Dec. 30, 1947. D. EDGAR 2,433,352

MACHINE FOR TREATING SHEET MATERIALS

Filed March 22, 1946 4 Sheets-Sheet 1

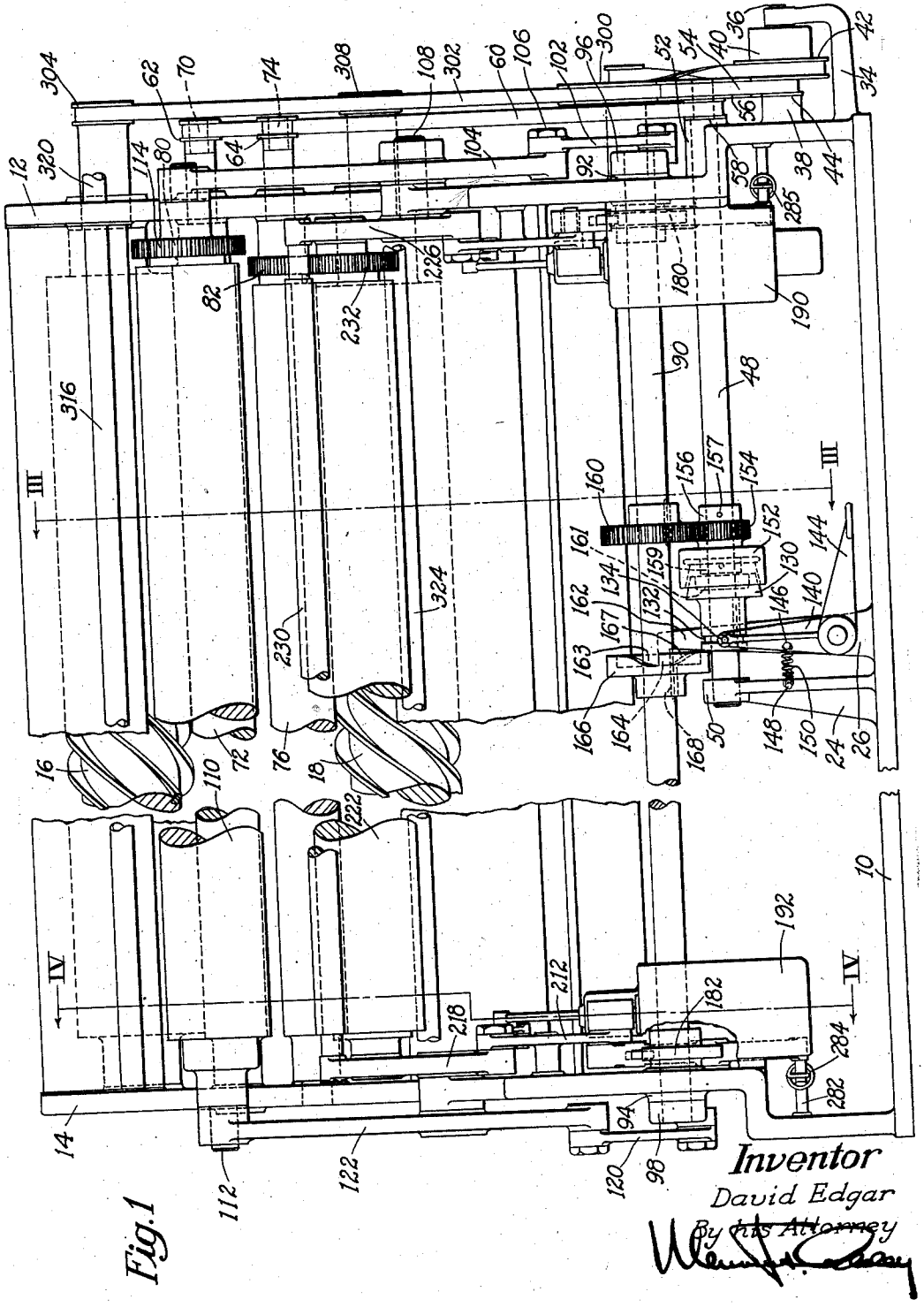


