

(No Model.)

4 Sheets—Sheet 1.

H. S. CROMBIE.
RIVET SETTING MACHINE.

No. 552,043.

Patented Dec. 24, 1895.

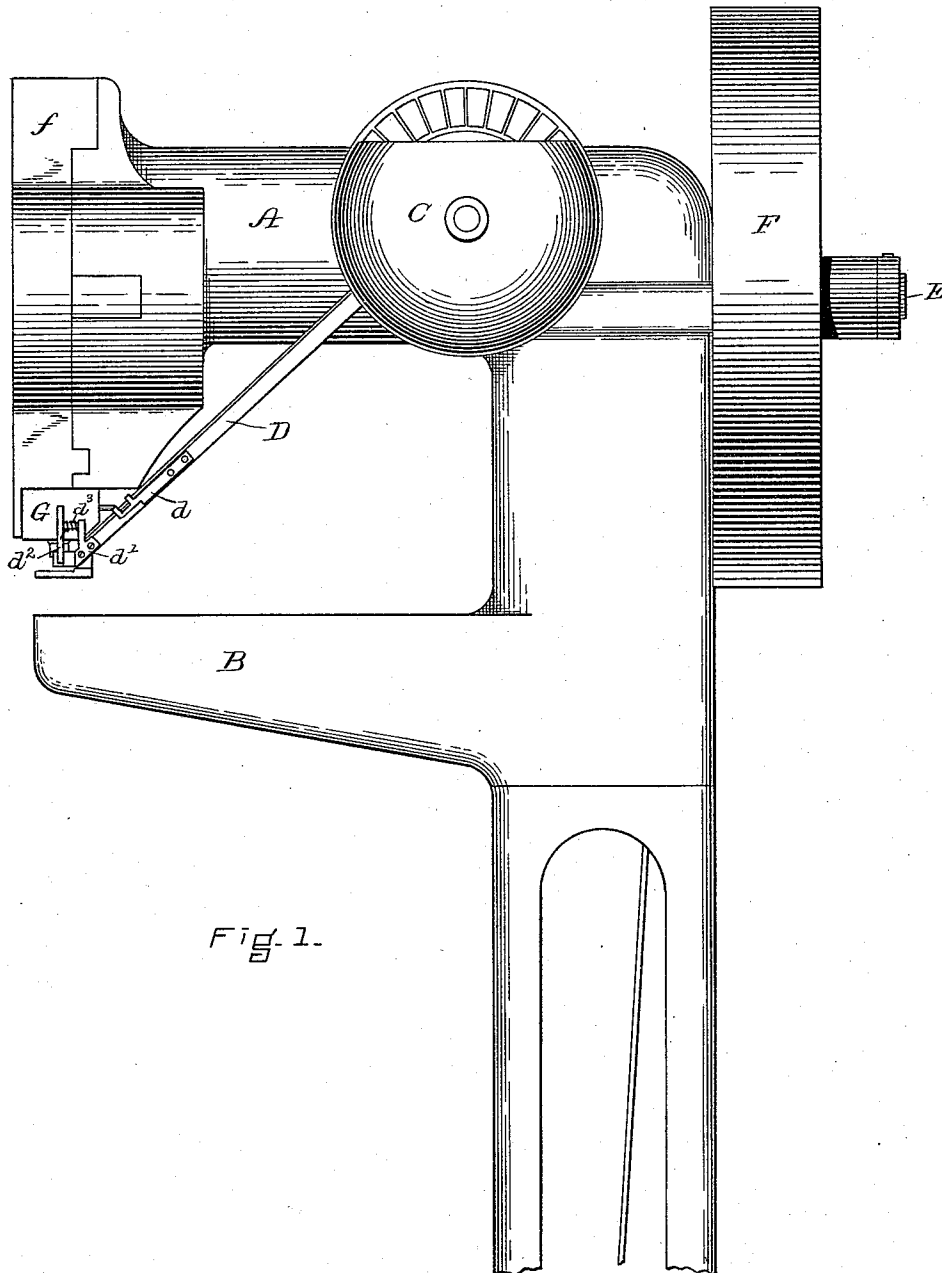


Fig. 1.

