No. 676,588. Patented June 18, 1901.

J. P. RUST & G. W. FISHER.

HOOP RIVETING MACHINE.

(No Model.) (Application filed Oct. 10, 1900.) 4 Sheets—Sheet 1.

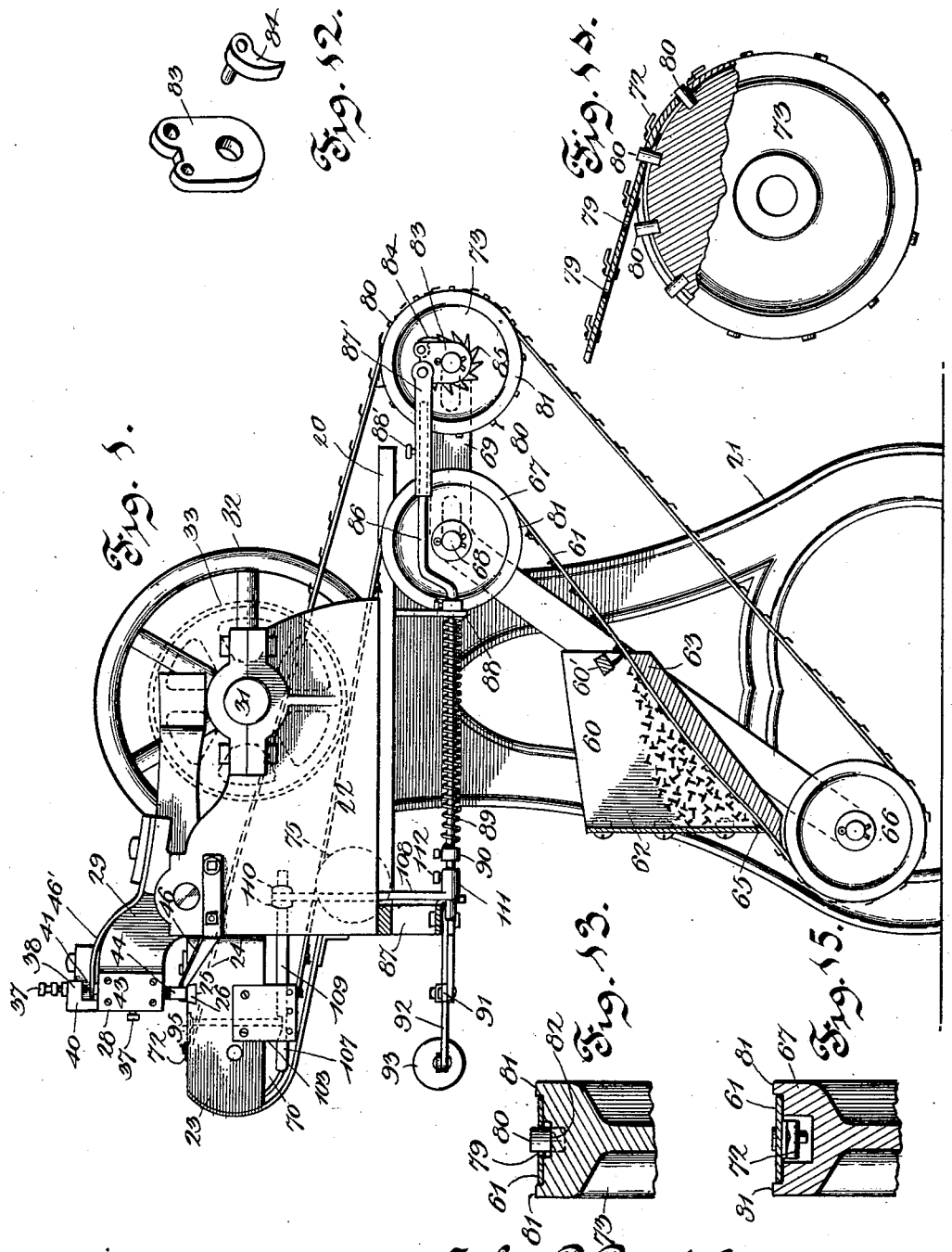

Fig. 1.

Fig. 2.

Fig. 5.

Fig. 3.

Fig. 4.