Fig. 1

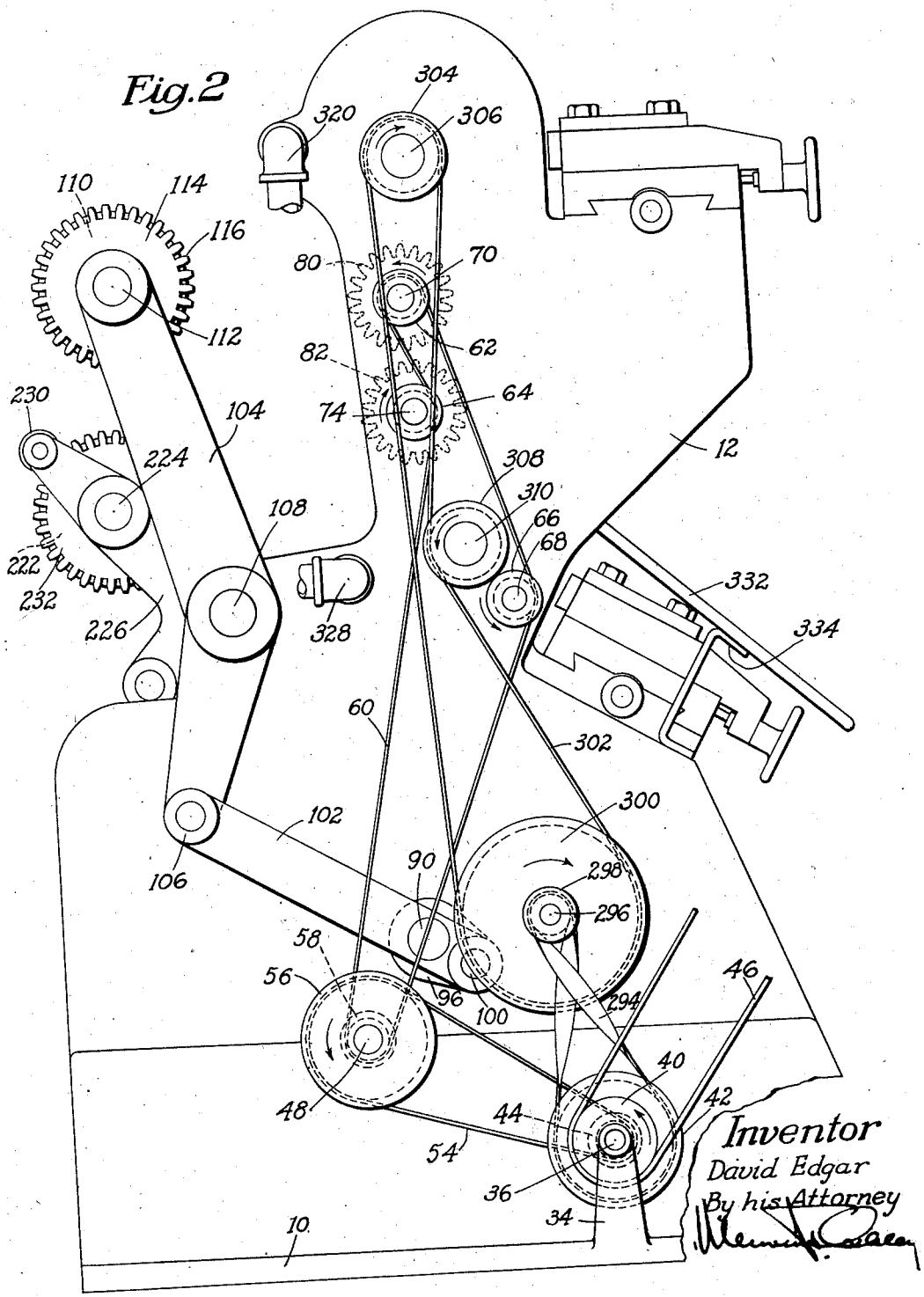
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MACHINE FOR TREATING SHEET MATERIALS