WITNESSES.

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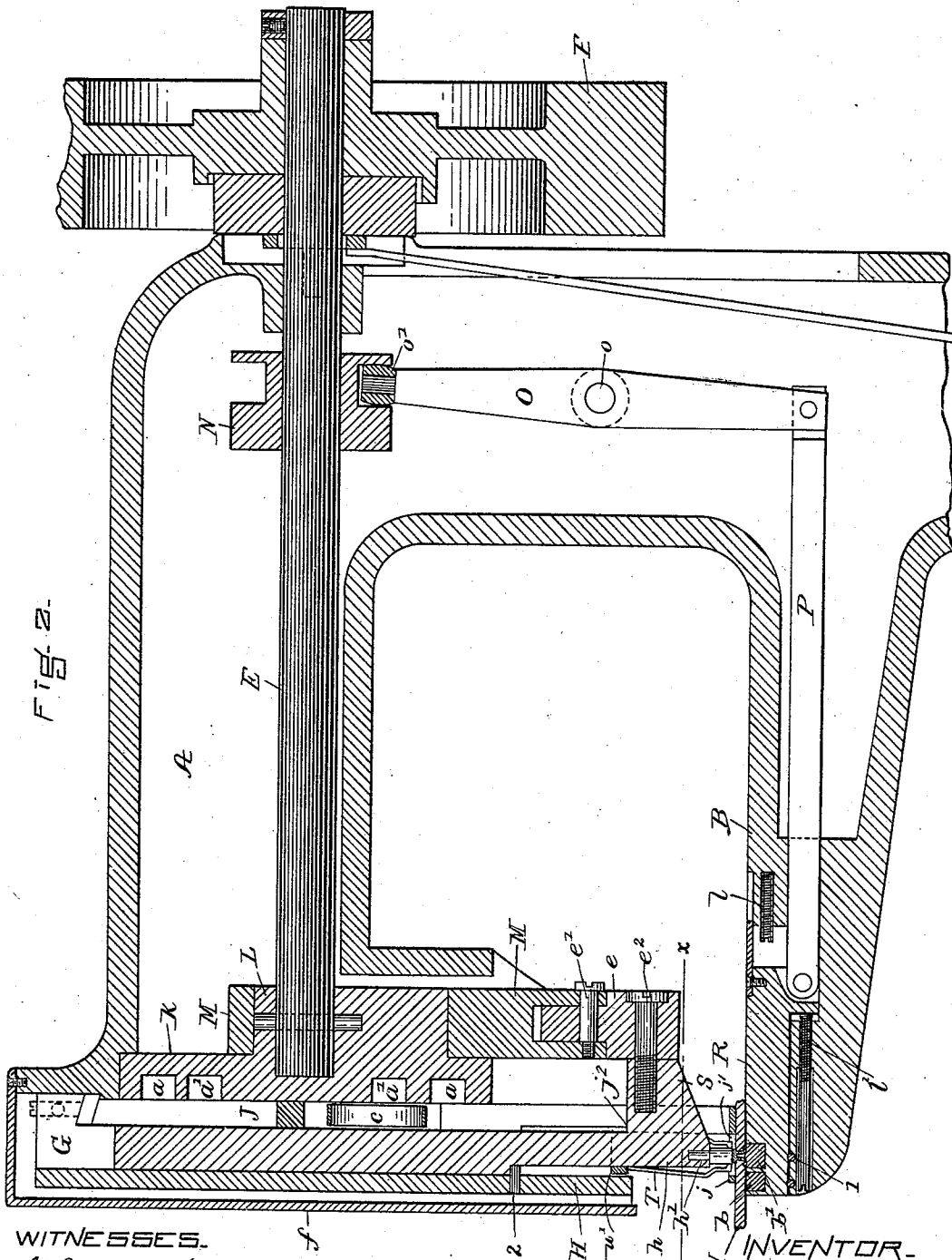
