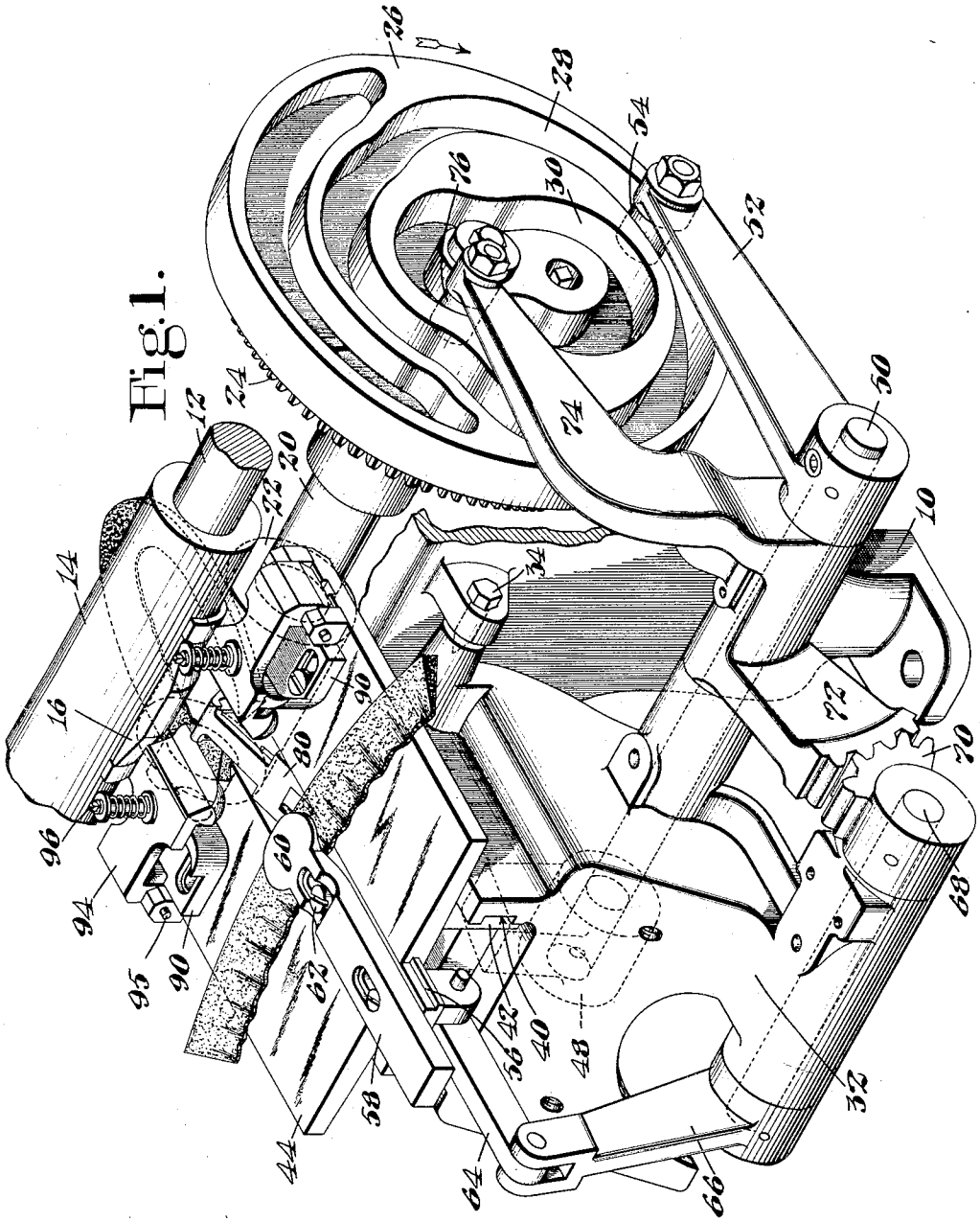
Aug. 1, 1933. F. ASHWORTH 1,920,235

RAND FORMING MACHINE

Filed Sept. 4, 1931 4 Sheets-Sheet 1

Fig. 1.