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Fig. 2



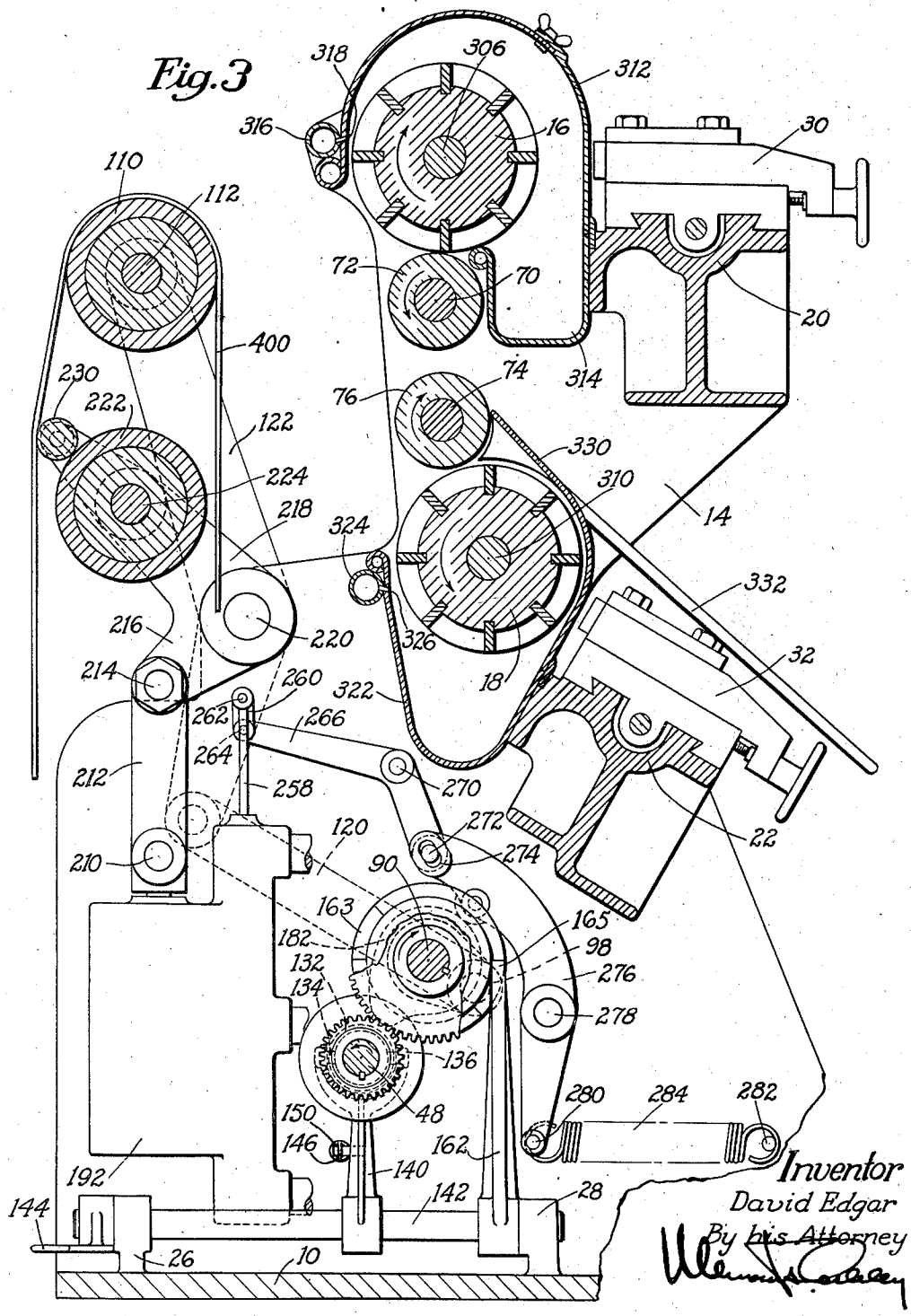
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MACHINE FOR TREATING SHEET MATERIALS

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Fig. 3



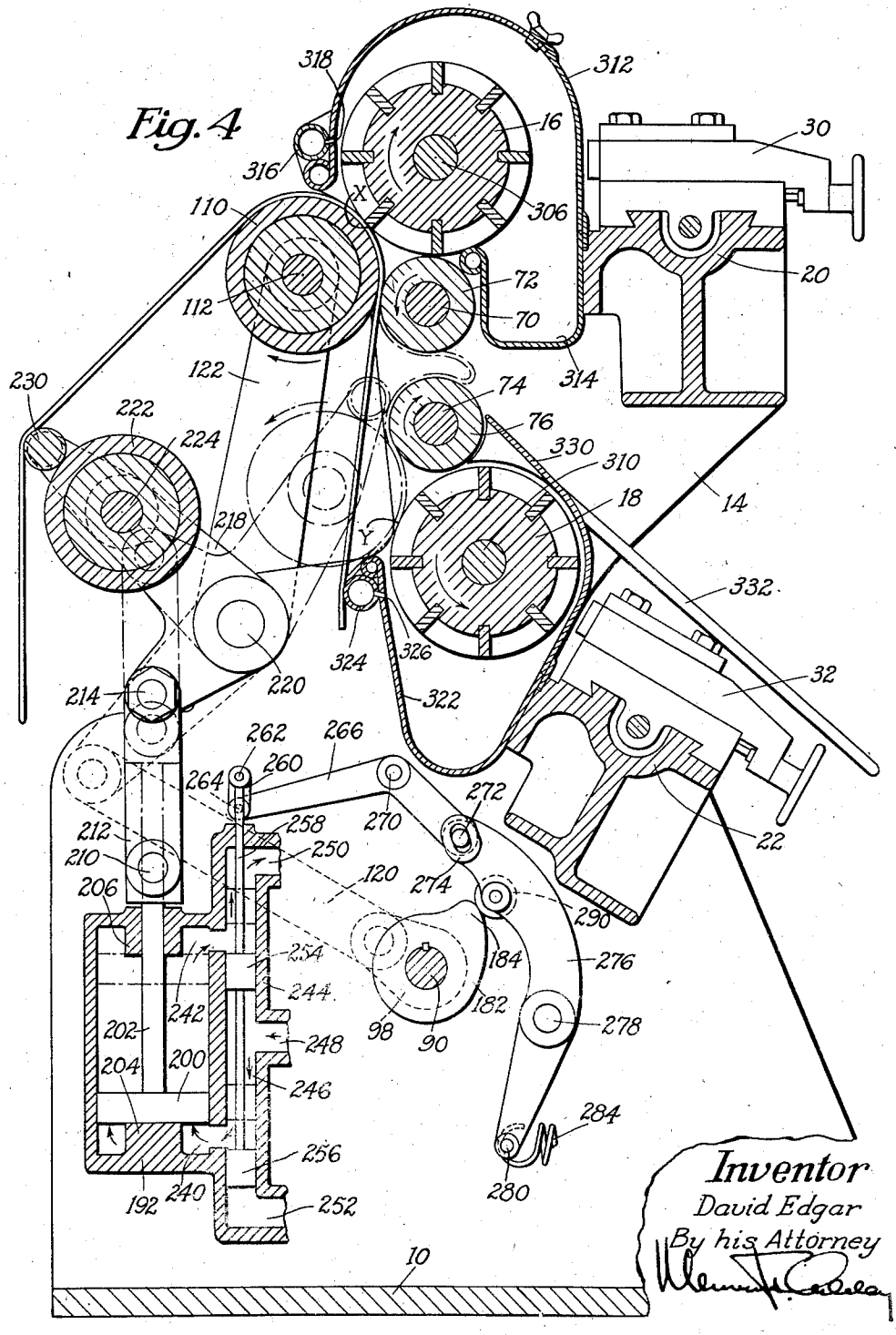
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Fig. 4



