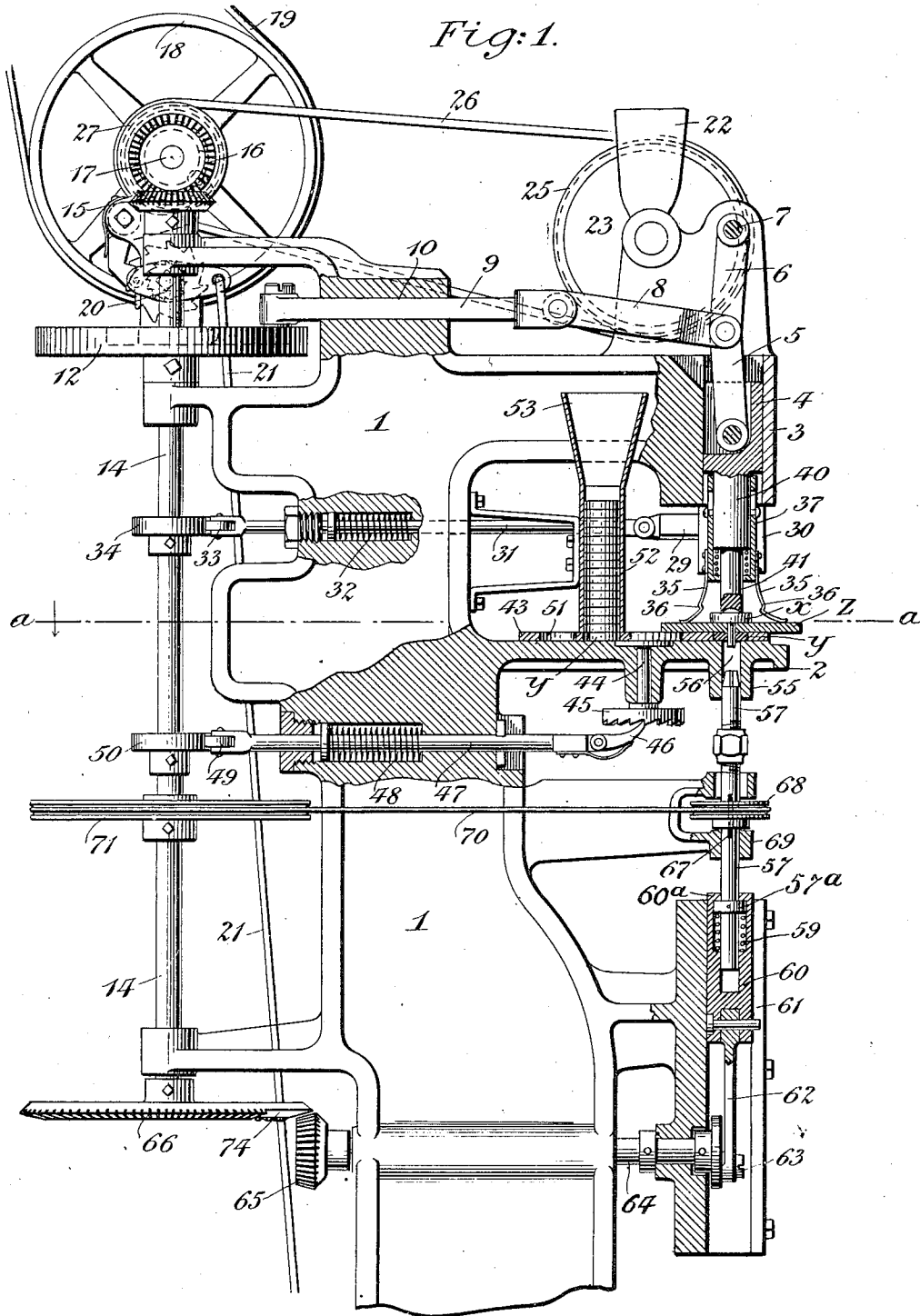


990,405.

Patented Apr. 25, 1911.

3 SHEETS—SHEET 1.



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990,405.

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3 SHEETS—SHEET 2.

Fig. 2.