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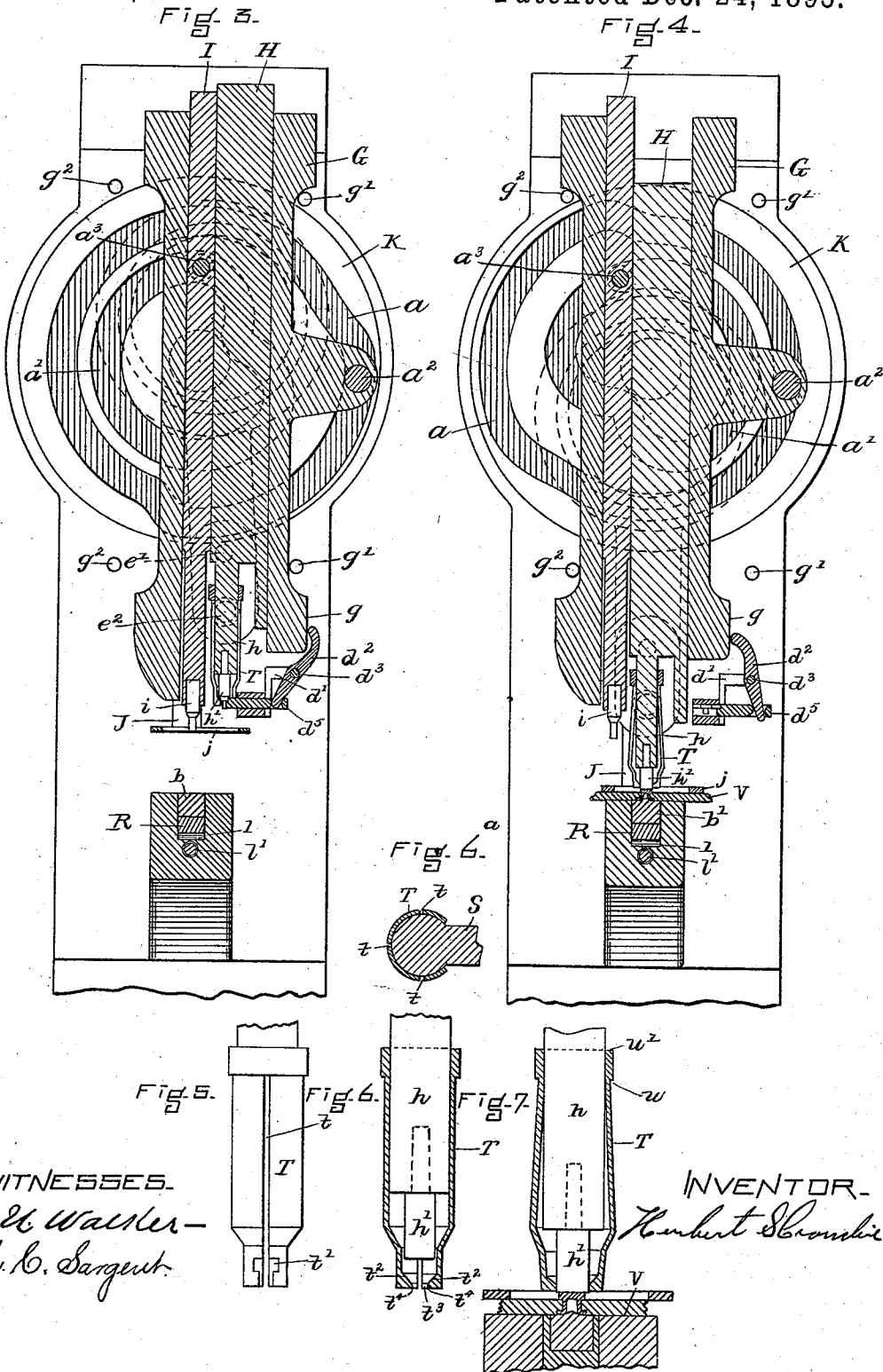
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