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MACHINE FOR TREATING SHEET MATERIALS

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Application March 22, 1946, Serial No. 656,317

9 Claims. (Cl. 69—42)

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This invention relates to improvements in machines for treating sheet materials such as hides, skins, and leather. While the invention is illustrated as embodied in a machine for performing fleshing operations upon hides and skins, it is to be understood that the invention is not limited to use in machines of that specific type. In the tanning industry the novel and useful aspects of the invention are also applicable for glazing, unhairing, putting-out, seasoning and other operations.

Sheet materials, such as skins, are passed through numerous individual operations and numerous machines before they are finished. Fleshing, for example, is sometimes repeated three times in a tannery and almost always is performed twice for each work piece. Fleshing machines and many of the other machines conventionally perform an operation on one half of the skin after which the operator turns the skin around for work to be done on the other half. The reversal of the skin, the second feeding operation and the final withdrawal of the treated work piece are steps which consume considerable time and effort on the part of the operator. In view of the large number of such operations presently required in a tannery there is a need for machines in which the work performed on each work piece consumes a minimum of time; in which the number of operations required to handle each work piece is reduced; and and in which the handling is of such nature as to be convenient and safe for the operator.

It is an object of this invention to provide an improved multiple cylinder or roll machine capable of performing a complete operation on a work piece of sheet material during a single passage of the work piece through the machine, different portions of the work piece being treated simultaneously and the arrangement of the machine parts being convenient as well as safe for the operator.

It is an important feature of the invention to provide a machine in which the work piece may be hung over a bed roll within convenient reach of the operator and from which bed roll different portions of the work piece are presented for simultaneous treatment. Another feature comprises an arrangement of two sets of cooperating rolls for simultaneously treating different portions of a work piece and then discharging a central portion of the work piece first.

These and other important features of the invention will now be described in detail in the

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specification and pointed out in the appended claims.

In the drawings,

Fig. 1 is an elevational view of the front of a machine in which the present invention is embodied, portions of the structure being broken away for purposes of illustration;

Fig. 2 is an elevational view of the side of the machine at which the mechanical power is applied;

Fig. 3 is a sectional view along the line III—III of Fig. 1 with a work piece introduced and positioned for subsequent treatment; and

Fig. 4 is a sectional view along the line IV—IV of Fig. 1 but with the parts in work treating positions.

The illustrated machine comprises a base plate 10 and vertical end plates 12 and 14 provided with suitable bearings for two rotatable work treating rolls 16 and 18. The work treating roll 16 is located above the work treating roll 18 and both of these rolls are provided with work treating tools such as blades suitable for performing the operation desired. The end plates 12 and 14 of the frame are braced and rigidly joined together by horizontal frame members or H-sections 20 and 22 (Figs. 3 and 4). The base plate 10 approximately midway its length is provided with a vertical bracket 24 (Fig. 1) and also the smaller brackets 26 and 28 (Fig. 3) for purposes subsequently to be described. The frame members 20 and 22 not only serve as stiffening members for the frame but also conveniently serve as supporting members for two emery brick grinders 30 and 32. These brick grinders are conventional devices used for sharpening blades on machines of the type herein described and accordingly they are not herein shown and described in detail since they form no part of the present invention.