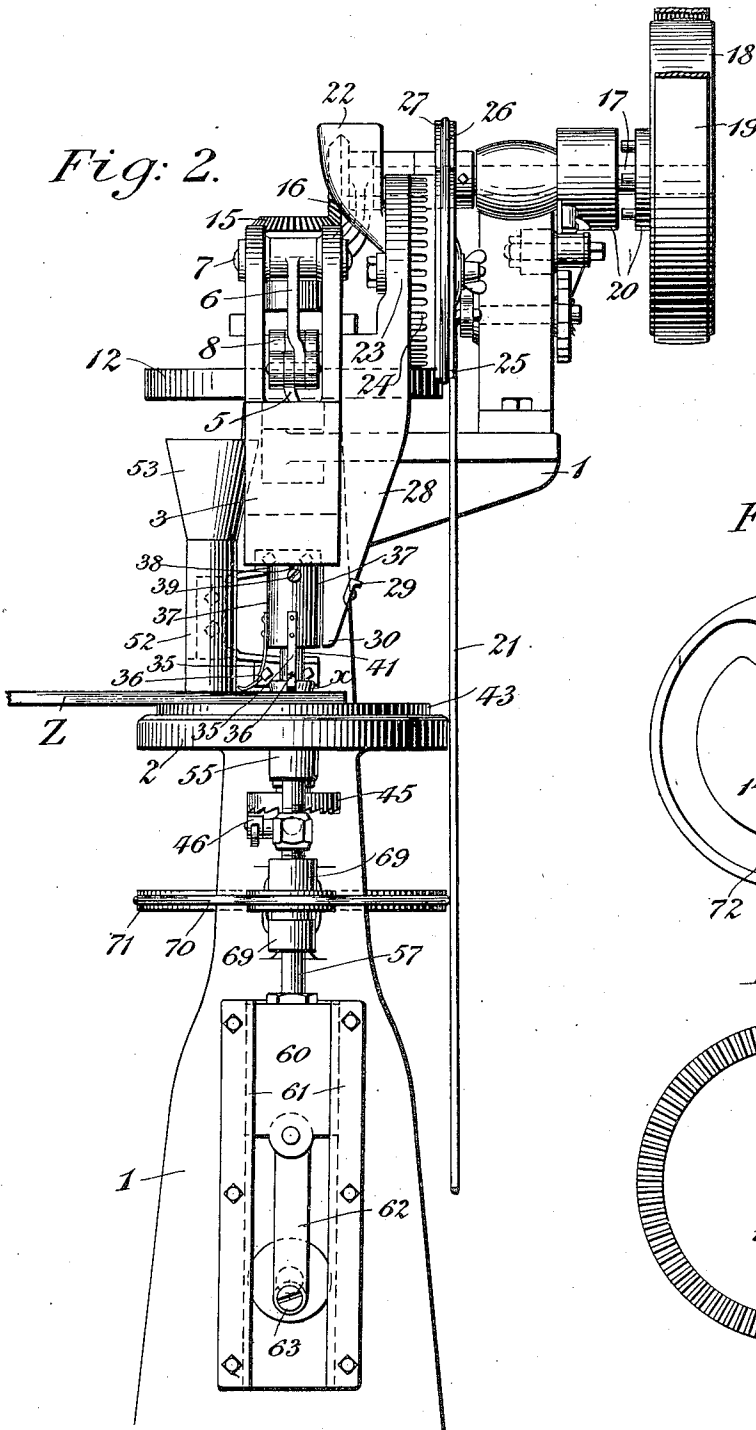


Fig. 4.

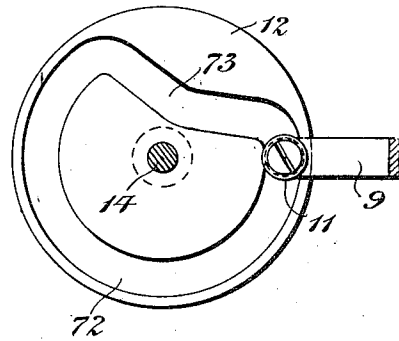
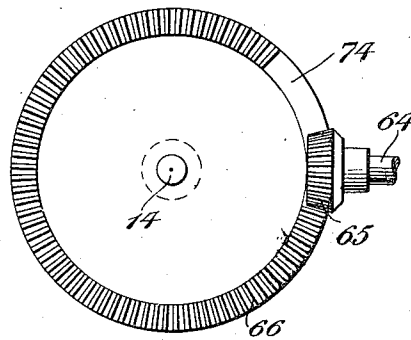


Fig. 5.