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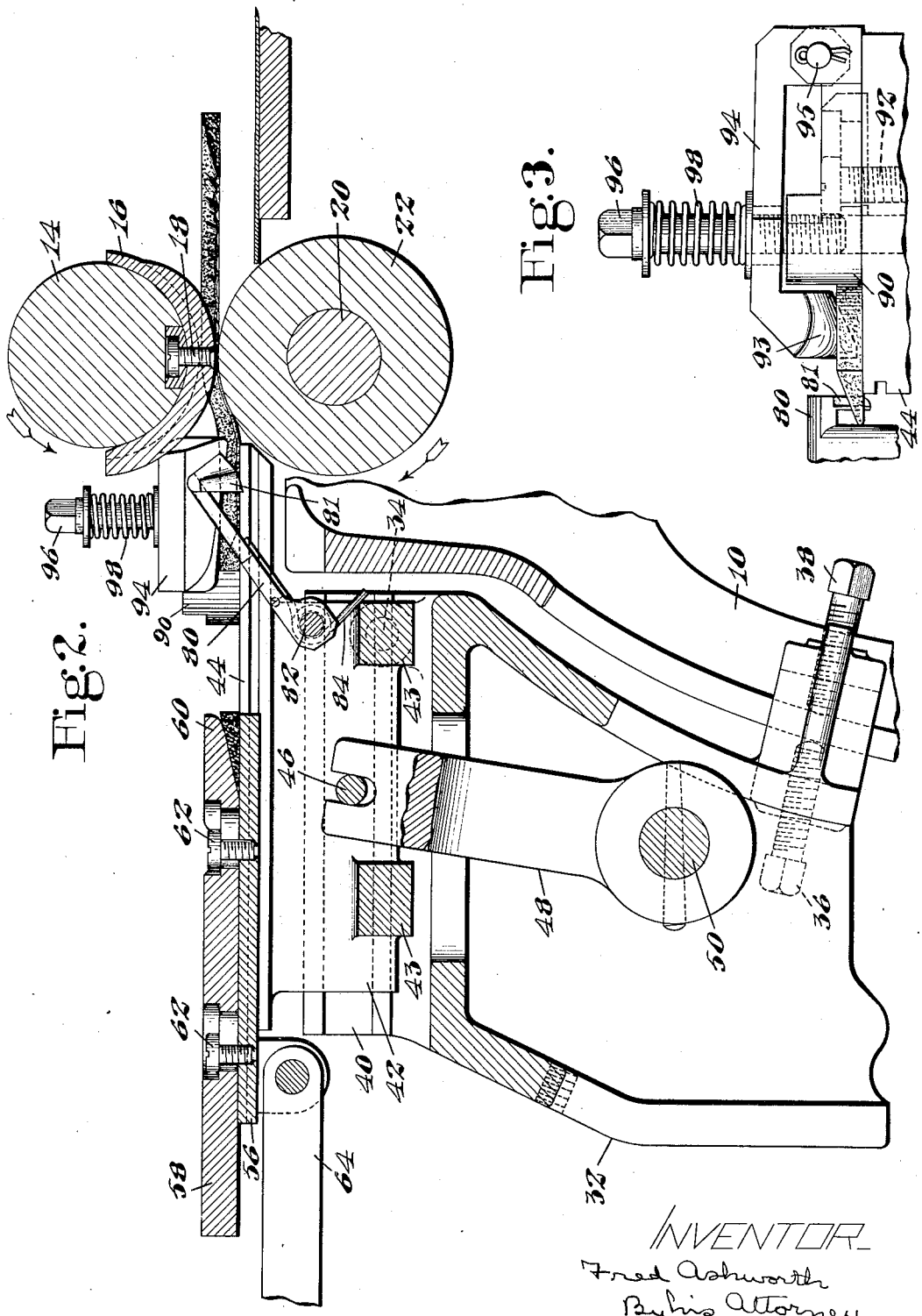

Fig. 2.

Fig. 3.

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Fig. 4.

