracket **313**. The arm **312** is held to the head casting **24** by means of a cap plate **320** bolted to the head casting **24** by means of bolts **322**. A similar counterbalancing unit utilizing an arm **324** is employed at the other end of the head casting **24**. This unit has a depending rod **326** and a coiled spring **328** and is held in slidable and pivotal relation with the end casting **18** by a nut **329**. It will thus be seen that the head casting **24** is held in rotative relation with the shaft **196** and special means must be provided for normally holding the head casting **24** in accurate and operative relation with respect to the lower parts of the machine. This accuracy obviously is necessary because of the small dimensions dealt with in the treatment of leather and will be more clearly understood as the description proceeds. The end castings **16** and **18** have already been referred to as having horizontal shoulders **48** and **58**. These serve together with the bearings **300** and **302** to support the head casting **24** and interposed between the shoulders **48** and **58** and the appropriate parts of the head casting **24** are wedges or shims **330** and **332** (Fig. 3). These wedges or shims may be varied in thickness or number positively to determine the exact clearance desired for particular work to be treated.

In order to hold the head casting **24** firmly down on the wedges or shims **330** and **332**, wedges **334** and **336** are provided near the top of the machine. As clearly depicted in Fig. 3, the upstanding projection **42** of the end frame **16** is recessed or grooved at **340** to accommodate the wedge **334**, and the head casting **24** is correspondingly recessed (for that same wedge) at **342**. The upper and lower surfaces of these recesses **340** and **342** are not in the same planes as clearly shown in Fig. 3 and the construction is such that movement of the wedge **334** into place serves to wedge that end of the head casting **24** downwardly against the wedge or shim **330**. After the wedge **334** is firmly driven into place or drawn into place by a suitable bolt **350**, bolts **352** may be tightened firmly locking the wedge **334** and that end of the head casting **24** in position. The wedge **336** for the other end of the head casting is similarly provided with an adjusting bolt **354** and tightening bolts **356**.

The head casting **24** is provided with five vertical passages **360** (Fig. 3) serving as air ducts leading from the vicinity of the work guiding plate **144** to an air suction hood **362** bolted at **364** to the top of the head casting **24**. The means disclosed for removing dirt and other extraneous matter from the work treating zone is not claimed herein but is the subject of an application for United States Letters Patent, Serial No. 350,951, filed April 24, 1953, in our names. The hood obviously must be disconnected in the event that the head casting is to be tilted.

The lower steel roll **290** is adapted to be driven by a gear **364** which in turn is driven by a gear **366** and the gear **208**.

A motor RM (Fig. 7—and not shown in Figs. 1 to 6, inclusive) is utilized to drive a shaft **370** (Figs. 2 and 3) to which is keyed a sprocket **372** for driving a chain **374**. This chain drives a sprocket **376** (Fig. 2) which is keyed to the shaft **196**. The shaft **198** is driven from the shaft **196** by means of sprockets **380, 382** (Fig. 1) and a sprocket chain **384**. It will be noted that the sprocket **382** is slightly larger in diameter than the sprocket **380**. This is for the reason that the rubber covered feed roll **184** (at the zone of work discharge) must be driven at a slightly faster rate than the feed roll **186** as each work piece is elongated during the treatment, as will be further brought out.

The upstanding projection **42** of the end frame **16** (Fig. 5) is bored at **390** to accommodate a spring pressed plunger **392** to which a knob **394** is pinned, the knob having a finger **396** for engaging a shoulder **398** on the projection **42**. The head casting **24** is drilled at **400** to receive the plunger **392** when the head casting **24** is in a temporary lowered position. A second plunger with a knob **401** is similar to the plunger **392** and is provided for holding the head casting **24** in its raised position as shown in Fig. 1. Both of these plungers are not essential but are provided merely for convenience. The plunger with the knob **401** has been found to be much more useful than the plunger **392**.