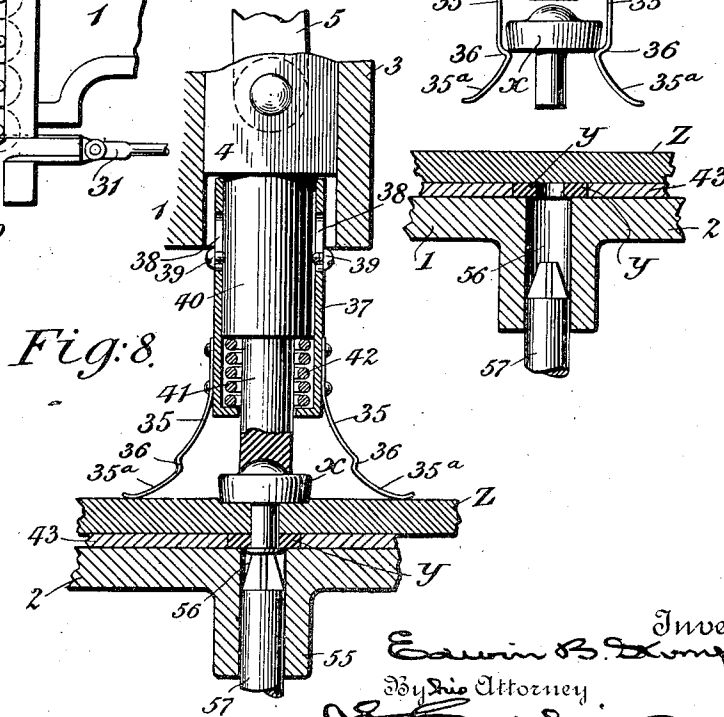
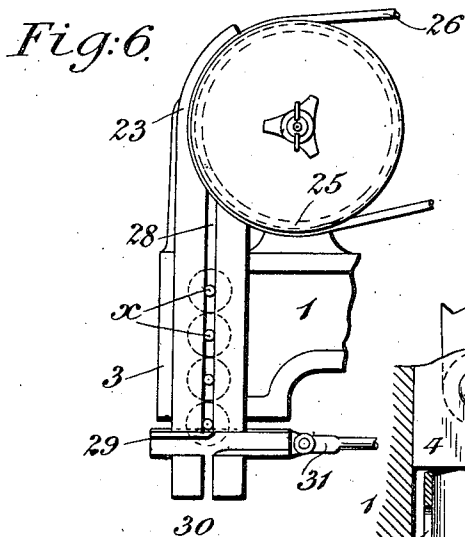
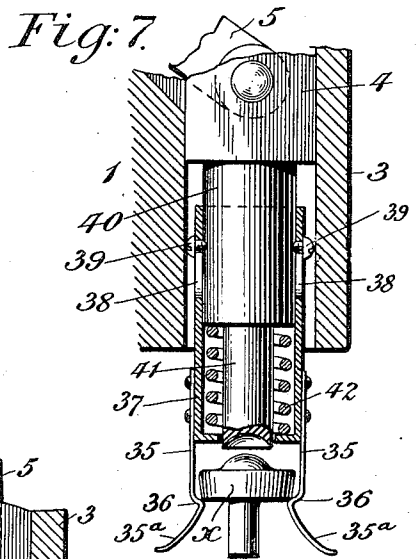
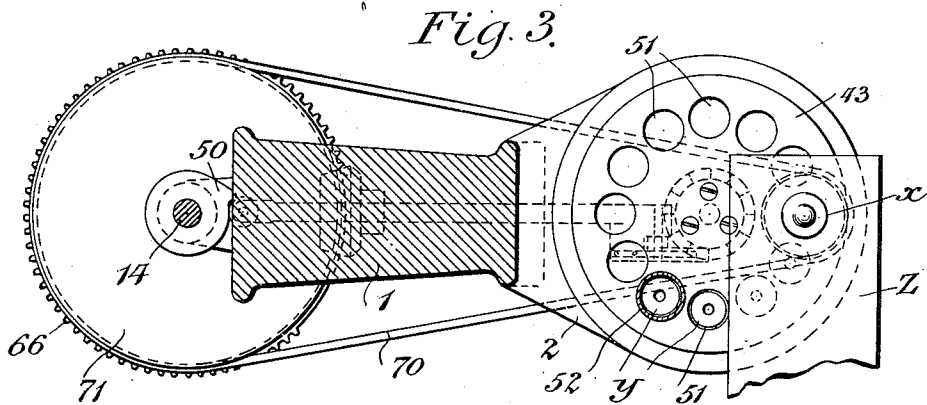
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990,405.

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UNITED STATES PATENT OFFICE.

EDWIN BALL STIMPSON, OF NEW YORK, N. Y., ASSIGNOR TO EDWIN B. STIMPSON COMPANY, A CORPORATION OF NEW YORK.

RIVETING-MACHINE.

990,405.

Specification of Letters Patent.

Patented Apr. 25, 1911.

Application filed April 29, 1907. Serial No. 370,750.

To all whom it may concern:

Be it known that I, EDWIN BALL STIMPSON, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Riveting-Machines, of which the following is a specification.

This invention relates to certain improvements in riveting machines, and more especially in that class of such machines which are particularly designed and adapted for use in connection with rivets having shanks adapted to be upset or bent to afford a secure attachment of the rivet to the material to which it is to be applied, and the object of the invention is to provide a machine of this general character of a simple and comparatively inexpensive nature which shall present certain features of novelty and improvement by reason of which the riveting machine is rendered capable of more rapid and effective operation, whereby a material economy in time and labor is effected and increased convenience is attained in the application of the rivets.