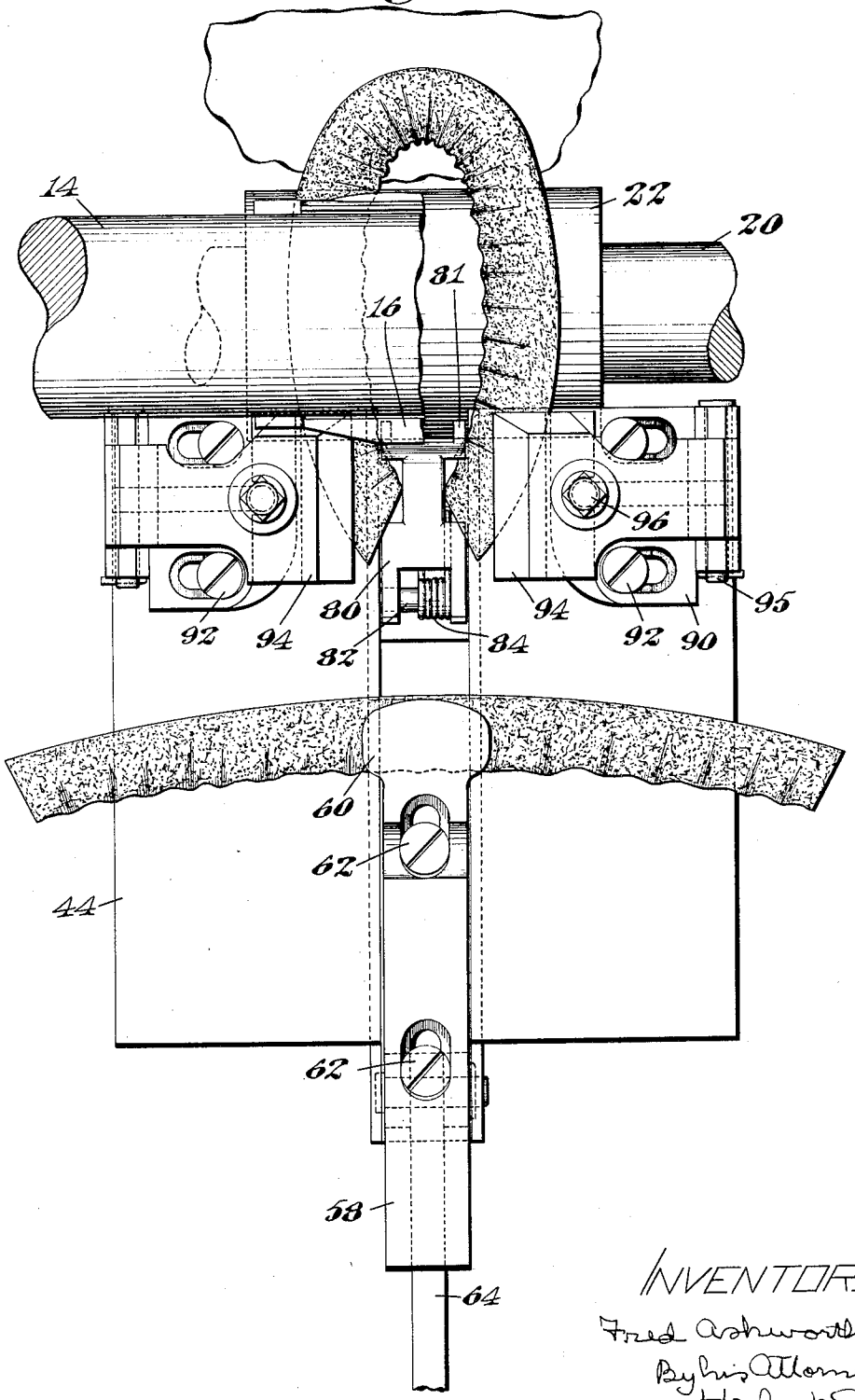

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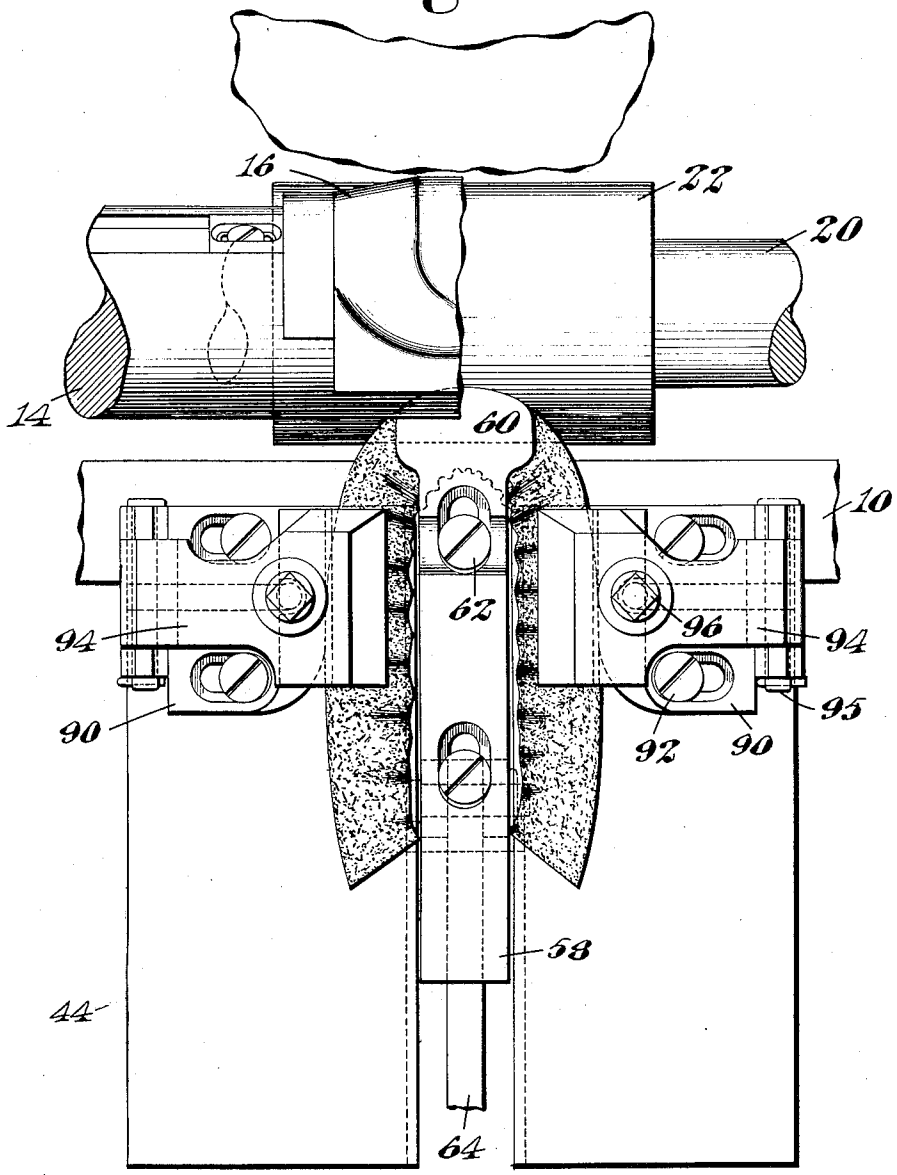
Fig.5.



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Patented Aug. 1, 1933

1,920,235

UNITED STATES PATENT OFFICE

1,920,235

RAND FORMING MACHINE

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Application September 4, 1931. Serial No. 561,205

16 Claims. (Cl. 12—67.1.)

This invention relates to rand forming machines of the type wherein a rand strip is first bent into U-shaped contour and then set or molded in shape by cooperating forming rolls. Such a machine is disclosed in United States Letters Patent No. 1,115,037 granted October 27, 1914 on the application of E. A. Tripp, and in one aspect the present invention consists in a further development or carrying forward of the machine of that patent with a view to simplifying its construction, rendering it more compact and convenient in design and more rapid and accurate in its operation.

With these ends in view, an important feature of the invention consists in novel bending devices constructed and arranged not only to cooperate in bending the straight rand strip into a U-shaped contour, but also to hold in position the bent rand during one stage of its feeding movement to the forming rolls. The desired results are secured, as herein shown, by providing each bending device with a presser member which is arranged to act independently upon one side only of the rand as presented for the bending operation. The presser members are consequently adapted to accommodate themselves independently to the thickness of that side of the rand presented to them with a result that the rand is gripped with equal pressure at two laterally spaced points and may thus be advanced accurately and without danger of its displacement to the forming rolls. Preferably and as herein shown, each presser member is mounted upon the bending device with which it is associated and may be adjusted with the bending device when the latter is moved without in any way disturbing the operative relation of these elements.