At one end of the base plate 10 and exterior to the end plate 12 is formed an angle bracket 34 (Figs. 1 and 2) serving as a support and bearing for one end of a short shaft 36. The other end of the shaft 36 is supported for rotation within a boss 38 integral with the lower portion of the end plate 12. Keyed to the shaft 36 are three pulleys 40, 42 and 44 (Figs. 1 and 2). Motive power is transmitted to the machine by a belt 46 which drives the pulley 40 in the direction shown by the arrow in Fig. 2. A second shaft 48 (Fig. 1) is mounted to rotate within a bearing 50 of the vertical bracket 24 and also within a boss 52 of the end plate 12. This shaft 48 is driven in the direction shown by the arrow in

Fig. 2 by a belt 54 adapted to transmit power from the driving pulley 44 to a pulley 56 keyed to the shaft 48. Also keyed to the shaft 48 is a small pulley 58 which serves as a driving pulley for an endless belt 60, this belt in turn serving to drive two small pulleys 62 and 64 in opposite directions as shown by the arrows in Fig. 2. The belt 60 also runs over an idler pulley 66 mounted on a short shaft 68 protruding from the end plate 12. The small pulley 62 is keyed to a shaft 70 passing through an upper discharge roll 72. The pulley 64 is keyed to a shaft 74 passing through a lower discharge roll 76. Both discharge rolls 72 and 76 are preferably provided with a rubber covering and it will be understood that the shafts 70 and 74 are suitably journaled for rotation in the two end plates 12 and 14. One end of the upper discharge roll 72 is provided with a gear 80 (Figs. 1 and 2) having teeth of extended length for a purpose to be described. The lower discharge roll 76 is provided with a gear 82 also having teeth of extended length. The two discharge rolls 72 and 76 are so related that a substantial clearance exists between them. This clearance should be of such a dimension that a doubled work piece would not be adversely affected due to a folding or other undesirable action.

At a level somewhat above that of shaft 48 and journaled within the bosses 92 and 94 of the end plates 12 and 14 is mounted the longer shaft 90. Cranks 96 and 98 are keyed to the ends of the shaft 90, as shown in Fig. 1, and at the end 100 (Fig. 2) of the crank 96, is pivoted a link 102 joined to a bell crank 104 by a pivoted connection 106. The bell crank 104 is mounted to rotate on a short shaft 108 protruding from the end plate 12. A rubber covered bed roll 110 is mounted on a shaft 112 one end of which is journaled in the upper end of the bell crank 104. The roll 110 carries a gear 114 having teeth 116 of extended length. The crank 98 at the left-hand end of the machine is connected to link 120 which in turn is pivoted to a bell crank 122, these last two elements being similar in all respects to the link 102 and bell crank 104 at the other end of the machine, the upper end of the bell crank 122 serving as a bearing for the left-hand end of the shaft 112 passing through the rubber bed roll 110.

The shaft 48 has keyed thereto a conical clutch member 130 provided with an annular groove 132 (Figs. 1 and 3) into which extend short pins 134 and 136 mounted in the upper ends of the arms of a forked vertical lever 140 which is secured to a shaft 142 rotatably mounted in suitable bearings in the two brackets 26 and 28. A treadle 144 is carried by and keyed to one end of the treadle shaft 142. A pin 146 extends from the bracket 140 parallel to the shaft 142 and another pin 148 extends from the bracket 24 parallel with the pin 146. A spring 150 is mounted in tension between the two pins 146 and 148. Freely rotatable on the shaft 48 is a clutch member 152 (Fig. 1) bearing a gear 154 and a thrust ring 156 is pinned at 157 to the shaft 48, preventing movement of the clutch member 152 to the right, as viewed in Fig. 1. A second ring 159 is pinned to the shaft 48 and extends within a chamber 161 of the clutch member 152 to aid in retaining the latter in place. A gear 160 is placed in position meshed with the gear 154 and keyed to the shaft 90. The treadle shaft 142 has keyed thereto a second bracket or arm 162 having a right angle hook 164 (Fig. 1) at its upper end. A circular cam member 166, which may also be termed a

stop member, is keyed at 168 to the shaft 90 in such position as to cooperate with the hook 164 of the arm 162 in a manner to be described. This cam member has two spaced recesses 163 and 165 (Fig. 3), each of said recesses having one square shoulder and one curved shoulder as can be seen in Fig. 1. Near each end of shaft 90 but within the end plates 12 and 14 are keyed cam members 180 and 182 (Fig. 1). These cam members are similar in configuration and their shape is shown by the cam member 182 in Fig. 4. As will be seen, each cam member is cylindrical for the largest part of its circumference and is provided with a single projection 184.