The invention consists, in part, in a machine of this general character having means for setting the rivets and for holding the rivets from movement after they have been applied to the article to which they are to be attached and means, capable of actuation while the rivets are so held from movement, and arranged to upset or bend the shanks of the rivets for securing them in such article.

The invention also consists in a machine of this general character having improved feeding mechanism by means of which washers may be fed for application at the shanks of the rivets so that, when said shanks are bent or upset, the washers will be held thereon in such a manner as to afford a more secure attachment of the rivet to the article to which it is to be applied.

The invention also contemplates certain other novel features of the construction, and combinations and arrangements of the several parts of the improved riveting machine, whereby certain important advantages are attained and the machine is rendered simpler, cheaper and otherwise better adapted and more convenient for use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In the accompanying drawings which serve to illustrate my invention—Figure 1 is a fragmentary side elevation of a machine embodying my improvements; Fig. 2 is a front view of said machine; Fig. 3 is a sectional view taken horizontally through the machine in the plane indicated by the line *a-a* in Fig. 1; Fig. 4 is a detached detail view showing the cam device for actuating the upper rivet setting plunger of the machine; Fig. 5 is a detached detail view showing the gear connection for actuating the riveting tool; Fig. 6 is a fragmentary detail view showing certain features of the rivet feeding mechanism to be hereinafter referred to; Fig. 7 is a fragmentary sectional view, drawn to an enlarged scale, and showing certain features of construction of the upper rivet-setting plunger and of the rivet supporting means adjacent thereto; the parts being shown in raised position, and Fig. 8 is a view similar to Fig. 7, but showing the rivet setting plunger depressed and the riveting tool in position for operation to upset the shank of the rivet.

In these views 1 represents the frame of the improved machine, having a forwardly directed work supporting arm 2, above which is extended a head 3 whereon is mounted, for vertical reciprocatory movement, a plunger 4, the upper end of which is connected with the lower element 5 of a toggle, the upper element 6 of which has pivotal connection as shown at 7, with the head 3, while the said toggle is coupled, at the pivotal connection between its elements, with the forward end of a link 8, the rear end of which is coupled to a slide rod 9, guided for endwise movement as shown at 10 upon the machine frame, and carrying a roller 11, engaged with the groove of a cam 12 held upon a vertically extended shaft 14, journaled on the frame of the machine. The said shaft 14 is extended along a considerable part of the height of the machine as herein shown, and serves for actuating several of the mechanisms as will be hereinafter described, and the upper end of said shaft carries a miter gear wheel 15 meshing with a similar gear wheel 16 held upon a horizontally extended shaft 17 journaled at the upper part of the machine frame and

provided with a pulley 18 adapted for the passage of a belt or band 19 whereby the machine may be driven from any suitable source of power.

20 represents a stop mechanism, which may be of any preferred kind, having link connection as seen at 21 with a treadle or equivalent device (not shown) in such a way that, by pressing upon such treadle, the operator may place the machine in operation for a time corresponding with one rotation of the shaft 17, after which the pulley 18 is disconnected from said shaft and the machine is allowed to come to rest until such time as said treadle shall have been again depressed.

Upon the head 3 of the machine is carried a feed hopper 22, of any preferred kind, wherein a supply of rivets are adapted to be placed in a well known way, and below said hopper is a rounded casing 23 wherein turns a feed wheel or disk 24, held upon a horizontally extended shaft or stud and provided with a grooved wheel or pulley 25, over which one end of a belt or band 26 is extended, the opposite end of said belt or band being passed over a similar grooved wheel or pulley 27 held upon the horizontally extended driving shaft 17, in such a fashion that the feed wheel or disk 24 shall be continuously rotated during the operation of the improved machine. The feed wheel or disk 24 is arranged, when rotated, to segregate the rivets supplied to the hopper 22, and to discharge them, successively and one at a time, into a downwardly extended feed chute or channel 28, down which chute or channel the said rivets are adapted to pass in a well known way to a dog 29, by means of which said rivets are individually cut off or segregated, being discharged singly or one at a time and at regulated intervals, when the dog is actuated, to the lower or discharge end 30 of said chute or channel. As herein shown, the dog 29 is arranged to slide transversely across the feed chute or channel 28 and is normally adapted to support the rivets fed into said chute or channel in a column at the upper part thereof, as shown at *a* in Fig. 6, but when said dog is retracted as will be hereinafter explained completely across the channel 28, the lowermost rivet of the column theretofore supported by the dog is permitted to fall to the lower part 30 of said chute or channel. As herein shown, the dog 29 is coupled with the forward end of a slide-rod 31, guided in the frame for horizontal reciprocatory movement, and normally pressed rearwardly of the machine by means of a spring 32 coiled upon it, in such a way as to maintain the dog extended across the chute or channel 28 to support the column of rivets therein, but the rear extremity of said slide-rod 31 carries a roller 33, adapted to be engaged by a