Another feature of my invention consists in an auxiliary and angularly adjustable frame upon which the feeding and rand bending instrumentalities of the machine are mounted and which may be adjusted with respect to the feeding rolls so that the path and angle of presentation thereto of the bent rand may be varied and regulated in accordance with the requirements of different materials and shapes of rand. This feature increases the range of adaptability and scope of the rand forming machine herein disclosed as compared with those heretofore available, and also adapts it for more accurate operation under the various conditions encountered in commercial manufacture.

Another feature of my invention consists in a spreading device operative to control the direction of movement of the two opposite sides of a bent rand as the rand is delivered to the forming rolls. In machines heretofore available the straight sides of the rand have been likely to become displaced even to the extent of overlapping each other in reaching the forming rolls. The present invention contemplates a spreading device arranged to be automatically interposed between the sides of the bent rand during this portion of the cycle and acting positively to limit their approaching movement.

The machine herein shown employs an auxiliary feeding device or pusher which is utilized to advance the rand strip to the bending devices. The spreader is preferably arranged in line with the pusher and may be displaced by the latter or by the rand itself into an inoperative position to permit the passage of the curved portion of the rand. After the rand has passed and the pusher has been retracted, the spreader immediately assumes its operative position between the sides of the rand. Such cooperative relation of feeding and spreading devices is believed to be novel and comprises a further feature of the invention.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof, selected for purposes of illustration and shown in the accompanying drawings, in which:—

Fig. 1 is a view in perspective of the operating mechanism of the machine with certain parts broken away.

Fig. 2 is a similar view in longitudinal section.

Fig. 3 is a view in side elevation on an enlarged scale of one of the rand bending devices.

Fig. 4 is a plan view of the parts shown in Fig. 2, showing the feed table at the inner limit of its movement, and

Fig. 5 is a similar view showing the feed table at the outward limit of its movement.

The invention is herein shown as embodied in a machine employing rand forming rolls of well-known construction and these may be mounted and driven as is customary in machines of this general type. In the drawings, therefore, a portion only of the forming rolls is shown and the bearings and driving mechanism are omitted for the sake of clearness. In practice these may correspond to the similar parts disclosed in Letters Patent No. 1,115,037 above identified.

The machine frame 10 comprises a box-shaped casting and is provided with suitable bearings, not shown, for the driven top shaft 12 which carries the upper rolls 14 having a die projection 16 removably secured to its periphery by a

clamping screw 18. The lower shaft 20 is suitably journalled below the shaft 12 and provided with the lower rand forming roll 22. The die projection 16 is replaceable and is of the shape and size desired for handling the rands which it is desired to form and in this operation it engages and shapes the inner beveled surface of the U-shaped rand. The lower roll 22 has a cylindrical surface and is adapted to engage and flatten the lower face of the rand. It will be understood that these two rolls are positively driven at the same peripheral speed and are maintained in intimate yielding engagement by spring mechanism not herein shown. They cooperate to engage a previously bent rand and feed it between them under sufficient rolling pressure to set or mold the rand permanently in the shape which has been imparted to it before presentation.

The lower roll shaft 20 carries at its right hand end, as seen in Fig. 1, a gear 24 which is fast to a cam disk 26. The gear 24 is a part of the gear train which drives the shaft 20. The cam disk 26 rotates with the shaft in a clock-wise direction and is provided in its outer face with an outer cam track 28 and an inner cam track 30 which are utilized to operate the rand-feeding instrumentalities, as will presently appear.

