

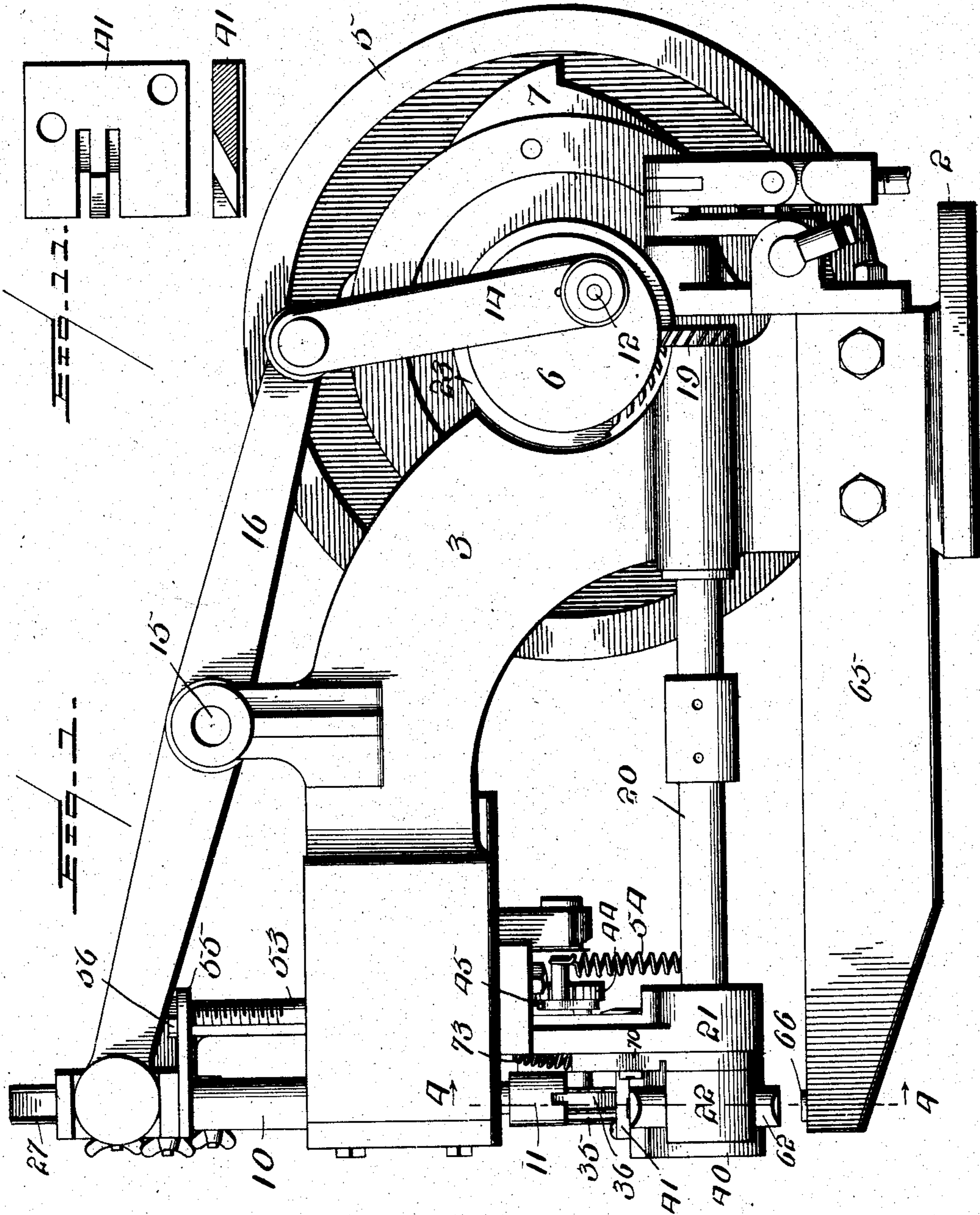
No. 790,186.

PATENTED MAY 16, 1905.

R. COATES & E. A. SUVERKROP.  
MACHINE FOR SHAPING AND SETTING METALLIC FASTENERS.

APPLICATION FILED JULY 1, 1903.