cam 34 upon the vertically extended shaft 14 whereby, at each rotation of said shaft, forward endwise movement is imparted to the slide rod, to move the dog 29 from its normal position across the chute or channel 28, whereby the lowermost rivet in said chute or channel is permitted to drop down into the lower end of the chute or channel, the spring 32 retracting said slide rod to return the dog to its initial position after the passage of said cam 34. The said lower end portion 30 of the feed chute or channel 28 is bent or curved laterally, and is arranged to guide the rivet cut off or segregated by dog 29 as above set forth, into position between retaining arms or members 35, having shoulders 36 upon which the lower circumferential edge of the head of the rivet are adapted to be engaged for support, as shown in Fig. 7, there being, as herein shown, three such arms or members 35. The said arms or members 35 are herein shown as carried upon a sleeve 37 inclosing the cylindrical lower end portion 40 of the plunger 4, being provided with vertically extended slots 38, with which are engaged screws or pins 39 carried by the cylindrical portion 40 of the plunger. By this construction the said sleeve 37 is made capable of a certain extent of sliding vertical movement, lengthwise of the plunger, and within the lower part of said sleeve 37 is housed or contained a spring 42, coiled around the reduced lower extremity 41 of the plunger with its upper end engaged upon an annular shoulder encircling the plunger at the upper end of said reduced lower extremity 41, while its lower end is engaged upon a shoulder at the base of sleeve 37, the arrangement being such that the tension of said spring 42 is normally exerted to hold the sleeve 37 normally pressed elastically downward upon the plunger, while a certain extent of contrary movement of said sleeve is permitted, dependent upon the length of the slots 38 in which the stops or screws 39 are engaged.

As herein shown, the work supporting arm 2 has a flattened and circular top surface, in close proximity to or in contact wherewith is a feed disk or member 43, mounted upon a vertical stud or pin 44 journaled at the central part of said arm 2 and having at its lower part a ratchet disk 45, the teeth whereof are adapted to be successively engaged by a spring actuated dog or pawl 46, carried upon the forward end of a horizontally extended slide-rod 47, guided for endwise sliding movement in the frame of the machine, and normally pressed rearwardly of the machine by means of a spring 48 coiled around said rod and engaged upon a collar thereon, the rear end of said rod 47 being provided, however, with a roller 49 adapted to be engaged by a cam 50 upon the vertically extended shaft 14, whereby it will be

seen that at each rotation of said shaft 14 a forward movement is imparted to slide rod 47, causing the dog 46 to engage and forwardly move the ratchet wheel 45, together with feed disk or member 43 to an extent commensurate with one tooth of said ratchet wheel 45, the spring 48 serving to return rod 47 and pawl or dog 46 after the passage of said cam, to the initial positions of said parts ready for further movement of the ratchet wheel and feed disk upon the next rotation of shaft 14.

The feed disk or member 43 is provided with an annular series of circular apertures or pockets 51, in number equal to or a divisor of the teeth of ratchet wheel 45, and arranged concentrically around the stud 44, and adapted to receive washers y , and above the feed disk or member 43 at the rear part of arm 2 is erected a feed chute 52 adapted to contain a supply or stack of the washers y , which may be replenished from time to time through the hopper 53 at the upper end of said feed chute 52. The said feed disk or member 43 is of thickness substantially equal to the thickness of the washers fed into the chute 52, and the arrangement of the parts is such that the apertures or pockets 51 of the annular series in disk or member 43 are caused to pass in succession beneath the lower open end of the chute 52, so that in the rotation of said disk or member, the said washers y are successively dropped from the chute 52 into the apertures or pockets 51 of the disk and are carried by the disk in a curved path to the forward end of arm 2.

The forward part of the arm 2 of the machine to which the washers y are thus carried by the movement of the feed disk or member 43, is alined beneath the lower pendent end of the plunger 4, and the proportion and arrangement of parts are such that at each partial turning movement of the feed disk or member 43, imparted by the dog or pawl 46 and its actuating means as above described, one of the apertures 51 of disk 43, carrying a washer y , is stopped below and in vertical alinement with the axis of the plunger 4.