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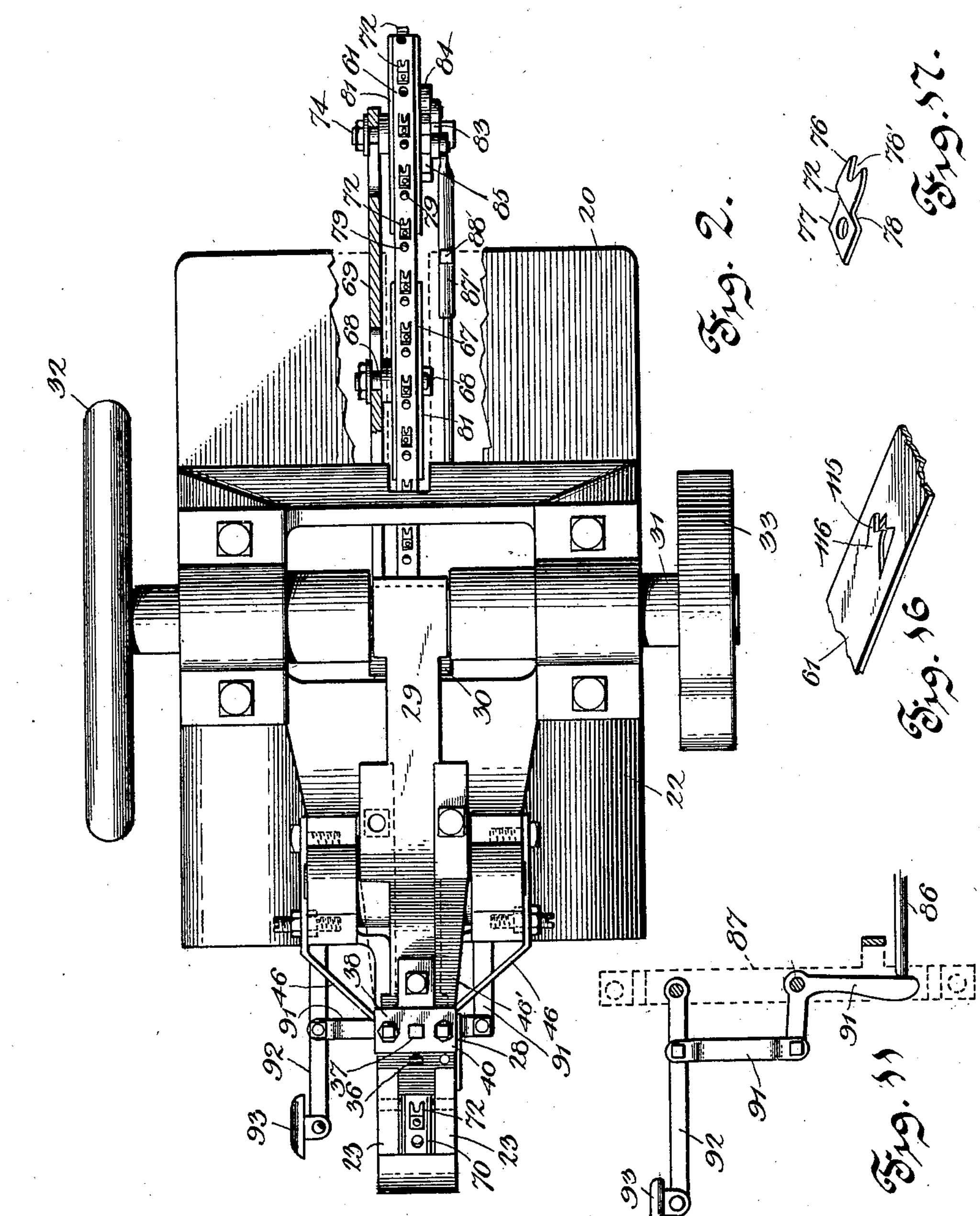
(No Model.) 4 Sheets—Sheet 2.



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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

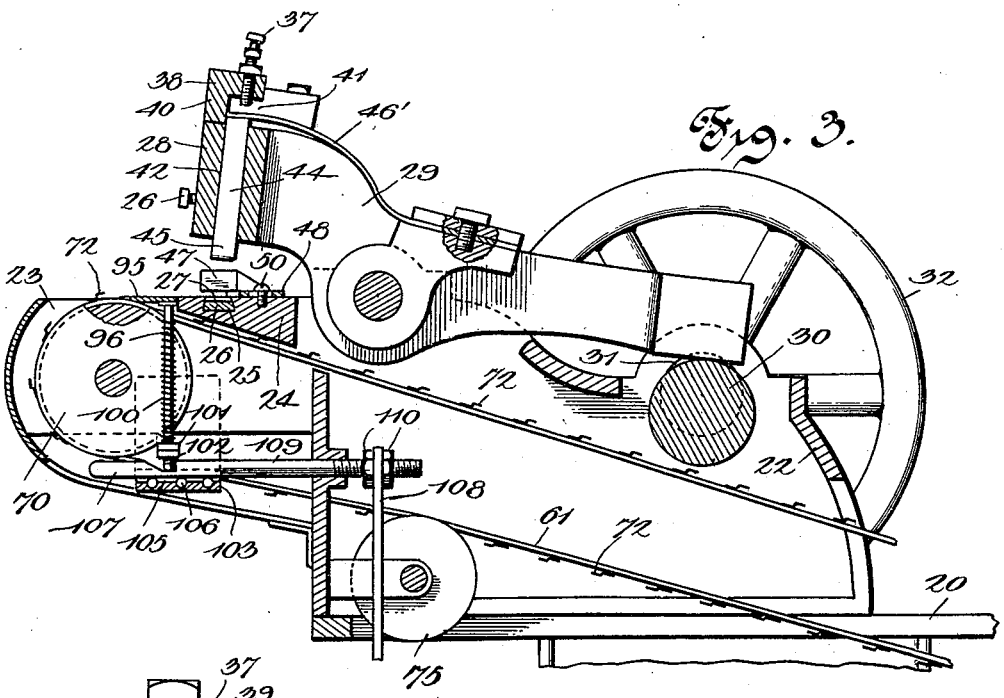


Fig. 5.

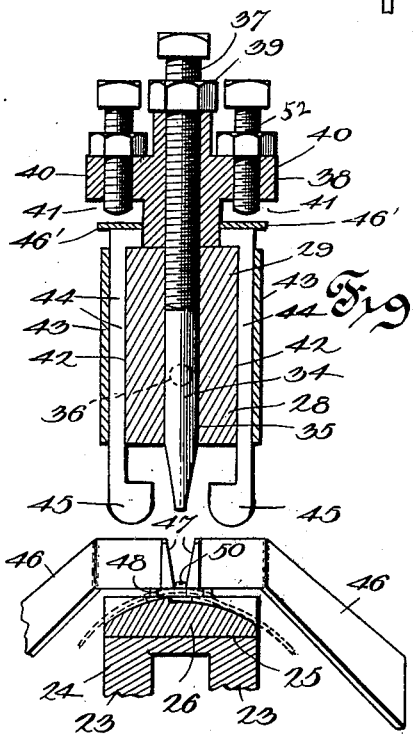
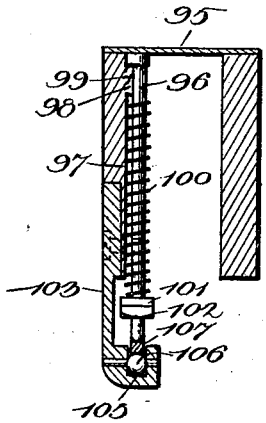


Fig. 7.