4 SHEETS—SHEET 1.



WITNESSES:

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*E. R. Ruffer*

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*Robert Coates, and  
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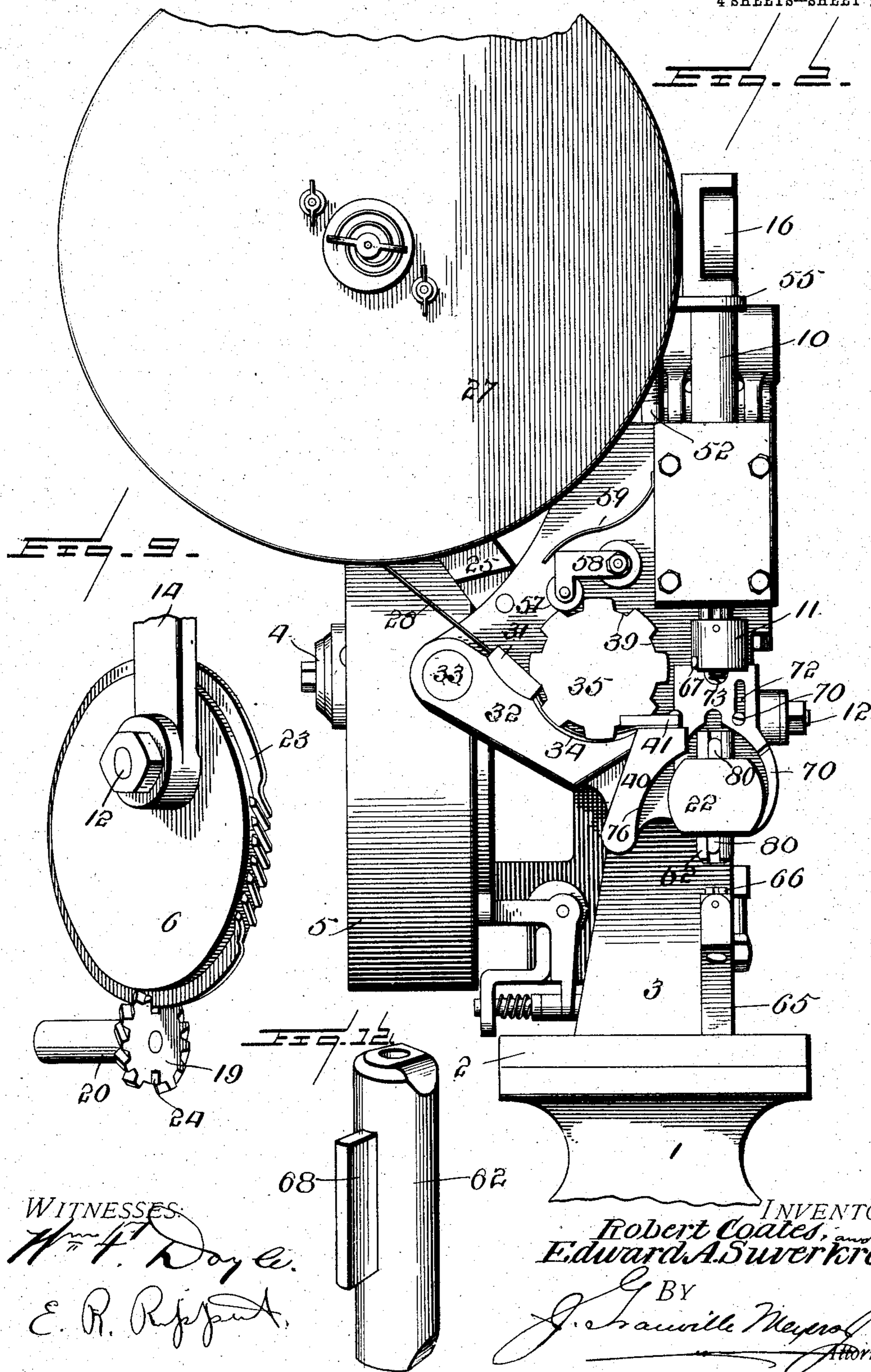
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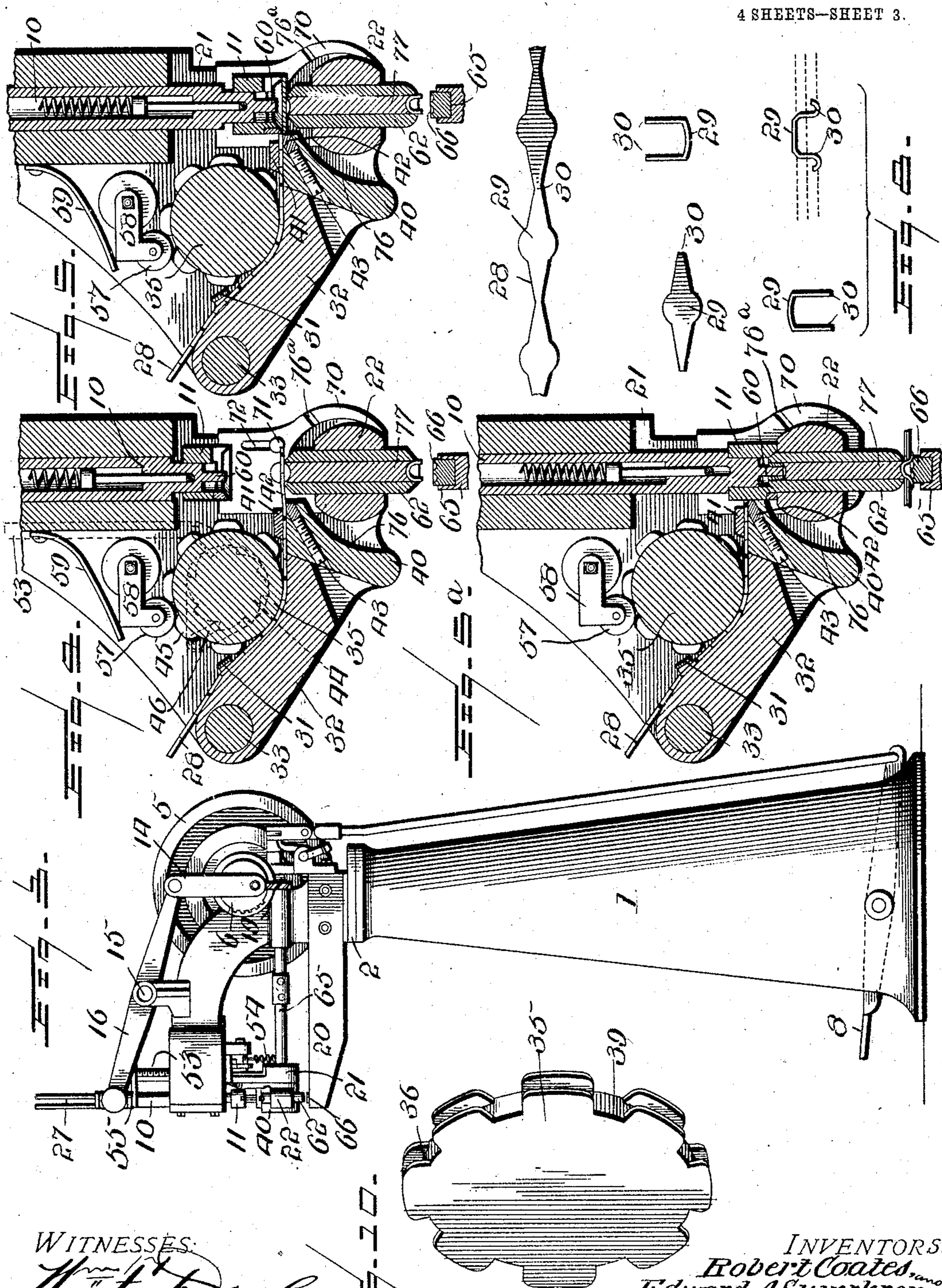
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4 SHEETS—SHEET 3.