Each end of the machine is provided with a hydraulic or pressure fluid mechanism (Fig. 1), the right-hand mechanism being shown at 190 and the left-hand mechanism at 192. Since these mechanisms and their linkages are similar only one of them need be referred to herein in detail. A sectional view of the mechanism 192 is shown in Fig. 4. This mechanism comprises a cylinder in which a piston 200 is arranged to reciprocate and which is connected to a piston rod 202. The range of travel of the piston 200 is determined by two bosses 204 and 206 located within the cylinder. The piston rod 202 extends through the boss 206 (Fig. 4) and is joined at 210 (Fig. 3) to a pivoting link 212 linked at 214 to one arm 216 of a bell crank lever 218. This bell crank lever is mounted to journal on a short shaft 220 (Fig. 3) extending from the end plate 14 and provides a bearing for one end of a shaft 224 supporting a second rubber covered bed roll 222. As will be understood, the bed roll 222 is supported at the other end of the machine by a bearing formed in one arm of a bell crank 226 (Figs. 1 and 2), which is similar to the bell crank 218. Journaled in the upper end of each bell crank lever 218, 226 is a small diameter roll 230. The rubber bed roll 222 has associated therewith a gear 232 having teeth of extended length. As will be understood, the gear 114 of the bed roll 110 is in the same plane as the gear 80 of the discharge roll 72 and the gear 232 of the bed roll 222 is also in the same plane as the gear 82 of the discharge roll 76. The teeth of the latter four gears are of extended length for the reason that the work being treated may vary in thickness and the long gear teeth insure proper meshing despite such variation. The hydraulic device 192 (Fig. 4) is provided with ports 240 and 242, one at each end of the cylinder and also a manifold 244 extending lengthwise of the cylinder. This manifold 244 has a long bore 246 provided with a port 248 through which fluid under pressure may enter from a convenient source, and with two exhaust ports 250 and 252. A valve member having lands 254 and 256 on a valve rod 258 is closely fitted for sliding movement within the bore 246. The rod 258 extends out through one end of the manifold 244 and is joined by means of a link 260 at 262 and 264 to one arm of a bell crank 266. The bell crank 266 is mounted for rotation on a short shaft 270 extending from the end plate 14 and the shorter leg of the bell crank 266 bears a pin 272 arranged for movement in a slot 274 in the upper end of a curved lever 276. Lever 276 is mounted for rotation on a short shaft 278 extending from the end plate 14 and the lower end of the lever 276 is provided with a pin 280. A pin 282 (Fig. 3) extends from the end wall 14 and a coil spring 284 is mounted in tension between the two pins 280 and 282. Near the upper end of the curved lever 276 a roller 290 is jour-

naled and is so located as to engage the cam 182. As aforementioned, these parts are duplicated at the other or right-hand end of the machine.

The work treating rolls 16 and 18 are rotated in opposite directions by a belt drive. As stated above, the mechanical power is transmitted to the machine by means of the belt 46. Pulley 42 is therefore rotated in the direction shown by the arrow in Fig. 2 and a crossed belt 294 is mounted thereon to rotate a shaft 296 in the reverse direction by means of a small pulley 298. The shaft 296 also carries keyed thereto a large pulley 300 for driving an endless belt 302, this belt engaging the pulley 304 keyed to the shaft 306 of the upper work treating roll 16 and also the pulley 308 keyed to the shaft 310 of the lower work treating roll 18.

The upper work treating roll 16 is provided with a removable metal cover 312 (Figs. 3 and 4) and this may carry a lower trough-like portion 314 for removing waste products. One side of the cover 312 is provided with a pipe line 316 having orifices 318 through which water may be directed upon the treating roll 16. This pipe line 316 may extend out through the end plate 12, as shown at 320 in Fig. 2. The lower work treating roll 18 is also provided with a trough-like member 322 of somewhat different configuration. One side of the member 322 is provided with a pipe line 324 having orifices 326 for directing water against the lower treating roll 18. This pipe line 324 may extend through the end wall 12, as shown at 328 in Fig. 2. Waste material may be removed from the two troughs by conduits not shown in the drawings. The upper end of the lower trough or cover member 322 is extended at 330 to form a guide means for work pieces discharged from between the discharge rolls 72 and 76. An inclined platform or table 332 is mounted in a suitable manner on the machine frame in alinement with the extended portion 330 of the lower trough member 322. Fig. 2 shows a suitable bracket 334 by means of which one end or portion of the platform 332 is supported.