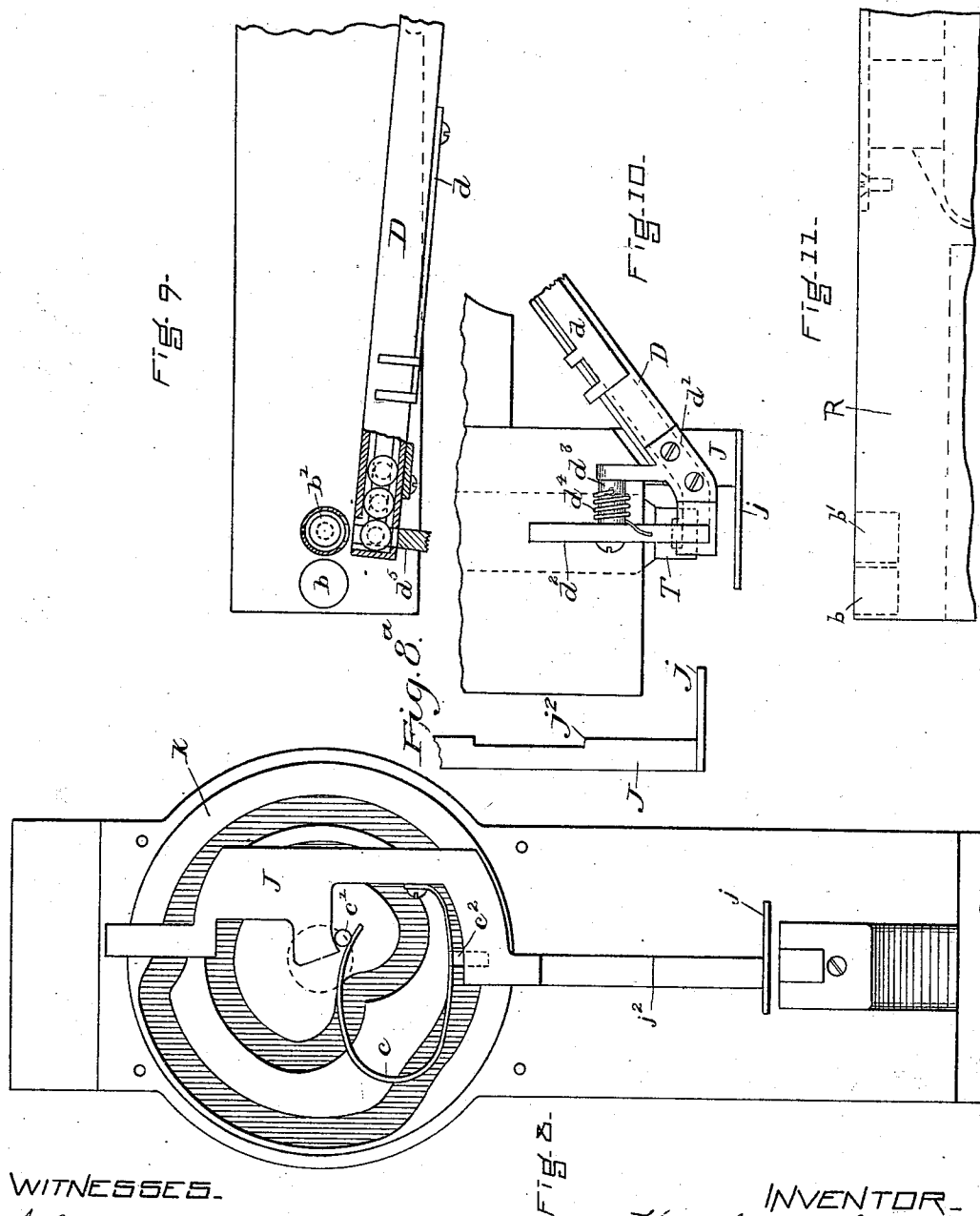
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UNITED STATES PATENT OFFICE.