WITNESSES:

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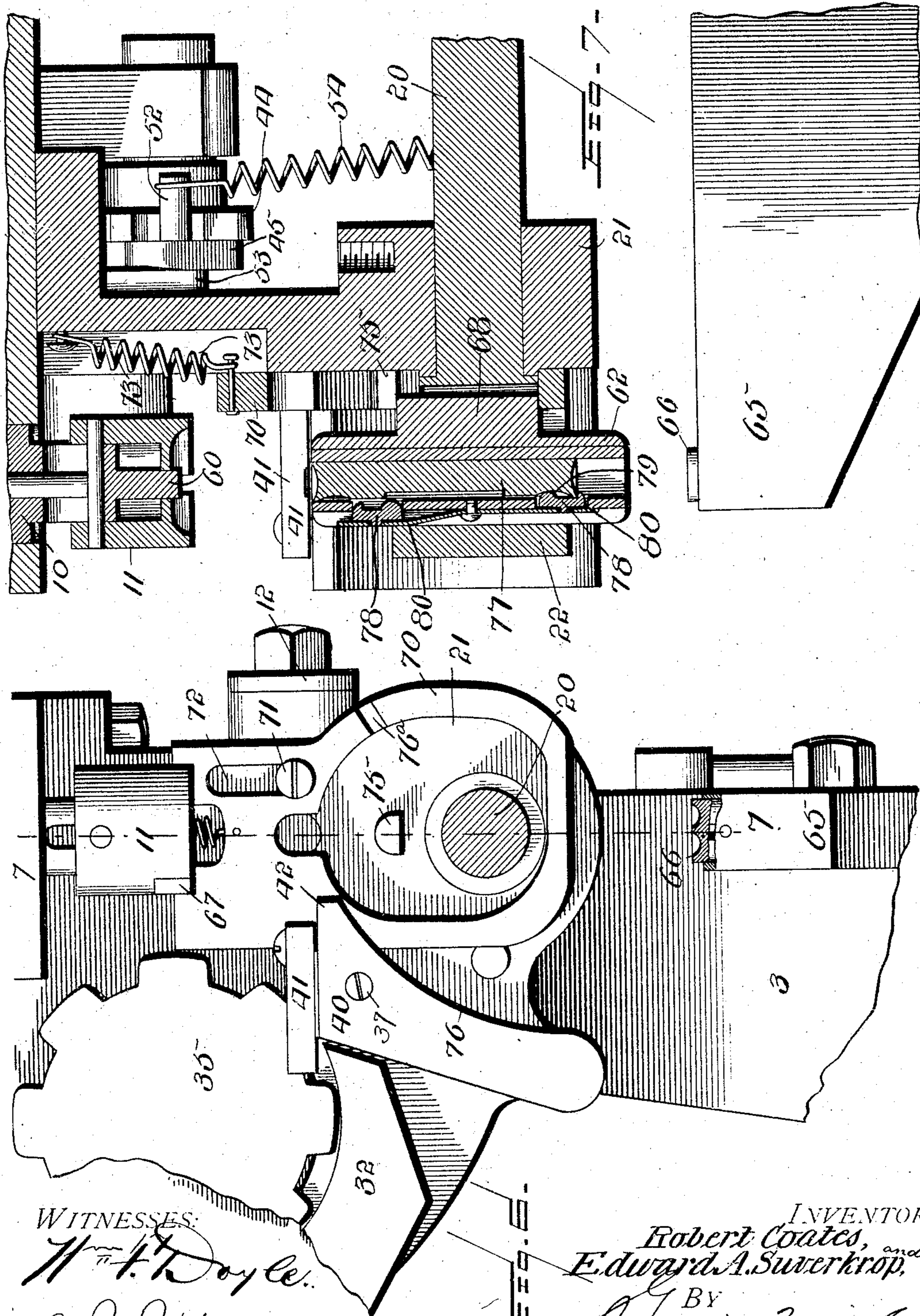
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WITNESSES:

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# UNITED STATES PATENT OFFICE.

ROBERT COATES AND EDWARD A. SUVERKROP, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE AMERICAN METAL EDGE BOX COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

## MACHINE FOR SHAPING AND SETTING METALLIC FASTENERS.

SPECIFICATION forming part of Letters Patent No. 790,186, dated May 16, 1905.

Application filed July 1, 1903. Serial No. 163,881.

*To all whom it may concern:*

Be it known that we, ROBERT COATES, a subject of the King of Great Britain, and EDWARD A. SUVERKROP, a citizen of the United States, both residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Machines for Shaping and Setting Metallic Fasteners, of which the following is a specification.

Our invention relates to certain new and useful improvements in machines for forming and setting metallic fasteners, and is in the nature of an improvement upon that type of machine shown and described in the patent to P. H. Reibisch, No. 689,410, dated December 24, 1901.

While these improvements are herein shown and described as applied to a machine of the above-mentioned type, we do not wish to be understood as limiting ourselves to this specific application; for it will be obvious that certain features of the invention will be found adapted for use in various forms of stamping-presses and the like; yet since certain other features of the invention were especially designed for and are particularly adapted to use in a machine for forming and setting fasteners we have chosen to illustrate and describe our invention as incorporated in such a machine.

The several operations performed by machines of the type illustrated are as follows: First, a strip of metal is fed step by step into the machine; second, a blank staple is cut off therefrom; third, the staple is formed by bending up the prongs, and, fourth, the staple is driven through the material and the prongs are bent over or clenched.

The die in which the staple is formed is carried in a rotary member which turns intermittently through one hundred and eighty degrees. This movement inverts the staple and places it in position to be driven into the material, which operation takes place simultaneously with the forming of the next staple.

The object of our invention is to simplify, render more positive, and improve generally the various mechanisms which perform the above-mentioned operations—viz., the feeding, the cutting off, and the forming and setting of a prepared rivet-blank.

In the accompanying drawings, Figure 1 is a side elevation of our improved machine without the standard or base. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevation of the machine complete as it appears when mounted on the standard. Fig. 4 is a section taken on the line 4 4 of Fig. 1. Figs. 5 and 5<sup>a</sup> are similar views, the parts being shown in different positions of operation. Fig. 6 is a front elevation of the feeding and die mechanisms with the rotary head removed. Fig. 7 is a section on the line 7 7 of Fig. 6. Fig. 8 is a diagrammatic view showing the sequence of operations performed. Fig. 9 is a perspective view of the operating-gearing for the rotary head. Fig. 10 is a perspective view of the strip-feeding wheel. Fig. 11 is a top plan and section, respectively, of the strip-guide; and Fig. 12 is a perspective view of the sleeve in the rotating head, showing the spline thereon.