In the specific embodiment of the invention as herein disclosed, both purely mechanical power and power by application of fluid pressure are utilized. Because of its flexibility in adapting it to the situation at hand, such an arrangement is preferred. It is apparent, however, that various arrangements may be used for the application of power without departing from the principles of operation herein disclosed.

In operation the shaft 48 will be constantly running because of the power applied through belt 46, pulleys 40 and 44, belt 54 and pulley 56. Figs. 2 and 3 show the machine parts in open position—that is—in position for receiving a fresh work piece for treatment. The workman places the work piece 400 over the bed roll 110 with substantial portions thereof extending down both sides of the roll, as shown in Fig. 3. The shaft 48, work treating rolls 16 and 18 as well as the discharge rolls 72 and 76 are constantly running in the directions shown by the arrows because of the direct belt and pulley drives from the shaft 36. The operator steps on the treadle 144 with the result that clutch member 130 (Fig. 1) will move to the right and engage clutch member 152 thereby driving the shaft 90 through gears 154 and 160. In moving the clutch member 130 to the right the hook 164 emerges from the recess 165 in the circular member 166 and permits the shaft 90 to rotate. As the operator releases the treadle 144 promptly after depressing it, the clutch

remains engaged because of the engagement of the hook 164 with the exterior surface 167 of the cylindrical member 166. Resiliency of the clutch facing or lining may serve to aid in such engagement. After the shaft 90 has rotated one-half a revolution the hook 164 will slip into the opposite recess 163 bringing about the disengagement of the clutch and stopping rotation of the shaft 90. This clutch and stop arrangement is conventional but it can be clearly seen that each time the treadle 144 is depressed and released the shaft 90 will be rotated through one-half of a revolution and the machine will be automatically brought to a stop. As stated above, the operator desiring to treat the work piece, steps on the treadle 144. The result is that the cranks 96 and 98 will rotate 180° from their positions, as shown by crank 96 in Fig. 2. This will turn the upper ends of the bell cranks 104 and 122 toward the work treating roll 16 and mesh the teeth of gear 114 with the teeth of gear 80 and the work piece 400 will commence to be worked upon by the blades of the work treating roll 16. That half revolution of the shaft 90 will also cause the projections of the two cam members 180 and 182 to engage their corresponding rollers and lower the valve member lands 254 and 256 of mechanism 192 and the lands of mechanism 190 into their positions as shown in Fig. 4. The result will be (taking mechanism 192 as an example of the operation of mechanism 190 as well) that pressure fluid entering at port 248 will pass through the port 240 and push the piston 200 into its uppermost position. The lower bed roll 222 will, therefore, hold one portion of the work piece 400 against the work treating roll 18 and also press the work piece against the lower discharge roll 76, as shown by the dot-and-dash lines in Fig. 4. The teeth of gears 232 and 82 will mesh, driving bed roll 222 counterclockwise as shown by the arrow in Fig. 4. As a consequence, different portions of the work piece 400 are treated simultaneously and the central portion of the work piece will bend or form a loop and be discharged between the two discharge rolls 72 and 76. After completion of the treatment of that entire particular work piece the piece will slide down the table 332 into some convenient receptacle, not shown.

During the above-mentioned operation, the parts of the machine move automatically in a definite sequence. The bed roll 222 is not permitted to come in contact with the work until the work has traveled over the bed roll 110 a distance preferably somewhat in excess of the distance between points X and Y (Fig. 4) on the treating rolls 16 and 18 respectively. This is accomplished by controlling the flow of fluid to the under side of the pistons in the fluid pressure mechanisms 190 and 192 and also because of the contour of the cams 180 and 182. The result is that the work treating roll 16 will treat the trailing half or substantial portion of the work piece and when the leading edge of that half or portion has reached or slightly passed the point Y, the treating roll 18 will begin to treat the portion not passed nor to be passed in contact with the tools of roll 16. From that time, the treating rolls 16 and 18 will work simultaneously and the work piece will be ejected fully treated.

The pressure of the fluid in mechanisms 190 and 192 should be such as to hold the roll 222 in working position with sufficient firmness to render effective the particular type of tools used.