The rivets x are so fed to the arms or members 35, that the shanks or stems of said rivets are caused to depend downward, and in the construction of the improved machine, the parts are so proportioned and arranged that the pendent lower end or shank of the rivet x when held between the arms or members 35, as shown in Fig. 7, will be in vertical alinement with the central opening of the washer y held within the pocket or aperture 51 of feed disk 43 immediately underlying said rivet, and in the downward movement of the plunger 4, actuated from cam 12 as above described, the shank of the rivet so held between the arms or members

35 is adapted to be forced or driven downward through an article or sheet of material laid upon the feed disk as indicated at z in the drawings, in such a way as to set the rivet in place in said article or material, the washer y , supported by the feed disk and alined with said shank performing the functions of a female die to permit the descending shank of the rivet to penetrate the article or material z .

At the underside of the forward end of the work supporting arm 2 there is produced a downwardly extended guide 55 having a bore 56 alined vertically with the axis of the plunger 4, and in the operation of the machine, when the feed disk or member 43 has been actuated to present a washer y beneath the said plunger, with its central opening positioned for the passage of the shank or stem of the rivet x the said washer so positioned will stand over the bore 56 of said guide 55. The said bore 56 being less in diameter, the washer so positioned will be supported by the engagement of its edge portions upon the top surface of the work supporting arm, so that in the descent of the shank of the rivet through the article or material z , the piece punched out of said article or material by the penetration of the shank, will escape by way of the bore 56.

57 represents a riveting tool which may be of any preferred kind, preferably having a serrated riveting surface at its upper end, and the said tool is supported vertically for reciprocatory movement below the work supporting arm 2 with its upper end guided within the bore 56 of the downwardly extended guide 55. The said tool 57 is in axial alinement with the plunger 4, and its lower end has a loose elastic connection with a slide 60, said connection including a collar 57^a on the riveting tool or spindle received loosely in a recess in the top of the slide 60 and abutting on occasion against the underside of an overhanging flange 60^a on the slide, and further including a spiral spring 59 between the collar 57^a and the bottom of the recess in the slide. The slide 60 is held for vertical reciprocatory movement between guides 61 and coupled by a link 62 with a crank 63 upon the forward end of a horizontally extended shaft 64, the rear end of which carries a bevel gear pinion 65 adapted to mesh with a mutilated gear 66 held upon the lower end of the vertically extended shaft 14.

The connection of the tool 57 with the slide 60 is such that said tool is adapted for turning movement independent of said slide, and at its upper part, the shank of said tool 57 has a keyway 67 wherein is engaged a key carried by a grooved wheel or pulley 68, held between spaced collars 69, 69 on the frame, the arrangement being such that said shaft is held to turn in unison with said

wheel or pulley, but is capable of endwise movement independent thereof, the said wheel or pulley being held against such endwise movement by engagement of the collars 69, 69 above and below it.

70 represents a belt or band which has its forward part passed around the wheel or pulley 68, while its rear part is passed around a grooved wheel or pulley 71 held upon the vertically extended shaft 14, in such a way as to communicate the movement of said shaft 14 to turn or rotate the riveting tool 57.

As shown in Fig. 4, the cam 12 for actuating the plunger 4 has its slot wherein the roller 11 of slide-rod 9 is engaged, constructed with a concentric outer portion 72 of considerable length and a comparatively short centrally directed eccentric portion 73, and this arrangement and proportion of the cam groove serves to impart to the plunger 4 a comparatively quick or rapid reciprocatory movement when the roller 11 is engaged with said centrally directed portion 73 of the groove, while said plunger is held stationary or at rest during a comparatively greater period of time in its depressed position as seen in Figs. 1, 2 and 8, when the roller 11 is engaged in the concentric outer part 72 of the cam groove. The mutilated gear wheel 66 is also so set upon the shaft 14, that its mutilated portion 74 comes opposite the gear pinion 65 when the roller 11 of slide-rod 9 comes into engagement with the centrally directed eccentric portion 73 of the cam groove. The stop mechanism 20 is also timed to operate to stop the movement of shafts 17 and 14 when the roller 11 reaches the extreme centrally directed eccentric portion of the cam slot. By this arrangement and proportion of the parts of the improved machine it will be evident that after each operation of the machine to set a rivet, the parts will come to rest with the plunger 4 in raised position as seen in Fig. 7 and with the mutilation 74 of the gear wheel 66 opposite to the gear pinion 65, the roller 11 resting at the same time at the extreme centrally directed portion of the cam groove. In this position of the parts, a rivet x will have been fed into the lower curved portion 30 of the feed chute, and by preference, the parts will be so proportioned that said rivet may seat itself upon the projections or shoulders 36 of the arms 35 with its crown out of contact with the extremity of the reduced part 41 at the lower end of the plunger, as shown in Fig. 7.

