

W. OSTERHOLM.
BOX STAPLING MACHINE.
APPLICATION FILED JULY 7, 1908.

980,553.

Patented Jan. 3, 1911.

4 SHEETS—SHEET 1.

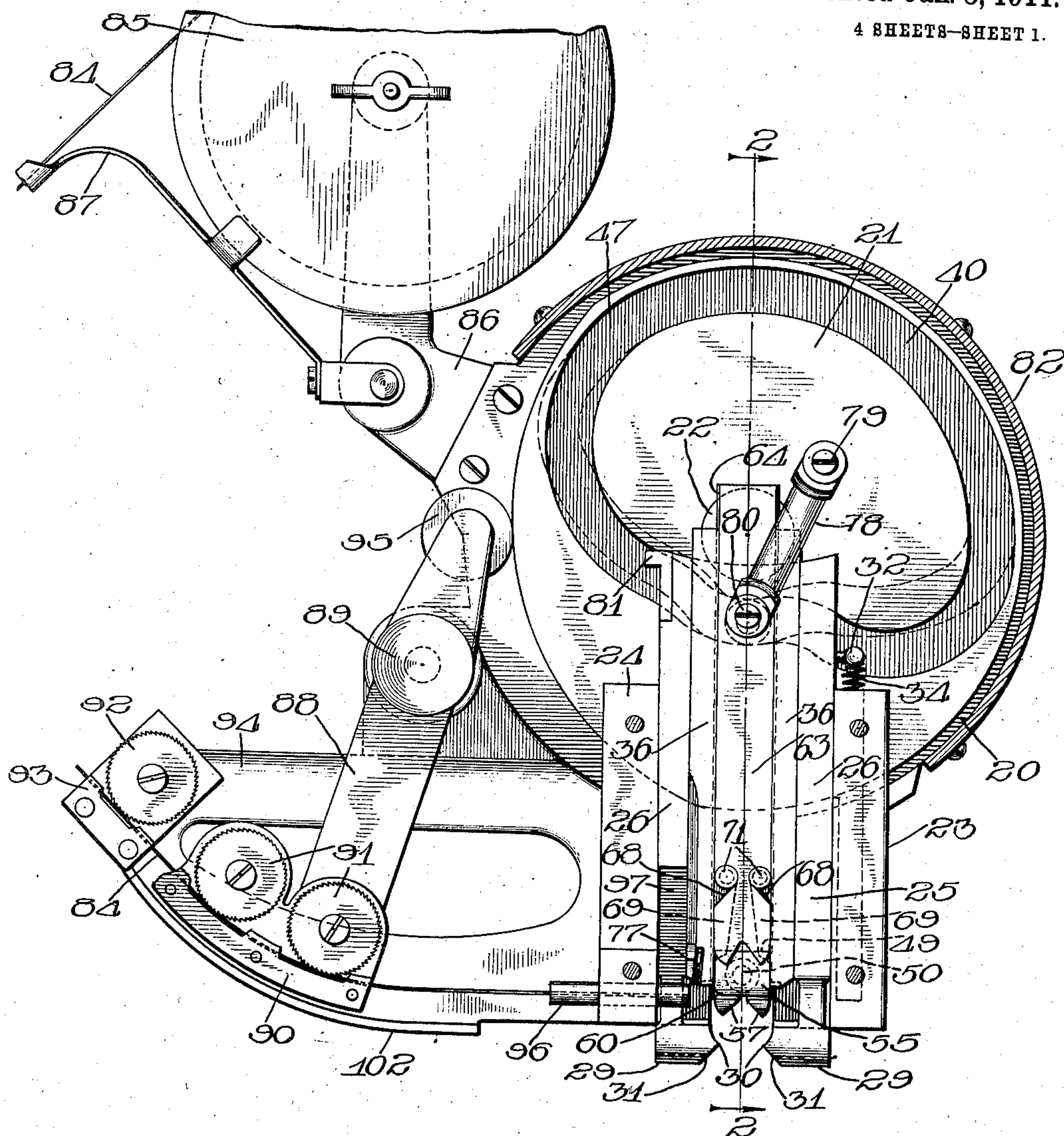
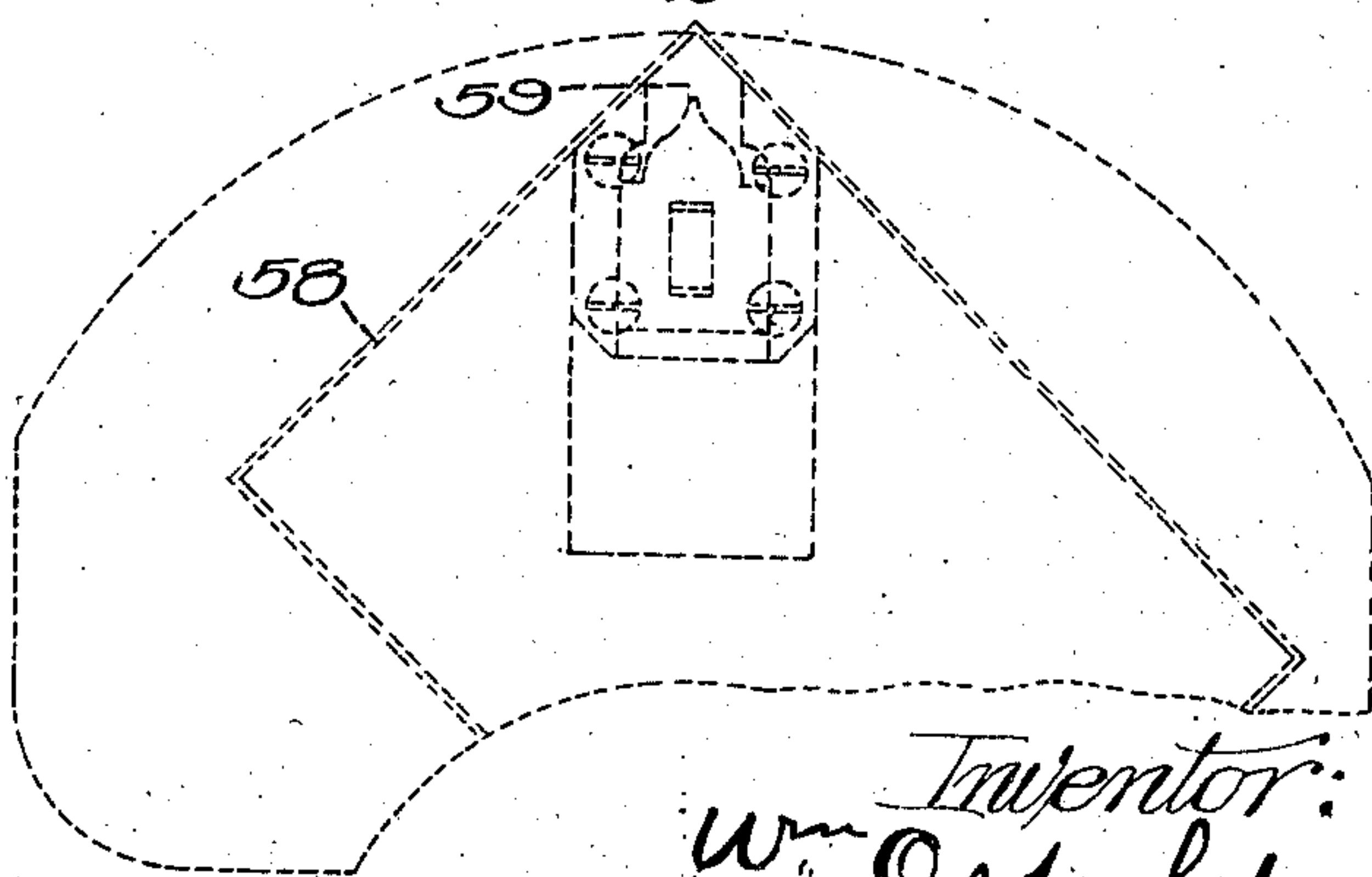