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HOOP RIVETING MACHINE.

(Application filed Oct. 10, 1900.)

(No Model.) 4 Sheets—Sheet 4.

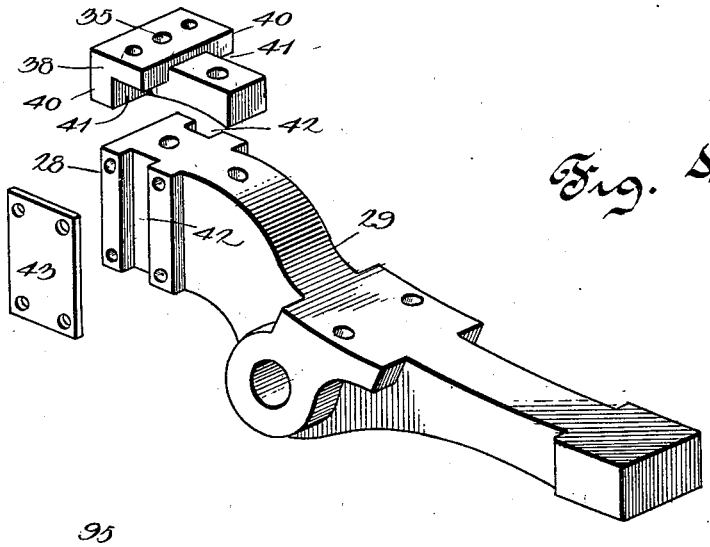


Fig. 4.

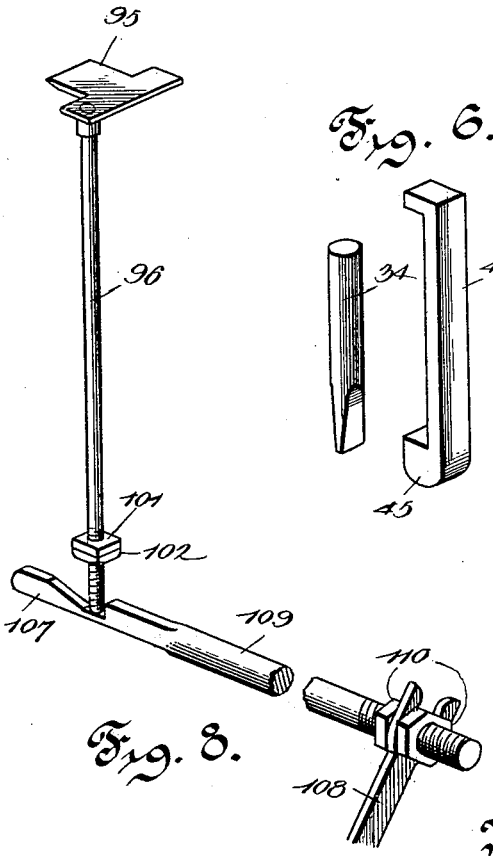
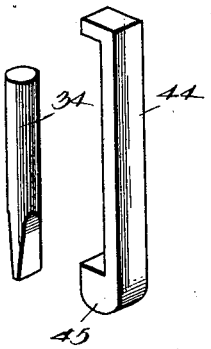


Fig. 8.

Fig. 6.



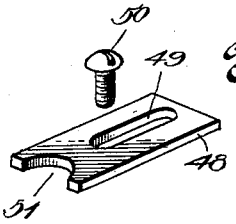


Fig. 10.

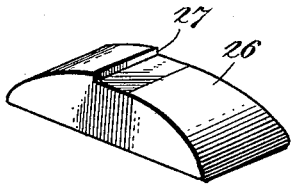


Fig. 9.

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UNITED STATES PATENT OFFICE.

JOHN P. RUST AND GEORGE W. FISHER, OF KEENE, NEW HAMPSHIRE; SAID RUST ASSIGNOR TO SAID FISHER.

HOOP-RIVETING MACHINE.

SPECIFICATION forming part of Letters Patent No. 676,588, dated June 18, 1901.

Application filed October 10, 1900. Serial No. 32,629. (No model.)

To all whom it may concern:

Be it known that we, JOHN P. RUST and GEORGE W. FISHER, citizens of the United States, residing at Keene, in the county of Cheshire and State of New Hampshire, have invented a new and useful Hoop-Riveting Machine, of which the following is a specification.

This invention relates to riveting-machines in general, and has specific reference to machines for riveting hoops and properly forming the hoop adjacent to the rivet after the riveting operation is initiated, it being understood, however, from the following description that the principles involved may be employed in riveting-machines for other specific uses.

One object of the invention is broadly to provide a machine wherein at the will of the operator the rivets will be successively delivered, point up, in advance of the anvil of the machine for engagement with the alined perforations at the end portions of a hoop and wherein after such engagement the hoop may be moved rearwardly to position the rivet accurately under the hammer, to be upset thereby.