The rand feeding and bending elements of the machine are mounted upon an auxiliary frame 32 which is pivotally secured at its upper inner corner to the machine frame 10 by cone-pointed screws 34 threaded into lugs projecting from the rear face of the frame 10, as shown in Fig. 1, and entering corresponding sockets in bosses formed integrally with the auxiliary frame 32. The body of the auxiliary frame 32 is hollow and the frame is adjustably connected to the machine frame 10 by adjusting screws 36 and 38, shown in Fig. 2. By manipulating these screws the angular position of the auxiliary frame 32 may be adjusted about the axis of the screws 34 and the proper relation secured between the path of movement of the feed table and the cooperating forming rolls 14 and 22. When the frame 32 has once been properly adjusted for the requirements of the work in hand, it is rigidly clamped in position by tightening the screws 36 and 38 against the opposite sides of the forward wall of the frame 10.

The auxiliary frame 32 is provided in its upper face with horizontal ways 40 for a feed carriage 42 comprising two side members spaced apart by transverse struts 43 cast integral with the side members. Secured to the upper face of the feed carriage 42 is a flat plate or feed table 44 of sufficient size to receive conveniently the unformed rand strip, as shown in Figs. 1 and 4, when presented thereto by the operator.

The feed table 44 is reciprocated toward and from the rand forming rolls by mechanism which will now be described:—A pin 46 extends between the side members of the feed carriage 42 and this is received in the forked end of an upstanding arm 48 pinned at its lower end to a transverse cam shaft 50 which is journalled in suitable bearings formed in the auxiliary frame 32. At its right hand end the cam shaft 50 is pinned to a cam arm 52 carrying at its free end a cam roll 54 which runs in the outer cam track 28 of the cam disk 26. The design of the cam track 28 is such as first to retract and then advance the feed table 44 in proper timed relation in the cycle of the machine. The adjusting movement of the auxiliary frame 32 moves the cam shaft 50 slightly with respect to the cam disk 26, but not sufficiently to disturb the timing of the cam-operated parts therein.

The feed table 44 is provided in its face with a central longitudinal slot or opening in which are formed ways for a slide 56 to which is adjustably secured an auxiliary feeding device or pusher 58. The purpose of the pusher is to engage the straight, or substantially straight, rand strip as presented upon the feed table 44 by the operator and to advance it upon the feed table to effect the bending operation. For this purpose it is provided with an enlarged head 60 having a beveled undercut face shaped to fit the beveled upper face of the rand strip. The pusher 58 is longitudinally slotted and secured to the slide 56 by clamping screws 62. By loosening these screws the longitudinal position of the pusher upon its slide may be adjusted and the effective path of its movement thus varied and regulated.

The slide 56 is provided at its outer end with downwardly extending ears to which is connected a link 64. This in turn is connected to the upper end of a forked arm 66 which is pinned to one end of a rock shaft 68 journalled in suitable bearings formed in the auxiliary frame 32. At its other end the rock shaft 68 carries a gear segment 70 which meshes with a corresponding gear segment 72 comprising part of a rocker member journalled upon the cam shaft 50. This rocker member includes also a cam arm 74 carrying at its free end a cam roll 76 which is arranged to run in the inner cam track 30 of the cam disk 26. The cam track 30 is designed to advance the pusher 58 early in the cycle of the machine and while the feed table 44 is being retracted.

The bending devices will now be described. These are carried by the feed table 44 in spaced relation adjacent to its inner end. Each bending device comprises a bending plate 90 having an upstanding projecting portion at its inner edge upon which is formed a curved vertical face for engaging the outer edge face of the rand strip as the latter is fed against it by the pusher. The bending plate 90 is provided with a pair of spaced transverse slots for clamping screws 92 and thus provision is made for the bodily transverse adjustment of the bending device. As shown in Figs. 1 and 4 each bending device is adjusted to the limit of its outward position for the accommodation of rands of the maximum size. At its outer side each bending plate 90 is provided with ears for a pivot pin 95 upon which is mounted a bridge-shaped presser or hold down member 94. The latter extends inwardly across the top of the plate 90 and then downwardly adjacent to its curved rand-engaging face where it is provided with a substantially horizontal face 93 shaped to engage and hold down one of the sides of the rand strip during the bending operation. An adjustable stud 96 is threaded into the plate 90 and arranged to extend freely through the presser member 94. Between the head of the adjusting stud and the presser member is interposed a compression spring 98 which acts to hold the presser member normally in contact with the thick or upstanding portion of the bending plate 90 and which permits the presser to yield upwardly to accommodate rand strips of various thicknesses. The action of the presser is well shown in Fig. 3 in which it will be noticed that the rand strip

is shown as having slightly lifted the presser member 94 and correspondingly compressed the spring 98.