The arms or members 35, by which the rivet is supported beneath the plunger in the initial position of the parts, are made from resilient or spring material so as to be adapted to be bent outwardly or apart from each other as shown in Fig. 8, to disengage their shoulders 36 from beneath the

marginal edges of the rivet head, and when the treadle is depressed to set the machine in operation, the first movement of shaft 14 will serve to cause roller 11 to pass out of the eccentric portion 73 of the cam groove, whereby descending movement is imparted to the plunger 4, the sleeve 37, and arms 35, partaking of such movement.

The lower ends of the resilient arms 35 have laterally extended and inclined parts 35^a which are adapted, in the descending movement of the parts, to come in contact with the material or article z laid upon the feed disk or member 43 of the machine, at or shortly after the tip of the rivet shank shall have come into contact with said article or material, and by the engagement of such laterally inclined parts 35^a of the resilient arms upon such material or article, it will be evident that as the descending movement of the parts is concluded, and the shank of the rivet x shall have been caused to penetrate through said material or article and through the central aperture of the washer so as to protrude its tip into the bore 56 of the guide 55, above the riveting tool 57, the said resilient arms 35 will have been thrown or pressed laterally apart from each other as shown in Figs. 1, 2 and 8 so as to disengage their shoulders 36 from beneath the rivet head, and to permit the latter to be pressed tightly by the plunger against the top surface of the material or article z in which the rivet is to be set. During this action of the parts, the gear wheel 66 has been turning with its mutilation 74 opposite the pinion 65, so that no movement will have been imparted to shaft 64 and consequently the riveting tool 57 will have remained quiescent so far as concerns its reciprocatory movement, but as soon as the plunger 4 shall have been depressed to its fullest extent to cause the rivet x to penetrate the material or article z as above described, the roller 11 will have reached the concentric portion 72 of the groove of cam 12, whereby the plunger will be held depressed and the mutilation 74 of gear wheel 66 will pass out of registry with pinion 65, whereupon the toothed faces of said gear 66 and pinion 65 coming into mesh will result in the transmission of movement from shaft 14 to shaft 64. The gear wheel 66 being of greater diameter than pinion 65, it follows that upon the meshing of said gears, the shaft 64 will be driven at a comparatively high speed, whereby rapid reciprocatory movement is imparted to the slide 60 and to the riveting tool 57 connected therewith in such a manner as to cause the serrated upper end of said tool to strike a rapid succession of blows upon the protruding lower end or tip of the shank of rivet x below washer y , while said rivet is held securely in position by the depressed

plunger 4. As the shaft 14 rotates, the belt or band 70, and wheels 71 and 68 on said shaft and on the shank of the riveting tool, respectively, insure the rotation of said shank in unison with said shaft so that the riveting tool will be rotated simultaneously with its reciprocation as above described, whereby the protruding lower end or tip of the rivet shank will be neatly and effectively upset and expanded beneath the washer to afford a secure attachment of the rivet to the material or article z in which it was desired to set the same. When the rivet shall have been set as above described, the shaft 14 will have been so turned as to cause the mutilation of gear 66 to again come into registry with the pinion 65, whereby the reciprocatory movement of the riveting tool 57 will be stopped, and at the same time the roller 11 of slide-rod 9 will have passed around the concentric portion 72 of the groove of cam 12, and will enter the centrally directed portion 73 thereof, so as to cause the plunger 4 to be elevated to its initial position so that the material or article z in which the rivet has just been set may be removed from the feed disk 43 or adjusted thereon as desired in position to receive another rivet. It is preferable, though not essential that the mechanism for feeding the washer y and rivets x be adjusted to operate upon the upstroke of the plunger.

From the above description of my improvements it will be seen that the riveting machines constructed according to my invention are of an extremely simple and comparatively inexpensive nature and are especially well adapted for use by reason of the simplicity and convenience of their operation and of the economy in time and labor afforded by the elimination of such preliminary operations as punching the holes for the rivet shanks and applying the rivets and washers separately from the operation of riveting or upsetting the shank, and it will also be obvious from the above description that the machine is capable of considerable modification without material departure from the broad principles and spirit of the invention, and for this reason I do not desire to be understood as limiting myself to the precise form and arrangement of the several parts herein set forth in carrying out my invention in practice.

In conclusion, one of the points of view from which the machine and its operation may be looked at is the following:—It consists of the described interconnection and coördination of plunger, washer-feed and riveting spindle, whereby the plunger in its reciprocations is free of the work for a certain period of time X and is down in contact with the rivet-head to act as an anvil for a certain period Y . During the plun-

ger's elevated period X , the coördination is such that the washer-feed operates to feed a washer between the plunger and riveting spindle which latter during the same X period is quiescent. On the other hand during the down or Y period of the plunger the reverse is true that the washer-feed is quiescent, whereas the riveting spindle is in operation.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. A riveting machine comprising two parts, one of which is a support for a rivet to be set and the other of which is a support for material in which the rivet is to be set, one of said parts being movable toward and from the other, said material supporting part having an aperture in registry with the rivet held by said rivet supporting part, means for feeding washers adjacent to the material supporting part and comprising a feed member rotatively mounted on said part and provided with a concentric series of apertures adapted, in the rotation of said member, to successively register with the aperture of said material supporting part, and a riveting tool having its end portion alined with the aperture of the material supporting part and adapted for movement in relation to the rivet when the first-named parts are approached.