A further object of the invention is to provide a machine wherein the feed of the rivets from the rivet-box to the horn of the anvil will be accurate and positive, the carrier being of such form as to automatically engage the rivets, an object of the invention being also to insure against dropping of the rivets from the hoop during the movement of the hoop to the hammer by providing a movable table which automatically assumes the proper position to perform this function at the proper time.

An additional object of the invention is to provide means for guiding the rivet engaged with the hoop into position beneath the hammer and holding the rivet yieldably in such position until after initial engagement by the hammer, and also to provide for gripping the hoop to hold it against movement during the riveting operation and for subsequently forming the hoop at the lap through the medium of this hoop-holding means.

Further objects of the invention relate to the formation of the carrying-belt to hold the rivets securely, while permitting them to be readily withdrawn, and to mount the belt in such manner that the rivet-holding means and the rivets by means of which the holding means are attached will not interfere with the easy running of the belt.

Additional objects and advantages of the invention will be evident from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a side elevation of the complete machine, the rivet-box being shown in section and containing rivets. Fig. 2 is a top plan view of the machine, the rear portion of the bed-plate being broken away to expose the adjustable mountings of the belt-carrying wheels, the frame of said wheels being shown partly in section. Fig. 3 is a vertical section of the upper portion of the machine, showing the hammer and its operating means and illustrating also the upper portion of the carrying-belt with the movable table in position to receive the hoop and rivet in their passage to the hammer. Fig. 4 is a perspective view of the rocker disassembled. Fig. 5 is a transverse section taken through the hammer-head and the anvil and illustrating in dotted lines the position of the rivet when about to be struck by the hammer. Fig. 6 shows in perspective the hammer and one of the gripping members carried by the rocker. Fig. 7 is a transverse section through the horn of the anvil and showing the table-operating mechanism, the reciprocatory rod upon which the table is directly supported being shown in elevation. Fig. 8 is a perspective view showing the table and its supporting-rod, with the wedge-block for raising it. Fig. 9 is a detail perspective view of the wear-plate of the anvil, upon which the rivet is upset. Fig. 10 is a detail perspective view showing the adjustable stop-plate which limits the movement of the hoop under the hammer to properly position the rivet. Fig. 11 is a detail elevation showing the lever mechanism, through the medium of which motion is given to the connecting-rod that operates the rivet-feed. Fig. 12 is a perspective view showing the rocker-plate and the pawl thereof, by means

of which motion is communicated from the connecting-rod direct to the ratchet upon the feed-pulley of the carrying-belt. Fig. 13 is a sectional view showing a portion of the feed-pulley for moving the belt, said section being taken radially of the pulley. Fig. 14 is a side elevation of the feed-pulley of the belt, a portion thereof being shown in section to illustrate the engagement of the pins or sprocket-teeth thereof with the belt. Fig. 15 is a partial radial section of one of the idler-pulleys which support the carrying-belt and illustrating the manner in which its periphery is grooved to permit passage of the rivet-holding clips. Fig. 16 is a perspective view showing a portion of a different form of belt, made integral. Fig. 17 is a perspective view of the attached clip of the two-piece belt.

Referring now to the drawings, the present riveting-machine comprises a bed-plate 20, which is supported in the present instance upon legs 21, which are cast in the manner and form of the legs usually used in this class of machinery.

Upon the bed-plate 20 is fixed a hollow casing 22, the upper portion of which comprises spaced plates 23, which project forwardly beyond the bed-plate and form the horn of the anvil of the machine, and at the rear end of this horn is formed the solid body portion 24 of the anvil, which body portion acts to connect the plates 23 and form a rigid structure, said plates and body, however, being formed, preferably, integral.

The body portion 24 of the anvil is provided with a transverse dovetail groove 25 therein to removably receive the wear-plate 26 of the anvil, against which the riveting is done, this plate having its base broadened to fit the groove. The upper face of the wear-plate is arc-shaped, as shown in Fig. 9, to conform to the curvature of the finished hoop, and centrally thereof is formed a transverse rectangular slot or groove or recess 27, the depth of this groove being slightly less than the thickness of a rivet-head, whereby in the riveting operation the head of the rivet will lie in the slot and in such position that the proper curvature of the hoop will not be destroyed at the lap.

In practice the punched and overlapped ends of the hoop are slipped over the horn of the anvil and are brought to engage a rivet with the alined perforations, the rivet having been previously delivered upon the horn of the anvil in an upright position by mechanism to be hereinafter described. The hoop is then moved rearwardly of the anvil and onto the wear-plate 26, with the head of the rivet in the slot 27 and the upper end or point of the rivet in position to be struck by the hammer.

The hammer above mentioned is carried in the head 28 of a rock-lever 29, which is pivotally mounted in the casing 22, the rear end of this rocker being positioned to bear against an eccentric 30 at its under side and mounted upon a drive-shaft 31, said shaft having a balance-wheel 32 and a drive-pulley 33, through the medium of which it is rotated from a belt in the usual manner. As this shaft 31 is rotated the eccentric is correspondingly moved, and by throwing the rear end of the rocker upwardly the head thereof is moved downwardly to operate the hammer. This hammer is shown at 34 and consists of a simple cylindrical rod, which is slidably mounted in a vertical passage 35 in the head 28 and is held from dropping from the passage by means of a set-screw 36, engaged with the head and disposed to impinge against the hammer. The lower end of the hammer, which is tapered, as shown, projects below the head 28, and the degree of this projection is adjusted by a screw 37, which has threaded engagement with the upper portion of the passage 35 and has its lower end disposed against the upper end of the hammer. When the set-screw 36 is loosened, this screw 37 may be adjusted to feed the hammer downwardly or to permit it to be raised, said screw 37 when in contact with the hammer preventing upward movement thereof and receiving the pressure thereof during the riveting operation.