HERBERT S. CROMBIE, OF WALTHAM, MASSACHUSETTS, ASSIGNOR TO THE
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RIVET-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 552,043, dated December 24, 1895.

Application filed March 1, 1895. Serial No. 540,205. (No model.)

To all whom it may concern:

Be it known that I, HERBERT S. CROMBIE, a citizen of the United States, residing at Waltham, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Machines for Setting Hollow-Shank Rivets, of which the following is a specification.

My invention relates to improvements in machines for perforating and setting rivets having hollow shanks in a desired material, as leather, and to a class of such machines in which a sliding guide carries a punching device and a rivet-setting device backward and forward to perforate the material and then set the rivet in the same; and the objects of my improvement are to do away with much elaborate mechanism and to provide a simpler and more easily-operated mechanism for these purposes by improvements consisting in new parts of the apparatus and new combinations of the parts, and a new mode of operation of the parts and combinations. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a vertical section through the operating pulley-shaft, sliding guide, anvil and rivet. Fig. 3 is a vertical section through the sliding guide and the perforating and riveting mechanisms when the perforating and riveting mechanisms are both elevated. Fig. 4 is a vertical section substantially like Fig. 3 in the position when the perforating-bar has just been elevated and the riveting mechanism has driven the rivet into place. Figs. 5, 6, and 7 are details showing the clutching mechanism or thimble and riveting device; Fig. 6^a, a section of T and S on line *x x*, Fig. 2. Fig. 8 is a front view showing the face-cam, the slide G and parts shown in Figs. 3 and 4 being removed, and also showing the presser-foot and the devices for elevating and lowering the same, and its construction in order to control the thimble of the riveting-bar. Fig. 8^a is a detailed view of the presser-bar. Fig. 9 is a plan of a raceway, broken away and showing a part in section. Figs. 10 and 11 are details, and may be viewed as one drawing.

Similar letters and figures refer to similar parts throughout the several views.

A is the frame of the machine; B, the arm of the frame upon which the anvil is carried; C, the hopper for receipt of the rivets; D, the raceway; E, the shaft; F, the driving-pulley; *f*, the face-plate. The general construction of these parts is so much like well-known mechanism as to require no further description at this point.

The shaft E, Fig. 2, has the edge cam N by which is operated, by cam-roll *o'*, the lever O, which is pivoted to the frame at *o* and carries the bar P, by which the anvil part R of the machine is alternately moved forward and back to offer either the punching-anvil *b* or the riveting-anvil *b'*. The anvil part R is retained solidly in its positions by means of the center catches 1, and detained by the stops *l* and *l'* respectively. The shaft E has the face-cam K and also carries a large eccentric L, operating the riveting-bar to which its projecting angle-piece S connects by the eccentric-strap M and link *e*.

The sliding guide G, limited by the stops *g'* and carrying the punching and riveting-bars I H, is in Figs. 2 and 4 shown in the position when the upper riveting-die *h'* has compressed the rivet. The presser-foot *j* is here shown upon the material V. The punch *i* is carried upon the punch-bar I and riveting-die *h'* upon the riveting-bar H. The face-cam K, as will be understood from Figs. 2, 3, 4 and 8, has the cam-grooves *a a'*, in which move the cam-rolls *a²* of the guide G and *a³* of the punch-bar I. The grooves *a a'* in the face-cam K, as said cam revolves control the side motions of the punching and riveting bars contained in the guide G by means of the cam-roll *a²* and the up-and-down-motion of the punch-bar I by means of the cam-roll *a³* traveling in the cam-groove *a'*. The up-and-down motions of riveting-bar H are derived from the large eccentric L, to which the strap M fits, to which the riveting-bar H is attached by the screw *e²* holding the link *e* firmly to the projection S of the riveting-bar, as best shown in Fig. 2.