2. A setting machine comprising a member movable to and from the material; rivet supporting arms on said member extending toward the material, said arms having a normal tendency toward each other to uphold a rivet between them with its shank extending toward the material, said arms being adapted to be pressed apart to release the rivet when their ends come in contact with the material on the motion of the member toward said material, said member at the same time being adapted to contact with the head of the rivet to seat its shank in the material; a support for the material having an opening therethrough in line with the rivet supporting arms on the member; and riveting means adapted to work in the opening in said support and to upset the shank end while the member is in contact with the rivet head.

3. A setting machine comprising a member movable to and from the material; rivet supporting arms on said member extending toward the material, said arms having a normal tendency toward each other to uphold a rivet between them with its shank extending toward the material, said arms being adapted to be pressed apart to release the rivet when their ends come in contact with the material on the motion of the member toward said material, said member at the same time being adapted to contact with the head of the rivet to seat its shank in the ma-

material; a support for the material having an opening therethrough in line with the rivet supporting arms on the movable member; means adapted to feed washers one at a time 5 between the material, and said support, and into line with the opening in the latter; and riveting means adapted to operate in the opening in said support and to upset the shank end while the plunger is in contact 10 with the rivet head.

4. A setting machine comprising a plunger adapted to be moved to and from the material, said plunger having rivet supporting arms extending beyond its ends, 15 adapted to support between them a rivet with its shank in line with the plunger and extending outwardly between the extremities of the supporting arms, said arms having a normal tendency toward each other to support the rivet and being adapted to be 20 pressed apart to release the rivet as the plunger brings the arms in contact with the material, said arms having a movable connection with the plunger permitting it to 25 move into contact with the rivet head after the arms have contacted with the rivet material; and means adapted to feed rivets into position between the rivet supporting arms, one each time said arms are out of 30 contact with the material.

5. A setting machine comprising a plunger adapted to be moved to and away from the work and on its motion toward the work to carry a rivet shank into position through 35 the material; means adapted to operate said plunger into positions free of the work for a period X and into contact with the rivet head with its shank through the material for a period Y; means adapted to upset said 40 rivet shank comprising a reciprocating spindle; means adapted to operate said spindle to reciprocate it for a period Y and to permit it to remain quiescent for a period X; and an interconnection between said plunger 45 and said spindle operating means adapted to cause their X periods to come together, also their Y periods.

6. A setting machine comprising a plunger adapted to be moved to and away from 50 the work and on its motion toward the work to carry a rivet shank into position through the material; means adapted to operate said plunger into positions free of the work for a period X and into contact with the rivet

head with its shank through the material 55 for a period Y; means adapted to upset said rivet shank, comprising a reciprocating spindle; means adapted to operate said spindle to reciprocate it for a period Y and to 60 permit it to remain quiescent for a period X; an interconnection between said plunger and said spindle operating-means adapted to cause their X periods to come together, 65 also their Y periods; rivet holding means on the plunger adapted to detachably support a rivet with its shank extending toward the work; and means adapted to feed rivets to the rivet supporting means on the plunger when said plunger is away from the work.

7. A setting machine comprising a washer 70 feed adapted to feed washers one at a time into line with a plunger and a spindle located respectively on either side of the washer so fed; operating means for said 75 washer feed adapted to give it an operation comprising a period X during which it feeds the washer into position between the plunger and spindle, and a period Y during 80 which it remains quiescent before the next feed motion X; a plunger movable to and away from the work and adapted on its motion toward the work to carry a rivet shank into position through the work; means 85 adapted to operate said plunger into positions free of the work for a period X and into contact with the rivet head with its shank through the material for a period Y; means adapted to upset said rivet shank 90 comprising a reciprocating spindle; operating means for said spindle adapted to reciprocate it for a period Y and to permit it to remain quiescent for a period X; and connections between said operating means 95 for the washer feed, the plunger and the reciprocating spindle, adapted to cause the feed motion X of the washer means to take place during the X period of the operation of the plunger and spindle, and adapted further to cause said X periods of the operation 100 of the plunger and spindle to take place together, also their Y periods.

In witness whereof I have hereunto signed my name this 27th day of April 1907, in the presence of two subscribing witnesses.

EDWIN BALL STIMPSON.

Witnesses:

WILLIAM J. FIRTH,
H. G. HOSE.