Secured upon or formed integral with the head 28, as preferred, is a block 38, having a passage which alines with and forms a continuation of the passage 35, said screw 37 passing upwardly through this passage of the block and having a jam-nut 39 for contact with the block to hold the screw from loosening. The block 38 has laterally-projecting flanges 40, which are spaced above the upper face of the head 28 and are separated therefrom by interspaces 41, the body portion of the block being contracted transversely to form these flanges and the side faces of the head having grooves 42 formed vertically therein and disposed mutually opposite, said passages or grooves 42 leading to the interspaces 41. Face-plates 43 are provided, which are adapted to cover the grooves 42, to form guideways for holding clamps comprising cross-sectionally-rectangular rods or bars 44, which are slidably mounted therein. These bars 44 have their upper ends turned laterally to limit the downward movement of the bars, and at their lower ends are formed clamping-feet 45, these feet and ends being turned inwardly, as illustrated in Fig. 5 of the drawings. The upward movements of the clamping-bars are limited by the flanges 40, and to hold them yieldably against this upward movement spring-plates 46′ are clamped upon the rocker and have their forward ends disposed against the upper ends of the bars. As shown in Fig. 5 of the drawings, these clamping or holding bars are positioned at opposite sides of the transverse groove at the uppermost portion of the wear-plate, so that as the head of the rocker descends the feet 45 will first engage the hoop upon the wear-plate and will hold it, while the head of the rocker has lost motion with

respect to the bars, and when the upper ends of the bars strike the flanges 40 the bars will be depressed and will act to bend the hoop to conform to the curvature of the anvil wear-plate.

To hold the hoop, with the rivet, against lateral displacement and to guide it to the proper position beneath the hammer, spring-plates 46 are secured to the sides of the casing 22 and have their forward ends taken upwardly to a level with the upper face of the wear block or plate, where they are bent to project forwardly and divergingly, the inner faces of these forwardly-projecting portions 47 being converged downwardly to correspond to the taper of the lower end of the hammer. A stop-plate 48 is secured adjustably to the upper face of the body portion 24 of the anvil, this plate having a longitudinal slot 49 therein, through which is passed a set-screw 50 for clamping the plate to the portion 24. The front end of the stop-plate has a recess 51 to receive the lower end of the hammer, while permitting the edge at the sides of the recess to be projected sufficiently far to act as a stop for the hoop. Thus the hoop after engagement of the rivet therewith may be moved rearwardly, taking the projecting upper end of the rivet between the ends of the spring guide-plates, until the hoop strikes the stop-plate, said stop-plate being positioned to stop the hoop with the rivet in the direct path of movement of the hammer in its descent. It will be noted that the clamping-rods have their feet 45 below the lower end of the hammer, so that prior to the engagement of the hammer with the rivet the feet strike upon the hoop and are held in such engagement by the springs 46. Thus as the head of the rocker descends these feet 45 first engage the hoop, but do not stop the movement of the hammer, the spring 46 being not of sufficient strength to cause the rods to bend the hoop. The hammer then engages the upper end of the rivet and begins the upsetting operation, and when this upsetting operation is partially completed the lost motion of the rocker-head with respect to the clamping-bars is at an end, the springs 46 striking against the flanges 40, when further downward movement of the rocker-head carries the clamping-bars downwardly, bending the hoop to the curvature of the wear-plate of the anvil. Adjustable stop-screws 52 are engaged with the flanges 40 for engagement by the springs 46, and thus by adjustment of these screws the degree of lost motion of the rocker with respect to the hammer may be varied and the degree of curvature given the hoop may be varied to correspond to the different-sized hoops and the corresponding wear-plate, it being understood that different plates may be used for different hoops. When the head of the rocker has reached the limit of its downward movement, the rivet has been upset and the hoop formed, the clamping-bars having also the function of flattening down the burs at the ends of the hoop formed in the cutting of the metal, these burred portions being pressed against the wear-plate. It will be understood that the rocker is in constant motion, the unriveted hoop being slipped into place and then withdrawn after the rivet has been upset.

To supply the rivets in the proper position at the upper face of the horn of the anvil, a carrying-belt is provided and which draws its supply from a rivet-box 60, the belt being indicated at 61. The rivet-box is secured to the legs 21 of the machine and comprises a cross-sectionally-rectangular receptacle 62, the top and rear end of which are open, the base 63 of the box being slanted upwardly and rearwardly, so that the rivets therein will tend to collect in the forward end of the box. In the rear end of the box and directly adjacent to the bottom thereof is disposed the carrying-belt, while the front of the box, which is removable, terminates slightly above the bottom to form an entering slot 65 for the carrying-belt 61, which is passed inwardly through the slot 65 and along the bottom of the box and out through the open back. The carrying-belt is mounted upon pulleys, of which one pulley 66 is rotatably mounted in advance of and below the box and with the bottom of the box substantially tangent thereto at the upper edge of the pulley, so that the belt in passing from this pulley may move into the box through the slotted front thereof. From the rivet-box the carrying-belt passes upwardly and rearwardly in the same direction as through the rivet-box and around an idler-pulley 67, having an axle or spindle 68, which is slidably mounted in a slot in the lateral extension 69 of one of the legs 21, said spindle having a reduced portion which is mounted in the slot and provided with a terminal nut, whereby the shoulder at the inner end of the reduced portion may be clamped against the said extension. From the pulley 67 the belt 61 is taken upwardly and forwardly and around an idler 70, which is rotatably mounted in the hollow horn of the anvil, this pulley 70 being positioned to cause the belt at one point to lie flush with the upper face of the anvil-horn, so that its clips 72, hereinafter more specifically described, will be successively projected above the horn. From the pulley 70 the belt is taken rearwardly and downwardly and around a drive-pulley 73, which is loosely mounted upon a spindle 74, the reduced end of which is slidably mounted also in the slot of the extension 69 and is adapted to be clamped at different points of its movement therein. From the pulley 73 the belt returns to the pulley 66. To support the belt between the pulleys 67 and 70, an idler 75 may be employed, mounted in the lower portion of the hollow horn of the anvil. As shown in the drawings, the belt consists of an endless strap of steel or other metal, having the clips 72 riveted thereto at regular intervals, each of these clips comprising a head portion 76, a foot portion 77, and a