In order to prepare the machine for reception

of the next work piece the workman merely steps on the treadle 144 momentarily giving the shaft 90 another half revolution and thereby bringing bed rolls 110 and 222 back into their open positions, as shown in Figs. 2 and 3. During the latter half revolution of shaft 90 (terminated by the hook 164 entering into the recess 165), the cams 180 and 182 will rotate to positions (see the position of cam 182 in Fig. 3) whereby the action of horizontal coil springs 284, 285 (Fig. 1) will lift the valve lands controlling the pistons of the fluid pressure mechanisms 190 and 192. Fig. 4 shows, by means of dash lines, the raised positions of lands 254 and 256. While so positioned, the fluid pressure will enter through ports 240 and 242 and lower the piston 200. As a consequence, the bed roll 222 is moved to the open position by the downward travel of the pistons in both fluid pressure mechanisms 190 and 192 and this motion may be relatively rapid, if so desired. It is preferred, however, to regulate the speed of motion and this can be done by using throttling valves (not shown in the drawings) for the fluid exhaust passages of mechanisms 190 and 192. Obviously, such passages may be designed for a predetermined speed thereby eliminating the use of regulating valves. Simultaneously with the outward swing of bed roll 222, the bed roll 110 will swing outwardly because of the action of cranks 96 and 98 and their associated linkages.

The structure of the machine is such that it need not be installed in a position beneath the level of the operator but may be on the same level with him. The operator approaches the machine from the side and is enabled to place work in the machine in a simple as well as convenient manner. The time of treatment for each work piece is minimized as each piece is handled only once for the given operation to be performed. It should also be noted that the parts of the machine most dangerous to life and limb are located in positions remote from the operator—those parts are the innermost parts of the machine.

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

1. In a machine for treating sheet material, two work treating rolls, a discharge roll adjacent to each work treating roll, a first bed roll at one side of said two treating rolls and adapted to hold a portion of a work piece in engagement with one of said treating rolls and its adjacent discharge roll, and a second bed roll for holding another portion of the said work piece in engagement with the other treating roll and its adjacent discharge roll, the two discharge rolls being arranged upon rotation in opposite directions to bend and discharge the work piece between them.

2. In a machine for treating sheet material, two sets of cooperating rolls, each set including a work treating roll, a discharge roll and a bed roll, the discharge roll of one set being adjacent to and above the discharge roll of the other set, and means for moving each bed roll into and away from its operative position with respect to the other rolls of its set.

3. In a machine for treating sheet material, two sets of cooperating rolls, each set including a work treating roll, a discharge roll and a bed roll, the discharge roll of one set being adjacent to and above the discharge roll of the other set, means for guiding sheet material from between the two discharge rolls, and means for moving each bed roll into and away from its operative position with respect to the other rolls of its set.

4. In a machine for treating sheet material, two sets of cooperating rolls, each set including a work treating roll, a discharge roll and a bed roll, one set being located above the other, means for moving the bed roll of the upper set into operative position with respect to the other rolls of its set, and separate means for subsequently moving the bed roll of the lower set into its operative position with respect to the other rolls of its set.

5. In a machine for treating sheet material, two work treating rolls, a discharge roll adjacent to each work treating roll, a first bed roll at one side of said two treating rolls and translatable from a loading position to a position for holding a portion of a work piece in engagement with one of said treating rolls and its adjacent discharge roll, and a second bed roll translatable from an inactive position to a position for holding another portion of the said work piece in engagement with the other treating roll and its adjacent discharge roll, the translation of said second bed roll being effected by fluid pressure means automatically controlled, and the two discharge rolls being arranged upon rotation in opposite directions to bend and discharge the work piece between them.

6. In a machine for treating sheet material, two work treating rolls arranged one above the other, a discharge roll adjacent to each work treating roll, a first bed roll for holding a portion of a work piece in engagement with one of said treating rolls and its adjacent discharge roll, and a second bed roll for holding another portion of the said work piece in engagement with the lower treating roll and its adjacent discharge roll, the two discharge rolls being arranged upon rotation in opposite directions to bend and discharge the work piece between them.

7. In a machine for treating sheet material, two sets of cooperating rolls, each set including a work treating roll, a discharge roll and a bed roll, the discharge roll of one set being just above the discharge roll of the other set for the discharge of a double thickness of sheet material between them, and means for moving first one bed roll into its operative position with respect to the rolls of its set and for then moving the other bed roll into its operative position with respect to the rolls of its set.

8. In a machine for treating sheet material, two sets of cooperating rolls, each set including a work treating roll, a discharge roll and a bed roll, one set being located above the other, means for moving the bed roll of the upper set into operative position with respect to the other rolls of its set, and separate means for automatically moving the bed roll of the lower set into its operative position with respect to the other rolls of its set at a predetermined time subsequent to the initiation of operation of the upper set.

9. In a machine for treating sheet material, two sets of cooperating rolls, each set including a work treating roll, a discharge roll and a bed roll, the discharge roll of one set being adjacent to and above the discharge roll of the other set, and means for moving each bed roll into its operative position with respect to the other rolls of its set in a predetermined sequence.

DAVID EDGAR.