A safety switch SS is mounted on the front of the machine (Figs. 4 and 7) and this is adapted to be operated by an arm **400** (Fig. 4) keyed to a shaft **402** mounted for rotation on the bearing blocks of the rubber roll **186**. The arm **400** also constitutes a stop means for holding a bar **404** immediately above a work piece W as such a work piece is fed through the machine. Curved arms **406** support the bar **404** from the shaft **402**. A spring **410** is provided tending to hold the bar **404** in its normal position.

In Fig. 7 the electrical control system for the machine, incorporating various features of the present invention, is depicted. Three phase current is drawn from the three lines ML and a transformer T is utilized to provide suitable current to operate four magnetic coils A, B, C and D. The coil A is arranged to operate a relay K1 for controlling the motor **80** driving the work compacting tools. The coil B is adapted to close a relay K2 and the coil C is adapted to close a relay K3. The coil D operates a pneumatic time delay relay K4 (within the confines of the dash lines of Fig. 7). The secondary line from the transformer T is controlled by a stop button or switch SB the operation of which terminates all current flow.

The tool motor **80** is started by closing a switch TS and energizing the coil A which closes the relay K1. The contactor *a* serves to hold the relay K1 closed after the switch TS is released and opened and the motor **80** therefore continues running.

The motor RM for driving the feed rollers **184, 186, 222** and **290** is started by closing a switch RS to energize the coil B and closing the relay K2. The circuits controlling the feed motor RM are so connected that the feed rollers may be stopped almost instantaneously. This is performed by the opening of the safety switch SS (when leather is caught or buckled under the bar **404**) to de-energize the coils B and D. This causes the contactor *m* of the relay K4 to close, and because of the action of a dash-pot DP, the contactor *n* remains closed for a time depending upon how fast air is permitted to flow into the dash-pot cylinder. While the contactors *m* and *n* are closed the circuit is completed through the relay K3 to reverse the current to the motor RM. This brings the motor RM, and hence the feed rollers, quickly to a stop. Preferably the dash-pot DP air inlet is adjusted so that the contactor *n* will open just before the motor RM is completely stopped and thereby remove the reverse voltage so that the feed rolls are not driven in directions opposite to those in feeding the work. However, the dash-pot DP air inlet may be adjusted so that the contactor *n* will remain closed for a longer period, allowing the motor RM to come to a stop and then drive the feed rolls in a reverse direction for a predeterminable period, thereby withdrawing the fouled work piece from the work treating zone automatically.

Where the dash-pot DP is adjusted so that the feed rolls are not driven in reverse directions a button or switch JS is provided which the operator may use in his discretion in order to free jammed work pieces and extricate them from the machine. Closing the switch JS serves to energize the coil C and the feed rolls are reversed as long as the switch JS is depressed.

Only the switch SS is shown in the drawings as placed on the machine but the switches SB, TS, RS and JS may all be grouped at the front of the machine or on the shelf **30** within convenient access for the operator.

Having described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for compacting hides, a frame, means on said frame for feeding a spread-out work piece in a

shallow path leading through the machine, reciprocating tools and cooperatively arranged anvils supported on said frame for treating said work in a given zone of said path, a work detector contiguous to and on the in-feed side of said zone, and mechanism for controlling said feeding means, said mechanism being arranged to be operated by said work detector.

2. In a machine for compacting hides, a frame, means on said frame for feeding a spread-out work piece in a shallow path leading through the machine, reciprocating tools and cooperatively arranged anvils supported on said frame for treating said work in a given zone of said path, a work detector contiguous to and on the in-feed side of said zone, and mechanism for controlling said feeding means, said mechanism being arranged to be operated by said work detector to reverse the said feeding means.

3. In a machine for compacting hides, a frame, power operated rolls on said frame for feeding a spread-out work piece through a work treating zone within the machine, a work detector of arcuate form mounted contiguous to and substantially concentric with one of said feed rolls, and mechanism for controlling said power operated feeding rolls, said mechanism including a switch arranged to be operated by said work detector.

No references cited.