stem 78, connecting the head and the foot, the stem lying at nearly a right angle to the head and foot. The free end of the head, which is disposed in the direction of movement of the belt, has a tapered notch 78 therein, while the foot of the clip is riveted fast to the belt. Directly in the rear of each clip is formed a perforation 79, these perforations being equally spaced for engagement by the radially-extending pins 80 upon the periphery of the drive-pulley 73, these pins forming, in effect, sprocket-teeth. As the belt 61 passes through the rivet-box the clips thereof engage the rivets by taking the head of the rivet under the head of the clip and with the stem of the rivet projecting upwardly through the notch in the forward end of the head of the clip, and the rear end of the rivet-box is slotted to permit the stem of the rivet to pass therethrough. The rivets engaged with the belt-clips are carried upwardly and over the pulley 70, the belt being given an intermittent motion, so that when the rivet reaches a position upon the upper face of the horn of the anvil it will stop and may be engaged with the lapped ends of the hoop to be riveted, in the manner hereinafter described.

It will be noted upon reference to Fig. 1 of the drawings that the clip side of the belt engages the pulleys 67 and 75, and, as shown in Fig. 15, the peripheries of these pulleys are channeled at the centers of their concavities to receive the clips, the flanges 81 of the pulleys preventing lateral displacement of the belt therefrom. The pulleys 66, 70, and 73 receive the side of the belt on which are the heads of the rivets that hold the clips to the belt, and these pulleys have channels 82 in their peripheries of lesser depth.

In order to give intermittent motion to the drive-pulley 73 and therethrough to the belt 61, a rocker 83 is pivoted upon the spindle of the pulley 73, and this rocker has a pawl 84 pivoted thereon and adapted for engagement with a ratchet 85, fixed upon the end of the pulley, whereby when the rocker-plate is moved in one direction the pulley will be rotated, while the return movement will be free from the pulley. To rock the plate 83, a reciprocatory rod 86 is slidably mounted in a hanger 88, depending from the casing 22, the rear end thereof being formed of two telescopic members, as shown, the rear member 87′ being pivoted to the rocker-plate. The telescopic connection is held adjustably against movement by means of a set-screw 88′ in the member 87′ and adapted for engagement with the second member of the rod, which is inserted in a socket in the member 87′. The rod 86 is held normally in its retracted position by means of a helical spring 89, which encircles it and bears at one end against the hanger 88 and at the opposite end against an adjustable collar 90 upon the rod, said collar permitting adjustment of the spring to the proper tension. To move the rod 86 against the tendency of its spring to operate the ratchet-wheel, and thereby move the belt, a right-angled lever 91 is pivoted to the hanger 87, and one end thereof is disposed against the rod, while the opposite end projects outwardly and is connected by means of a connecting-rod 91′ with a knee-lever 92, which is also fulcrumed upon the hanger. The knee-lever has a knee-pad 93 thereon disposed for engagement by the side of the knee of the operator, and when this pad is pressed laterally the angular lever is moved to press the rod 86 and cause it to actuate the rocker-plate. When the knee-pad is released, the helical spring returns it and the rocker-plate to their normal positions.

As hereinbefore intimated, the rivets are engaged with the hoops, while the rivets are yet in engagement with the clips, the rivets being moved from the clips when the hoops are moved rearwardly to the wear-plate of the anvil. In this movement of the rivet from the clip there is a liability of the rivet dropping from the hoop, for the reason that the belt takes downwardly into the slot of the horn of the anvil and there is nothing to support the head of the rivet and hold it up into place. This slot must, however, be left open during the movement of the belt to permit the clips to pass downwardly and rearwardly in the manner above described. It is therefore essential that some means in the form of a table be provided, which when the belt is motionless, as when a rivet is projected above the anvil-horn for engagement with a hoop, will close the slot in the horn or cover it and will reach from the surface of the belt to the body 24 of the anvil and which when the belt starts to move will rise and permit the clip which has last presented a rivet to pass under the table and down through the slot. This table referred to consists of a plate 95, which is adapted to lie at times in a recess in the upper faces of the side walls of the slot of the anvil-horn and flush with said upper faces, the front edge of the plate, which is beveled on its under side, lying upon the slanting belt, while the rear edge of the plate lies against the front side of the body 24 of the anvil. When in this position, the table forms a continuous surface which receives the head of the rivet while being moved with the hoop to the wear-plate of the anvil and holds the rivet in place. When the belt is moved to bring up another rivet, however, the table must be raised, and for this purpose the plate 95 is mounted upon the upper end of a rod 96, which is slidably mounted in a vertical recess or passage in the inner face of the slotted horn of the anvil, this passage or slot being shown at 97 and having a partition 98 near its upper end, through which is formed a perforation 99, which the rod 96 snugly and slidably fits, said perforation being of less diameter than the slot 97, and upon the rod, below the partition 98, is disposed a helical spring 100, which bears at its upper end against the partition and at its lower end against a nut 101, en-

gaged with the rod, the nut 101 being held against displacement by a jam-nut 102.