In said figures, 1 indicates the pedestal or standard on which the frame proper of the machine, comprising a base-plate 2 and overhanging arm 3, is supported. At the back of said arm is journaled the driving-shaft 4, carrying on one end the driving-pulley 5 and on the other end the mutilated spiral gear 6. The pulley 5 is loose on the shaft 4, and a clutch 7 is provided, arranged to be controlled by the operator through a treadle 8, as is usual in machines of this class. Any desired form of clutch may be employed, but preferably one that is normally disengaged and that is only thrown in during the time that the treadle is depressed. In the forward end of said arm 3 is guided to reciprocate vertically the plunger 10, which carries on its reduced lower end the slidable collar 11, hereinafter referred to. The plunger is actuated

from the driving-shaft by a crank-pin 12, link 14, and lever 16, pivoted at 15 to said arm. The crank-pin 12 is carried by the mutilated spiral gear 6, mentioned above. The teeth of  
 5 said gear 6 mesh with and drive a spiral pinion 19, fast on a shaft 20, running parallel with said arm and journaled at its front end in a bracket 21, attached to said arm. This shaft 20 has attached to its front end the rotary die-head 22, which will be hereinafter  
 10 more fully described. Around the smooth portion of the periphery of said mutilated gear 6 runs a rib or flange 23, which engages with one of two diametrically opposite slots  
 15 24, formed in the pinion 19, thereby firmly holding said pinion and shaft 20 stationary against movement in either direction during a portion of each rotation of said gear. These parts are so proportioned that the shaft 20  
 20 and die-head 22 make a half-rotation once during each complete rotation of the driving-shaft.

Before entering into a description of the dies and their operation the strip-feeding  
 25 mechanism will first be described. On an arm 25, secured to the overhanging arm 3, is rotatably mounted a reel 27, carrying the metal strip from which the staples are to be formed. While any suitable form of strip can be used  
 30 with our improved die mechanism, one part of our invention comprises feeding mechanism constructed to feed a strip such as shown at 28 in Fig. 8, comprising circular portions 29, adapted to form the heads of the staples,  
 35 joined by oppositely-tapered narrow portions 30, adapted to form the prongs. From the reel the strip passes first into a guideway 31, formed on an arm 32, which is pivoted at 33 to the overhanging arm 3 or to a bracket bolted  
 40 thereto. From said guide the strip passes along over a concave-curved surface 34, formed on the arm 32, with which surface coöperates a feed-wheel 35. The periphery of said feed-wheel is cut away centrally to form a groove  
 45 36, between which and said surface 34 the strip passes. The walls of said groove are cut away, as at 39, at regular intervals corresponding to the length of the staple to be formed. The projections or teeth thus formed  
 50 engage the circular portions 29 of the strip, and thereby positively feed the strip to the dies. Beyond said feed-wheel the strip passes through another guide formed between a projection 40 on said arm 3 or on a bracket  
 55 bolted thereto and a plate 41, bolted to the top surface of said projection. Set into the upper surface of said projection is a cutter 42, which can be adjusted and clamped by screws 37 43, respectively, over the edge of which cutter  
 60 the strip is fed. The object of pivoting the arm 32 is that it may be conveniently swung down out of proximity with the feed-wheel in case the strip becomes jammed or is not properly fed for any reason. The feed-wheel is  
 65 positively rotated by the following described

mechanism: On the same shaft with said feed-wheel is mounted a ratchet-wheel 44, (shown in dotted lines in Fig. 4,) and rotatably  
 mounted on said shaft adjacent to said wheel is an arm 45, carrying a pawl 46. In a slot  
 70 in said arm 45 on the other side of its pivot engages a pin 52, carried by a vertical rod 53, slidably mounted in ways formed in the overhanging arm 3. A coiled spring 54, attached at one end to said pin 52 and at its other  
 75 end to a part of the frame in any suitable manner, tends to keep said rod depressed. The upper end of said rod is threaded and passes through an arm 55, attached to the plunger, nuts 56 on said rod engaging the up-  
 80 per side of said arm. The feed movement is therefore derived from the movements of the plunger, and the amount thereof can be finely regulated by adjustment of the nuts 56. A roller 57, mounted on an arm 58, pivoted to the  
 85 frame, said arm being pressed by a spring 59, engages the teeth of the feed-wheel and holds it steady.