In order to prevent the rear ends of the rand from overlapping as it is fed to the forming rolls, a spreader member 80 is provided. This comprises an elongated arm forked at its rear end and pivotally supported upon a transverse pin 82 which extends between the side members of the feed carriage 42 in alignment with and beneath the slot or opening in the feed table 44. A torsion spring 84 surrounds the pin 82 and tends normally to elevate the free end of the spreader into the position shown in Figs. 1 and 2, wherein it is positioned midway between the two bending devices. The intermediate portion of the spreader 80 is reduced in thickness and at its free end it is provided with two downwardly extending deflecting surfaces 81 which act to engage the inner marginal edges of the sides of the bent rand as the latter is drawn from between the bending device by the forming rolls 14 and 22.

The spreader is in position to be engaged and depressed by the pusher slide 56 or by the rand advanced therein during the bending operation and while the pusher occupies its advanced position on the feed table 44. When the pusher is retracted, after the bending operation, the spreader is automatically elevated by the spring 84 into operative position between the sides of the bent rand and subsequently, when the rand is drawn forward by the rolls, it holds its sides in spaced relation. The reduced intermediate portion of the spreader furnishes clearance for the inner corners of the rand and renders the deflecting surface 81 fully effective for the spreading operation.

In the operation of the machine, it may be assumed that the parts initially occupy the positions shown in Figs. 1, 2 and 4, that is to say, the pusher 58 is retracted to its outward position and the feed table 44 is advanced to the limit of its inner position. The operator presents a welt strip upon the table 44 in position to be engaged by the enlarged head 60 of the pusher. The welt strip at this time is substantially straight and may or may not have been subjected to a preliminary crimping operation.

When the machine is set in operation and the cam disk 26 rotated, cam track 30 is at once effective to advance the pusher 58 and shortly thereafter the cam track 28 becomes effective to retract the work table 44. The result of the relative movement of the pusher and table is to advance the rand strip into contact with the spaced bending devices, doubling its sides rearwardly and transforming the straight rand strip into a U-shaped rand. In this operation the spreader 80 is depressed beneath the pusher slide 56 and the rand is advanced so that its curved forward edge projects beyond the inner edge of the feed table 44 and into close proximity to the bite of the forming rolls 14 and 22. The machine is represented with its parts in this position in Fig. 5. In advancing the rand strip and performing the bending operation thereon, the presser members 94 of the bending devices independently engage the opposite sides of the rand and accommodate themselves to the thickness thereof. They also serve to hold the bent rand firmly in its advanced position upon the feed plate while the pusher is retracted.

In the continued operation of the machine the cam tracks 28 and 30 now become effective to retract the pusher and to advance the feed table 44 with the bent rand yieldingly clamped at opposite sides upon it to present the latter to the forming rolls, and this presentation of the rand to the rolls is timed in accordance with the location of the die projection 16 of the upper forming roll. As soon as the forming rolls engage the curved end of the rand, the latter is drawn through between them and the forming operation effected. Immediately upon the retraction of the pusher 58, the spreader 80 is automatically elevated to the position shown in Figs. 1 and 2 and acts to control the spacing of the sides of the rand during this operation. Meanwhile another rand strip has been presented to the pusher and the cycle is repeated, the rand strip being advanced successively one step to effect the bending operation and then another step to present it to the forming rolls.

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

1. A rand forming machine having, in combination, cooperating forming rolls, and rand feeding and bending means associated therewith and including spaced curved benders, and a separate yieldingly mounted presser located adjacent to the operative face of each bender.

2. A rand forming machine having, in combination, cooperating forming rolls, and means for feeding a bent rand thereto including spaced bending plates, a presser overlying each plate and constructed and arranged to yield independently to accommodate the opposite sides of a rand as the latter is advanced in contact with the bending plates.