Upon the outer face of the anvil-horn is secured a plate 103, which depends therebelow, and on the inner face of this depending portion is formed a race 105, having balls 106 therein, and in the upper portion of the race, which forms a guide, and upon the balls is disposed a wedge-block 107, which when moved in one direction acts to raise the rod 96 and therewith the table and when moved in the opposite direction permits the rod and table to be lowered under the influence of the helical spring 100. To reciprocate the wedge-block, an arm 108 is connected with the rear end or stem 109 thereof by passing this stem through a perforation in the upper end of the arm, the stem being threaded for engagement of nuts 110, which act to adjust and hold the arm in adjusted position. The lower end of the arm is provided with a sleeve 111, which is disposed upon the rod 86 and is held against movement by a set-screw 112. Thus when the rod 86 is pressed rearwardly to actuate the drive-pulley 73 and feed the belt the wedge of the wedge-block is slid under the lower end of the rod 96 and raises the rod to raise the table. When the rod 86 is released and returns under the influence of its retracting helical spring, the wedge moves from under the rod 96, when its spring 100 acts to draw it downwardly and seat the table in its operative position. Thus it will be seen that if the knee-lever be actuated to bring a rivet to the top of the anvil the table will at the same time be raised to permit the preceding rivet-holding clip to pass down from the face of the anvil-horn, and as soon as the lever is released the table drops to the position to cover the slot of the horn and present a smooth surface over which the hoop may be moved after engagement of the rivet therewith to prevent the rivet from dropping from place.

As above intimated, the hammer is in constant operation, while the rivets are presented by the action of the operator, so that the rivets may be fed up at will and may be then moved with the hoop to the hammer.

In Fig. 16 of the drawings there is shown a modification of the carrying-belt wherein the clips instead of being attached to the belt are formed integral therewith by punching or striking up of the metal thereof at intervals. The clips themselves have heads 115 and stems 116 of the same form and arrangement as in the previous instance; but the foot of the clip is formed by the metal of the belt.

As shown in Fig. 1 of the drawings, a steel-wire brush 60′ may be disposed at the rear open end of the rivet-box to rest with its bristles lightly against the upper face of the carrying-belt, and thus prevent movement of the loose rivets from the box should any of them become lodged upon the belt.

What is claimed is—

1. A carrying-belt for riveting-machines having rivet-holding clips at intervals thereof, each of said clips comprising a head lying in a plane above the face of the belt and having its forward end notched to receive the stem of a rivet, the heads of the clips being disposed to project in the direction of operative movement of the belt.

2. A carrying-belt for riveting-machines having rivet-holding clips at intervals thereof, each of said clips comprising a head, a foot and a connecting-stem, the end of the head opposite to the connection of the stem being notched, and the foot being secured upon the face of the belt, the heads of the several clips being projected in the direction of operative movement of the belt.

3. In a riveting-machine, the combination with the anvil and a rivet-box, of a guide-pulley beyond the box, the anvil being slotted, a guide-pulley in the slot of the anvil, a carrying-belt upon the pulleys and passed through the rivet-box, said belt having clips for engagement with rivets therein, and means for feeding the belt to carry the rivets successively to the face of the anvil.

4. In a riveting-machine the combination with an anvil having a slotted horn, and a rivet-box, of a carrying-belt passed through the box and adapted to engage and convey rivets from the box, guide-pulleys for the belt, of which one is disposed in the slotted anvil-horn and is located to project the rivets above the horn, and means for operating the belt.

5. In a riveting-machine, the combination with an anvil, of a rivet-box having an inclined bottom, the ends of the box at opposite ends of the incline having openings, a carrying-belt passed through the openings of the ends and over the inclined bottom and having rivet-holding clips projecting upwardly and away from the bottom to engage and convey rivets, a brush disposed in engagement with the belt at its point of exit from the rivet-box to prevent outward movement of loose rivets from the box, and guide-pulleys for the belt disposed to direct the belt to carry the rivets to the anvil.

6. A rivet-box for riveting-machines having an inclined bottom, the end of the box at the upper end of the incline being open and the end of the box at the lower end of the incline being removable and spaced from the bottom to permit the passage of a belt into the box, said box having a brush disposed at the upper end of the incline of the bottom for engagement with said belt to free it of loose rivets.

7. In a riveting-machine, the combination with a slotted anvil and a rivet-box, of a carrying-belt disposed to move through the box and the slot of the anvil to engage and carry rivets from one to the other, a drive-pulley engaged with the belt, a reciprocatory rod operatively connected with the driving-pulley to operate it when moved in one direction, a knee-lever operatively connected with the rod to move it in one direction and a return-spring for the rod.

8. In a riveting-machine, the combination with an anvil and a rivet-box, of a carrying-belt disposed to engage and carry rivets from one to the other, a drive-pulley engaged with the belt and provided with a ratchet, a rocker having a pawl for engagement with the ratchet to rotate the pulley, a reciprocatory rod connected with the rocker, a lever for moving the rod in one direction, and a return-spring for the rod.