Turning now to the forming and setting mechanism, the lower reduced end 60 of the  
 90 plunger 10 constitutes the male die, which co-operates with the open ends of a sleeve 62, slidably carried in the rotary head 22 to "form" or bend up the prongs of a staple. The collar 11, which surrounds the lower end  
 95 of the plunger 10 and which is constantly pressed toward the end thereof by springs, contacts with the opposite ends of said sleeve 62 alternately and forces said sleeve downward onto the work with a yielding pressure.  
 100 An arm 65, attached to the base of the machine, supports a stationary die 66, suitably formed to clench over the prongs of a staple when the same are forced thereagainst. Said collar 11 carries a removable cutter 67, which  
 105 coacts with the stationary cutter 42 aforesaid to sever the staples from the strip. The sleeve 62 is held against rotation within the head 22 by means of splines, as indicated at 68, Figs. 2 and 7, said splines being arranged  
 110 on the front and rear sides of the head. The die-head is limited in its downward movement by a yoke 70, lying between said head and the front face of the overhanging arm or of a bracket bolted thereto. Said yoke is guided  
 115 to slide vertically by a pin 71 engaging a slot 72 therein and is normally held in its highest position by a coiled spring 73, attached to said yoke and to the overhanging arm. Thus when the sleeve 62 is depressed  
 120 by the collar 11 the yoke descends with it, owing to the contact of the spline 68 on the rear side of the sleeve with the inside surface of said yoke, until the latter comes in contact with the stop and stop-pin 75, and then  
 125 when the plunger rises again the spring 73 elevates the yoke and through it the sleeve also. The upward movement of said sleeve is limited by the stop-pin 75 on the overhanging arm, and in order that said sleeve may clear  
 130

cutter 42 while it is being inverted, owing to the rotation of the head 22 before the rear spline comes under said pin 75, a cam-surface 76 is formed on the projection 40, with which the sleeve contacts in its rotation and which holds it until the spline is in position to engage said pin, which it does as soon as the sleeve rides off said cam-surface under influence of spring 73. In order to permit the withdrawal of said sleeve from the head, said yoke is slotted, as at 76<sup>a</sup>. When the head 22 is turned so as to bring the rear spline 68 in line with said slot, the sleeve can be withdrawn, thus obviating the necessity of removing the head itself.

Within the sleeve 62 is slidably mounted the plunger 77, the function of which is to transmit the movement of the male die 60 to the fastener held in the lower end of the sleeve to force it into the material. Said plunger 77, together with the formed fasteners, is prevented from falling out of said sleeve, and the plunger is normally held in either of two positions, nearer one end of the sleeve or the other, by two dogs 78, mounted in slots in the sleeve and pressed toward said plunger to engage recesses 79 therein by a flat spring 80, held on said sleeve.

The operation is as follows: Assuming the end of the strip to be over the upper end of the sleeve 62, with the enlarged circular portion immediately over the bore of said sleeve, when the machine is set in motion the plunger descends, the cutter 67 coacts with cutter 42 on the frame to sever the blank, and the collar 11 clamps the prongs thereof against the upper end of the sleeve. The male die 60 continuing to descend draws the center portion of the blank down into the open end of said sleeve, in doing which the prongs are drawn from under collar 11 and bent up at right angles to the center portion or head of the fastener. The plunger then goes up, and the head 27 is rotated through one hundred and eighty degrees, bringing the other end of the sleeve uppermost and in position to coact with the male die on the plunger to form a second fastener. In the operation of forming such second fastener the rod 77 is depressed and forces the first fastener out of the sleeve through the material and against the clenching-die. While the head 22 is being rotated to invert the sleeve the feed mechanism is operated to present another blank to the dies.

Having thus described our invention, it being understood that certain features thereof are applicable to other machines than the one shown and described and that modifications of the mechanism employed might be made without departing from the spirit of our invention, what we claim is—

1. In a machine of the character described, a plunger, a rotary head carrying a plurality of dies, each of which is arranged at an angle to the axis of said head, an operating-shaft,

gearing connecting said shaft and head and constructed to intermittently rotate the head, said gearing embodying in its structure means to lock the head against rotation during its periods of rest.

2. In a machine of the class described, a plunger, a rotary head containing a plurality of dies, each of which is arranged at an angle to the axis of the head, a shaft on which said head is mounted provided with a gear having slots coincident with the dies, an operating-shaft arranged at an angle to the first-mentioned shaft and carrying a mutilated gear meshing with said first-named gear to intermittently drive the same, the mutilated gear being provided with a flange to engage said slots to lock the gear against rotation during its periods of rest.