3. A rand forming machine having, in combination, cooperating forming rolls, and means for feeding a bent rand thereto including a feed table having spaced bending plates thereon, a presser pivotally mounted adjacent to each bending plate and having its operative face located to engage one side only of a rand during the bending operation, and independent means for yieldingly urging each presser toward the rand.

4. Bending mechanism for a rand forming machine, comprising a pair of spaced plates with curved opposed edge surfaces, a presser member pivotally mounted upon the outer side of each plate, extending across the latter and having a rand engaging surface disposed adjacent to the curved face of its associated plate, and adjustable means for holding each presser member in operative position.

5. Bending mechanism for a rand forming machine, comprising spaced bending plates each having a curved edge face for engaging the outer edge of a rand strip, and a bridge-shaped presser member pivotally mounted upon each plate and provided with a hold-down face extending beyond the rand-engaging face of the bending plate, each bending plate being mounted for transverse adjustment and carrying its presser member with it in its adjusting movement.

6. A bending device for a rand forming machine, comprising a bending plate having an edge face for deflecting one side of a rand strip and an upwardly projecting portion adjacent thereto, a presser member pivotally mounted at the outer edge of the bending plate, overlying the projecting portion thereof and having a rand-gripping face extending beyond the rand-engaging face of the bending plate, and spring means for holding said presser member in contact with the projecting portion of the bending plate.

7. A bending device for a rand forming machine, comprising a plate having a substantially vertical rand-engaging face at one edge, a bridge-shaped presser member pivotally mounted upon the outer part of said plate, extending inwardly across the latter and downwardly adjacent to said rand-engaging face and being provided with a substantially horizontal operative face, an adjustable stud threaded into said plate and extending freely through the presser member, and a compression spring surrounding said stud and bearing upon the presser member.

8. A rand forming machine having, in combination, a main frame with cooperating rand forming rolls mounted therein, an auxiliary frame movably connected thereto and having reciprocatory feeding means thereon for advancing a bent rand to said rolls, and means for angularly adjusting said auxiliary frame to vary the path of movement of said feeding means.

9. A rand forming machine comprising cooperating rolls, and rand-feeding and bending mechanism including spaced bending plates, a pusher movable to double a rand strip between said plates, and a movable spreader arranged to be displaced by the advancing edge of the rand strip and to assume an operative position between the sides of the bent rand.

10. A rand forming machine comprising cooperating rolls, and rand-bending and feeding mechanism including spaced bending plates, a pusher movable to double a rand strip between said plates, and a spring operated spreader normally projecting into a position between the bending plates and arranged to yield downwardly to permit the passage of the curved center portion of a bent rand as advanced by the pusher.

11. A rand forming machine comprising cooperating rolls, a feed table movable toward and from the rolls, spaced bending devices mounted on the table, a pusher movable to double a rand strip between said devices, and a spreader extending normally into the path of the pusher and arranged to be yieldingly displaced by the movement thereof in advancing a rand strip.

12. A rand forming machine comprising cooperating rolls, a feed table movable toward and from the rolls, spaced bending devices carried by the table, a pusher movable in a path between the bending devices, and a spreader arranged to be held in an inoperative position by the pusher during the bending operation and to be moved automatically into position between the sides of the bent rand thereafter.

13. A rand forming machine comprising cooperating rolls, a feed table movable toward and from the rolls, spaced bending devices carried by the table, means for doubling a rand strip between the bending devices, and a spreader movable automatically into position between the sides of the bent rand during the advancing movement of the feed table.

14. A rand forming machine having, in combination, cooperating forming rolls, a feed table having a centrally disposed opening therein and being movable to deliver a bent rand to said rolls, and a spreader member arranged to be moved through said opening into position between the sides of the bent rand when the rolls have engaged its curved end portion.

15. A spreader member for a rand forming machine, comprising an elongated member shaped at one end to be pivotally mounted, having spaced downwardly extending deflecting surfaces at its free end for engaging the inner edges of a rand, and an intermediate portion of reduced width affording clearance for the inner corners of the rand.

16. A rand forming machine having, in combination, cooperating forming rolls, a feed table movable to present a bent rand thereto and having means for independently gripping the rand at spaced points on opposite sides thereof, and a spreader member arranged to be interposed between the sides of the rand to limit their movement of approach.

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