9. In a riveting-machine, the combination with an anvil having a slotted horn, a hammer for engagement with the body of the anvil and a rivet-box, of a carrying-belt disposed to move through the slot of the horn and through the box to engage and carry rivets to the anvil in advance of the hammer, and means for advancing the belt intermittently to project the rivets successively.

10. In a riveting-machine, the combination with an anvil having a slotted portion, a hammer in operative relation to the anvil in the rear of the slot, and a rivet-box, of a belt disposed for movement through the box and slot of the anvil, said belt being adapted to engage and convey rivets from the box to the anvil, a movable table adapted to close the slot between the belt and the hammer, and means for raising the table and advancing the belt simultaneously.

11. In a riveting-machine, the combination with an anvil having a slotted portion, a hammer in operative relation to the anvil in the rear of the slot and a rivet-box, of a belt provided with rivet-holding clips, disposed for movement through the box and the slot of the anvil to convey rivets from the former to the latter and to project the rivets above the surface of the anvil, of a table disposed to lie at times to close the slot between the projected rivet and the hammer, and means for moving the table when the belt is operated, to permit the clip to pass under the table.

12. In a riveting-machine, the combination with the slotted anvil and a hammer in operative relation thereto, of a carrying-belt having rivet-holding clips and disposed for movement through the slot of the anvil and to project the rivets above the anvil, a movable table adapted to lie at times to close the slot between the projected rivet and the hammer, means for feeding the belt, and connections between said feeding means and the table for moving the latter from the slot when the belt is fed, to permit the clip to pass the table.

13. In a riveting-machine, the combination with an anvil and a hammer in operative relation thereto, of a rivet-carrying belt having clips for holding the rivets, said belt being disposed to project the clips with the rivets successively above the face of the anvil, said anvil having an opening through which the belt passes, a table disposed to lie at times in the opening to form a continuous surface between the hammer and the adjacent projected rivet-holding clip, a wedge-block disposed to raise the table to permit the clips to pass through the opening, means for operating the belt intermittently, and connections between the belt-operating means and the wedge-block for operating the latter.

14. In a riveting-machine, the combination with an anvil and a rivet-box of a carrying-belt for engaging and carrying the rivets from the box to the anvil, a drive-pulley for the belt, a ratchet in operative relation to the pulley, a reciprocatory rod for operating the ratchet in one direction, a return-spring upon the rod for returning the ratchet, and a knee-lever for moving the rod against the tendency of the spring.

15. In a riveting-machine, the combination with an anvil and a hammer in operative relation, of means for reciprocating the hammer, and spring-plates having their inner faces converged downwardly to receive the correspondingly-formed end of the hammer and having their faces diverged forwardly to guide a rivet into alinement with the hammer.

16. In a riveting-machine, the combination with an anvil and a reciprocatory hammer, of spring-plates having their inner faces spaced to receive the hammer therebetween, and a stop-plate adjustably mounted in the rear of the hammer, said plates being adapted to guide and stop a rivet in position beneath the hammer.

17. In a riveting-machine, the combination with an anvil and a reciprocatory hammer having its lower end tapered, of spring-plates disposed to receive a rivet therebetween and guide it into line with the hammer, said plates being adapted for engagement by the hammer to separate them and release the rivet.

18. In a riveting-machine, the combination with an anvil having a slotted horn, of a carrying-belt adapted to receive and carry rivets, said belt being disposed for passage through the slot of the horn to convey the rivets to the anvil, and means for supplying rivets to the belt.

19. In a riveting-machine, the combination with an anvil having a transversely-curved portion and a recess, of a rocker, a hammer carried by the rocker and positioned to engage the recess, and clamping-bars slidably mounted in the rocker for limited movement, said bars projecting normally below the hammer and having means for holding them yieldably in projected position.

20. In a riveting-machine, the combination with an anvil of a rocker, a hammer mounted in the rocker for engagement with the anvil, and clamping-bars slidably mounted in the rocker and projecting normally in advance of the hammer to strike the anvil before the hammer, means for holding the bars yieldably projected, and adjustable stops for limiting the movement of the bars in the rocker.

21. In a riveting-machine, the combination with a rocker having a passage therethrough, of a hammer slidably mounted in the passage, a stop-screw engaged with the passage to limit the movement of the hammer therein

and to form a stop therefor, a set-screw engaged with the rocker and disposed to impinge the hammer to hold it in place, clamping-bars slidably disposed in the rocker, means for limiting the movement of the bars and springs for holding the bars yieldably projected in advance of the hammer.

22. In a hoop-riveting machine, the combination with an anvil having a transversely-mounted portion and a recess therein, of a rocker having a hammer disposed for movement with the rocker against the recessed portion of the anvil, to engage a rivet disposed with its head in the recess, and clamping-bars yieldably held in the rocker and projected beyond the hammer to engage the hoop in advance of the engagement of the rivet by the hammer, said rocker having a degree of lost motion with respect to the bars to start the upset of the rivet and subsequently move the bars to bend the hoop to the curvature of the anvil.

23. In a riveting-machine, the combination with an anvil having a slotted portion, a rivet-carrying belt disposed for movement through the slot, of means for supplying rivets to the belt, and a movable table disposed between the belt and the striking portion of the anvil and in the slot of the anvil, said table being adapted to open and close the slot, for the purpose set forth.

24. In a riveting-machine, the combination with an anvil having a striking portion and an adjacent slotted portion, of a rivet-carrying belt disposed to carry rivets through the slotted portion of the anvil and project them thereabove for engagement to be moved to the striking portion of the anvil.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JOHN P. RUST.
GEORGE W. FISHER.

Witnesses:
HIRAM BLAKE,
JOSEPH MADDEN.