3. In a machine of the class described, the combination with the frame, a plunger mounted to reciprocate therein, a driving-shaft journaled in the frame and connections therefrom to the plunger, of a cooperating die member pivoted on the frame and carrying opposed dies, each of which is arranged at an angle to the fulcrum or axis of said die member, a shaft connected to said die member to rotate the same and connections between said shaft and the driving-shaft, comprising a spiral pinion having opposed radial slots in its periphery and a mutilated spiral gear having a circular flange projecting from the untoothed portion of its periphery and adapted to engage said slots, whereby said die member is intermittently rotated through one hundred and eighty degrees between successive strokes of the plunger and is positively locked against rotation during the cooperation of the plunger with each of said dies, substantially as set forth.

4. In a machine of the class described, a rotary head carrying a die, driving means to intermittently rotate said head, and means constituting part of the driving means to positively lock the head against movement during its periods of rest and means to actuate the die.

5. In a machine of the class described, the combination with the frame, a plunger mounted to reciprocate vertically therein, a driving-shaft and connections therefrom to said plunger, of a cooperating die member pivoted to the frame on an axis at right angles to the path of movement of said plunger and carrying a plurality of dies, means to intermittently rotate said die member directly from said driving-shaft and to lock it in position with one of said dies in alinement with the plunger, a cutter attached to the frame, a cooperating cutter carried by said plunger and means actuated from said driving-shaft to intermittently feed a strip of material over said stationary cutter and over one of said dies, substantially as set forth.

6. In a machine of the class described, the combination with the frame carrying a sta-

tionary work-support and a plunger mounted to reciprocate in said frame, of a rotatable head pivoted on said frame intermediate of said plunger and work-support, the axis of said head lying transversely of the path of movement of said plunger, said head having an aperture therethrough transverse to its axis, a sleeve slidably mounted in said aperture and splined to said head to prevent relative rotation therebetween the ends of said sleeve being adapted to cooperate with said plunger, a yoke slidably mounted on said frame adjacent to said head and constructed to limit the downward movement of said sleeve in said head, a cam-surface on said frame, constructed and arranged to depress said sleeve in said head as the latter rotates, a spring attached at one end to the frame and at the other to said yoke tending normally to raise said yoke and sleeve, and means on the frame to limit the upward movement of said sleeve, said yoke being slotted to permit the withdrawal of the splined sleeve.

7. In a machine of the class described, the combination with the frame and a plunger mounted to reciprocate therein, of a head pivoted to the frame on an axis at right angles to the line of movement of said plunger, a die-carrying member slidably mounted in said head transversely to the axis thereof, means to reciprocate said plunger and to intermittently rotate said head, a yoke slidably mounted on said frame and constructed to limit the downward movement of said die-carrying member, a spring tending to raise said yoke and sleeve, a cam-surface on the frame arranged to depress said die-carrying member as the head rotates, and means on the frame to limit the upward movement of said die-carrying member, substantially as set forth.

8. In a machine of the class described, the combination with a stationary work-support, a reciprocatory plunger and a rotary head intermediate of said support and plunger and having a passage therethrough, of a slidable sleeve in said passage splined to said head, a punch slidably mounted and frictionally held in said sleeve, yielding means to limit the downward movement of said sleeve and positive means to limit its upward movement, a cutter on said plunger, a cooperating stationary cutter and means to feed strip material between said head and plunger, substantially as set forth.

9. In a machine of the class described the combination with cooperating dies, one of which has a reciprocatory movement relative to the other, of means to feed strip material to said dies comprising a guide-arm having a concaved surface along which the material is fed, a feed-wheel constructed and arranged to cooperate with said surface to positively feed the material, said guide-arm being movable toward and away from the feed-wheel, means to intermittently rotate said

feed-wheel, and a stationary guide through which the material is fed by said feed-wheel, substantially as set forth.

10. In a machine of the class described, the combination with the frame, a plunger mounted to reciprocate therein, a rotary head carrying dies to cooperate with said plunger, a cutter carried by said plunger, a cooperating cutter carried by the frame, means to feed strip material between said cutters to said dies, a driving-shaft, connections therefrom to said plunger to rotate the same, connections from said driving-shaft to said head, said latter connections embodying means to alternately rotate the head intermittently in one direction and lock the same against rotation during its periods of rest, and connections from said plunger to said feeding means.

11. In a machine of the class described, the combination with a reciprocatory plunger and a cooperating die, of a stationary element having a concave surface over which strip material is adapted to be fed, a circularly-grooved feed-wheel coacting with the concaved surface of said stationary element, and means to rotate said feed-wheel.

12. In a machine of the class described, the combination with a reciprocatory plunger and a cooperating die, of a stationary element having a curved surface over which strip material having alternate wider portions and narrower portions is adapted to be fed, a cooperating feed-wheel circularly grooved to embrace the surface of said element and having teeth to engage the wider portions of said strip material and means to rotate said feed-wheel, substantially as set forth.