In an application of even date herewith I have shown a friction or thimble device in connection with a riveting-bar. I use a differently-constructed thimble in my present in-

vention, modified to fit it for use with different devices, as shown herein.

The friction device T will be best understood from Figs. 5, 6, 6^a and 7, in which *u*' is the top of the thimble, *u* a shoulder, while *t* indicates vertical cuts in the thimble, of which there are preferably four, for effecting a grip upon bar *h*, and beneath one of these cuts is a horizontal slot *t*' to enable the rivet-head to pass beneath the riveting-bar. This friction-thimble T has an angle-guide *t*², and in its end the hole *t*³ between the parts *t*⁴. The position of the friction device when the presser-bar has just driven the rivet home is best shown in Fig. 7. In Fig 6^a it will be seen that T is cut away sufficiently to allow the part S of the riveting-bar H to descend far enough, and I thereby also obtain a spring-friction between H and T.

When the riveting-bar H is depressed, it will force the upper die *h*' against guides *t*² in the friction device T, and through the friction device, simultaneously compressing the rivet into the material. The same situation is shown in Fig. 4. Upon the withdrawal of the riveting-bar H it will assume the position best shown in Figs. 3 and 6, from which it will be seen that the upper riveting-die *h*' will be withdrawn above the opening or slot *t*', at which the rivet is to enter the friction-clutch.

The riveting-bar as a whole will be seen to be composed of the part H (having the projecting angle-piece S into which fits the pin *e*² connecting it by link *e* and screw *e*' to the eccentric L) and the reduced portion *h*, into which is fitted or screwed the upper die part *h*'. The friction clutch or thimble T clasps the part *h*, (see Figs. 3, 6, and 7,) allowing the rivet to enter by slot *t*' and be sustained by the angle-guide *t*² until by descent of H by revolutions of eccentric L the point *h*' is driven through the aperture *t*³, the descent of the thimble being limited by the shoulder *u* upon the thimble T making contact with the shoulder *j*² of the presser-bar J, preventing the end *t*⁴ from coming in contact with presser-foot *j*. In the position shown in Figs. 4 and 7 the die *h*' is clasped by the parts *t*⁴ so tightly as to carry the thimble T up with the bar H, until said thimble is stopped by the stop 2 on the slide G, as in Fig. 2.

Referring now to the raceway, the escapement *d* is unnecessary, the supply of the rivets being effected by rivet-carrying bar *d*⁵, the support *d*', the rocking lever *d*² upon the stud *d*³ controlled by the spring *d*⁴, Fig. 10, rocking lever *d*² being operated by lower end *g* of slide G, Figs. 3 and 4.

The presser-foot mechanism will best be seen in Fig. 8 (see also Figs. 2 and 8^a) as operated upward by pin *c*' bearing against the bar J, and downward by means of the spring *c*, having the support *c*², and pressing against the pin *c*', which is upon face-cam K, so that as the shaft E revolves the presser-foot will be raised and lowered by the pin *c*',

and also control the downward motion of the thimble T, as above set forth.

Having described the parts I will now briefly refer to the operation of the parts of the machine.

The machine being in the position indicated in Fig. 3, upon rotation of the pulley F and revolutions of the shaft E the anvil *b* will be brought beneath the punching-bar *i*, which by the cam movement will be made rapidly to descend upon and perforate the material V. By means of the edge cam N the anvil-carrying part R will be then carried forward so as to bring the riveting-die *b*' beneath the riveting-bar H and its upper die *h*', and as the guide G, by the cam movement above described, is moved forward and the punch-bar I elevated the riveting-bar H will be caused to descend until the portion or upper riveting-die *h*' is forced through the clutch or thimble device T, so as to expand its parts *t*² and allow the part *h*' to drive the head of the rivet hard upon the material to be fastened and leave the die *h*' tightly clasped by the parts *t*⁴. Simultaneously with this double movement of the punch and the riveting-bar the presser-bar J and its presser-foot *j* are brought down upon and hold the material in place. It will thus be seen that by means of the friction-thimble and riveting-bar combination shown in Figs. 5, 6, and 7, and constituting the riveting-bar devices, combined with the punch-bar I, as described, and with the presser-bar J, as shown, when so combined with the presser-bar J and with the slide G as to enable the operation of all four by the rotation of the shaft E, I am able to provide four operations. In addition to these devices and combinations, my machine being provided with the ordinary raceway D, receives the hollow-shank rivets from the hopper C and conveys them into proximity with the slot *t*' in the thimble or friction device T, as shown in Fig. 9. At this point, by means of the rocking lever *d*², operating as an escapement, they are made to pass from the raceway through the slot *t*' into the friction device beneath the riveting-bar. Thus I have the following mode of operation: The pulley F being rotated, rotates the shaft E, which, by means of the edge cam N, operates through the pivoted levers O P the anvil-carrying part R, so as to present the anvil-dies *b* and *b*' to the punch-bar and the riveting-bar alternately. By the same rotation, by means of the pin *c*¹ and the spring *c*, as shown in Fig. 8, the presser-bar J is made to alternately press and release the material to be perforated and riveted, the thimble T is limited in its upward movement by its top *u*' coming in contact with pin 2, Fig. 2, and in its downward movement by its shoulder *u* making contact with shoulder *j*² of bar J. By means of the face-cam K and its parts as hereinbefore explained, and as particularly shown in Figs. 3 and 4, the guide G is caused to move forward and back correlatively with

these up-and-down movements of the presser-foot, punching-bar and riveting-bar, so that I translate the motion from my pulley into four motions; first, the horizontal to-and-fro motion of the guide G between the stops g' and g^2 caused by cam-roll a^2 in cam-groove a ; second, the up-and-down movement of the presser-bar J caused by pin c' and spring c ; third, the up-and-down movement of the punch-bar I caused by cam-roll a^3 in cam-groove a' , and, fourth, the up-and-down movement of the riveting-bar H caused by eccentric L connected to part S, as described. In order to secure these motions, the cams and cam-rolls must, of course, be so constructed and arranged with reference to each other as to allow these movements to take place in the following order, viz: As the material v is brought into proper position, it will be caught and held by the presser-foot V j and thereupon the punch-bar I will descend and perforate it, and, as the punch-bar ascends, the presser-bar still remaining in position, the rivet-carrying bar d^b will force a rivet from the race way through the thimble-slot t' , and the riveting-bar H will force its small end h carrying the upper riveting-die a' downward until it expands the parts t^2 of the clutch mechanism T and drives the head of the rivet into the material. As the riveting-bar H and presser-bar I ascend, the material is advanced for insertion of another rivet.

Having thus described my invention, I do not claim the many parts of this machine which are old.

The pulley-shaft and cam mechanism, broadly considered, are, of course, not my invention, while the raceway is simply adjusted to the particular form of rivets for which my machine is to be used; but my combination of mechanism for obtaining the four-fold co-incident or simultaneous movements above described by translation from a revolving shaft, I have not found to exist before in the art; also, although presser-bars and punch-bars are well-known devices, they have never before, so far as I know, been constructed, nor been combined in point of time and operation as I construct and combine them, with riveting devices composed of the thimble T, and the riveting-bar H h h' ; which riveting device also, so far as I know, does not exist in the state of the art.

I do not mean to confine myself to the exact mechanical construction shown, as variations may be made quite within the scope of my invention. For instance, although I have shown the thimble T as cut away to enable the descent of angle-piece S, I might lengthen the bar H, so that the projection S would not come down to the top of the thimble, at the same time, of course, increasing the space or opening between the part B and the part A, Fig. 1, and lengthening the lever O accordingly.