13. In a machine of the class described, the combination with a reciprocatory plunger and a cooperating die, of a pivoted arm carrying a guide-aperture and a curved rib through and over which the material is adapted to be fed, a feed-wheel circularly slotted to fit over said rib and coact therewith to feed the material, a second guide-aperture and a stationary cutter, a cooperating cutter on said plunger, operating means for said plunger and connections therefrom to said feed-wheel to intermittently rotate the same, substantially as set forth.

14. In a machine of the class described, the combination with a plunger carrying a cutter, means to reciprocate the plunger, a rotatable die-head, means connected to said plunger operating to alternately rotate and lock said head, a feed-wheel to feed material to said die, a pivoted arm cooperating with the cutter on the plunger and means to intermittently rotate said wheel adjustably connected to said plunger.

15. In a machine of the class described, the combination with a reciprocatory plunger, of a rotatable die-carrying head, a sleeve slidably mounted therein, the axes of said sleeve and head lying substantially at right angles

to each other, a spline to prevent rotation of said sleeve in said head, a yoke to limit the movement of said sleeve in said head by engaging said spline, a rod slidably mounted in said sleeve, means to retain said rod in said sleeve in either of two positions, and a stationary work-support, substantially as set forth.

16. In a machine of the class described, the combination with a stationary clenching-die, of a rotatable head, a sleeve slidably mounted on said head, a rod slidably mounted in said sleeve, means to limit the movements of said rod and of said sleeve, a plunger arranged to cooperate with said sleeve and rod to simultaneously form one fastener and drive another, means tending to force said sleeve upward in said head, means to limit its upward movement, a collar slidably mounted on said plunger, a cutter carried thereby, a stationary cooperating cutter, means to operate said plunger, means connected to said plunger to intermittently feed material between said cutters, and means positively connected to said plunger-operating means to alternately rotate and lock said head, substantially as set forth.

17. In a machine of the class described, having a stationary work-support, a reciprocating plunger and an intermediate rotatable die-carrying head, the combination with said head of a slidable sleeve splined therein, the ends of said sleeve alternately cooperating as dies with said plunger to form a fastener, and said sleeve having slots therein, a rod slidably mounted in said sleeve, said rod having recesses therein and cooperating with said plunger to eject a formed fastener from said sleeve and drive it through the work, a pair of catches yieldingly mounted in the slots in said sleeve and adapted to alternately engage the recesses formed in said rod, and means to limit the movement of said sleeve in said head, substantially as set forth.

18. In a machine of the class described, the combination of a rotatable head pivoted on the frame thereof, a die-carrying member splined to slide in an aperture in said head at right angles to the axes thereof, means to alternately rotate through one hundred and eighty degrees and lock said head, a yoke slidably mounted on the frame and arranged to engage said spline and thereby retain said sleeve in said head, a spring tending to hold said yoke in one extreme position, a cam-surface on the frame arranged to contact with the end of said sleeve as the head rotates and prevent further movement of said sleeve in said head under the influence of said spring-

pressed yoke, a pin on said frame arranged to engage the end of said spline as the sleeve passes out of contact with said cam-surface, said yoke being slotted in one place so as to permit withdrawal of said splined sleeve from said head, substantially as set forth.

19. In a machine of the class described, the combination with a rotatable head, having an aperture therein at right angles to the axis thereof, a die-carrying member splined to slide in the aperture in said head, a yoke arranged to engage said spline and retain the sleeve in said head, and a spring tending to hold said yoke in one extreme position, said yoke being slotted in one place so as to permit the withdrawal of said splined sleeve from the head.

20. In a machine of the class described the combination with cooperating dies, of means to feed strip material to said dies, said means comprising a feed-wheel and a guide-arm having a concaved surface arranged closely adjacent to the periphery of said wheel, said arm being adapted to be moved away from said wheel in the event that the strip material becomes jammed.

21. In a machine of the class described, the combination of a rotatable head having an aperture therein at right angles to the axis thereof, a die-carrying member splined to slide in the aperture in said head, and a yoke arranged to engage the spline of said die-carrying member and retain the sleeve in the head, said yoke being slotted so as to permit the withdrawal of said sleeve from said head.

22. In a machine of the class described, the combination of a rotatable head, and a die-carrying member mounted in said head, and means whereby said member is removable from the head when said head is in one position only.

23. In a machine of the class described, the combination with cooperating dies, of means for feeding strip material to said dies, said means comprising a stationary member and a wheel coacting therewith, said wheel having a peripheral slot the walls of which are broken away at regular intervals.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

ROBERT COATES.  
EDWARD A. SUVERKROP.

Witnesses:

J. H. BRINTON,  
A. FLORENCE YERGER.