What I desire to protect by Letters Patent and to claim is—

1. For a rivet-setting machine, a riveting-bar composed of the bar H, the angle-piece S, upon the lower end of the riveting bar, and the link e , pin e^2 , and screw e^3 , for connecting said angle-piece S with an eccentric operating the riveting-bar, and the diminished part h , and the upper riveting die h' ; substantially as described and shown.

2. For a rivet-setting machine, the friction thimble or clutch T, constructed with a ring-head, having the top u' , and shoulder u , the vertical slots t , extending from the base to the ring-head, the horizontal slot t' , the angle-guide t^2 , and the aperture t^3 ; substantially as described and shown.

3. In a rivet-setting machine, the combination of a riveting bar having a diminished portion and an upper die thereon, with a friction device having a ring-head preferably cut away as shown, several vertical friction slots, a horizontal slot for admission of the rivet-head, and a lower chamber of nearly the diameter of the upper die of the riveting bar gradually narrowing to an aperture normally of the size of the shank of the rivet, and smaller than the rivet-head; substantially as described and shown.

4. In a rivet-setting machine, a rivet-holding and driving device composed of the friction thimble T, for guiding the riveting bar, and also holding the rivet in place for the operation of said bar, having a ring-head and beneath it the vertical slots t , a horizontal slot t' , angle-guides t^2 , aperture t^3 , and parts t^4 , and a riveting bar H, having the reduced part h , and the upper riveting bar h' ; substantially as described and shown.

5. In a rivet-setting machine, in combination with a pulley and shaft mechanism, an eccentric L to carry the riveting-bar, a face-cam K constructed with two cam-grooves for the cam-rolls of a slide G and of a punch-bar I, a riveting-bar H having the angle-piece S by which it is to be connected with said eccentric, a punch-bar I, a cam-roll therefor running in one of the grooves of said face-cam, a sliding guide G having a cam-roll running in the other cam-groove of said face-cam and carrying said punch-bar I and said riveting-bar H; substantially as described.

6. In a rivet-setting machine, the combination with a pulley and shaft mechanism of a face-cam K upon said shaft, a presser-bar J, a pin c' upon the face-cam K to operate said presser bar, a spring c and a support c^2 therefor, all so combined that the pin c' in the revolution of said cam upon said shaft will bear upon said spring c and thereby lower said presser-bar in proportion to the thickness of the material to be riveted; all substantially as described.

7. In a rivet-setting machine, in combination with a pulley and shaft mechanism, a face-cam upon the end of said shaft having two cam-rolls, a sliding guide operated by said face-cam, a presser-bar and a punch-bar to be operated by said face-cam, a riveting-bar con-

ected with the eccentric upon said shaft, and an eccentric carried upon said shaft and to be operated thereby in connection with said face-cam; substantially as described.

- 5 8. A rivet-setting machine composed of a combination with a pulley and shaft mechanism, of the horizontal shaft E; the cam N, lever O and bar P for reciprocating an anvil; an anvil composed of the part R, dies *b*, *b'*,
10 and having proper catches; an eccentric L near the end of the main shaft and a strap M connected thereto to operate a riveting-bar; a face-cam K having the cam-grooves *a*, *a'*,
15 for operating a sliding guide G, and a punching bar I; a presser-foot J operated by a pin *c'* upon said face-cam and having the shoulder *j*² to contact with the shoulder *u* of thimble T; a riveting-bar H, having a projecting angle-

piece S, whereby it may be connected to said strap M and eccentric L; a punching bar I 20 having a cam-roll and operated by said face-cam K; a sliding guide G carrying said punching and riveting bars and having a cam-roll to gear with face-cam K; a thimble T, constructed and operating in connection with 25 said presser-bar J; substantially as described, to movably clasp the riveting-bar and also sustain the rivet until the descent of said riveting-bar; all substantially as described.

In witness whereof I have hereunto set my 30 hand this 28th day of February, 1895.

HERBERT S. CROMBIE.

In presence of—

NATHANIEL U. WALKER,
L. C. SARGENT.