Fig. 1.



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Fig. 2.

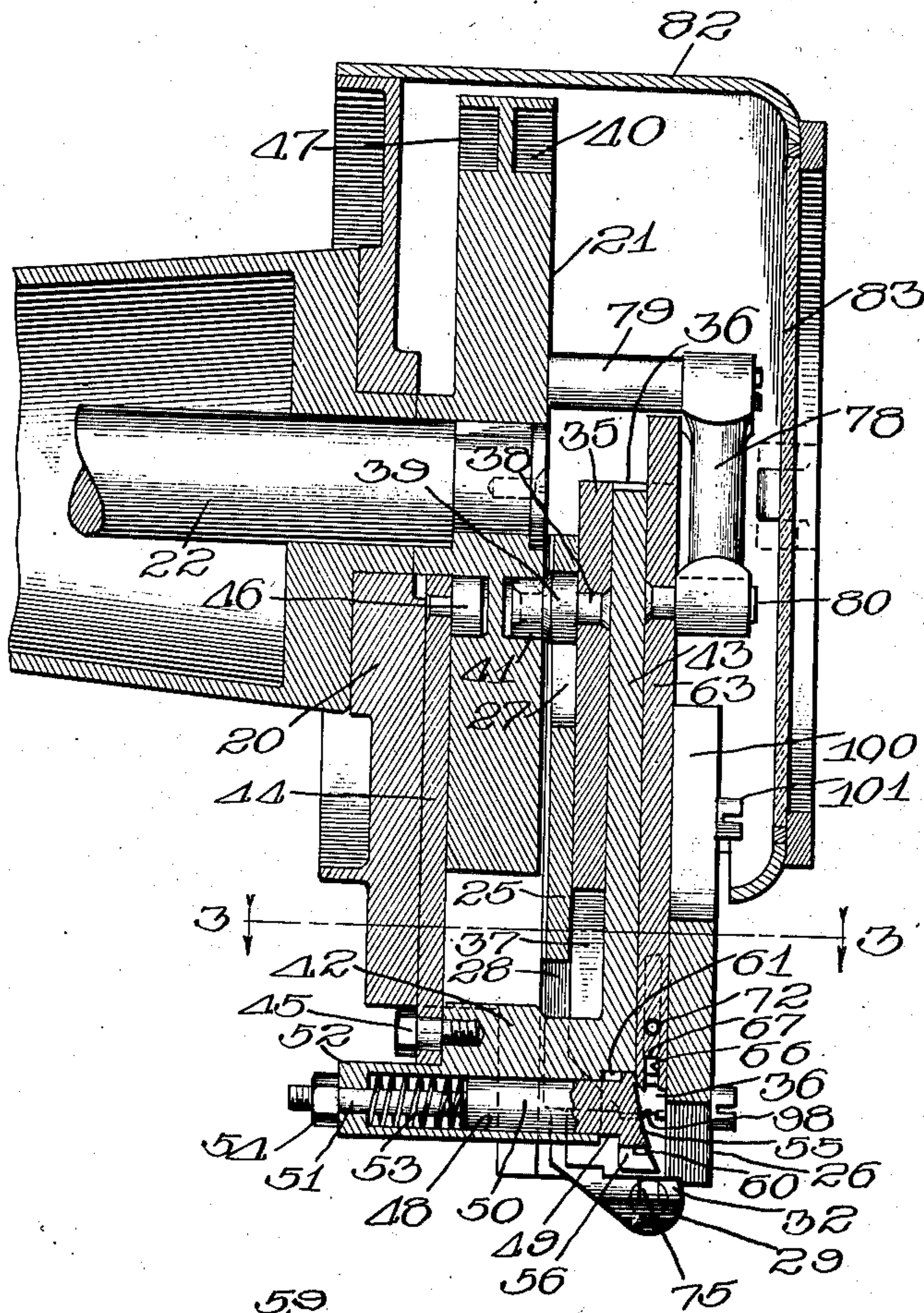


Fig. 3.

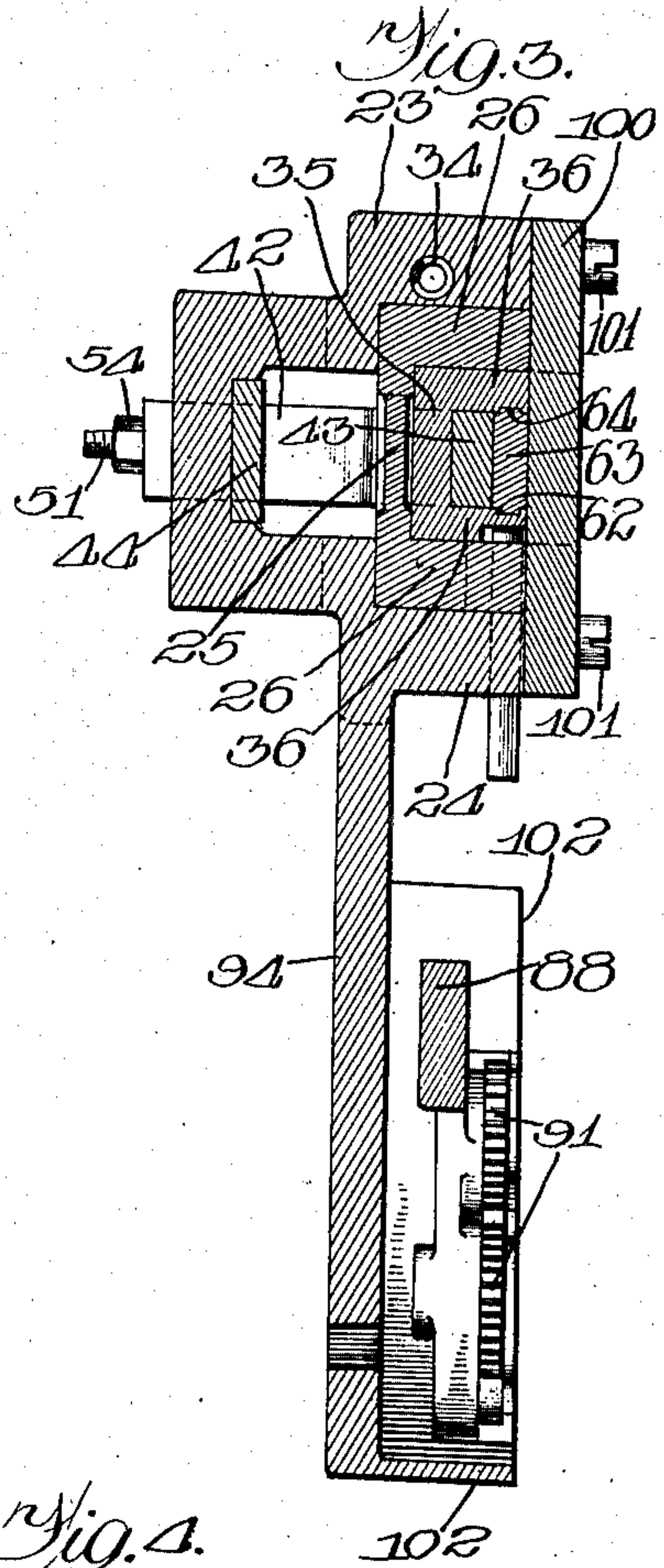
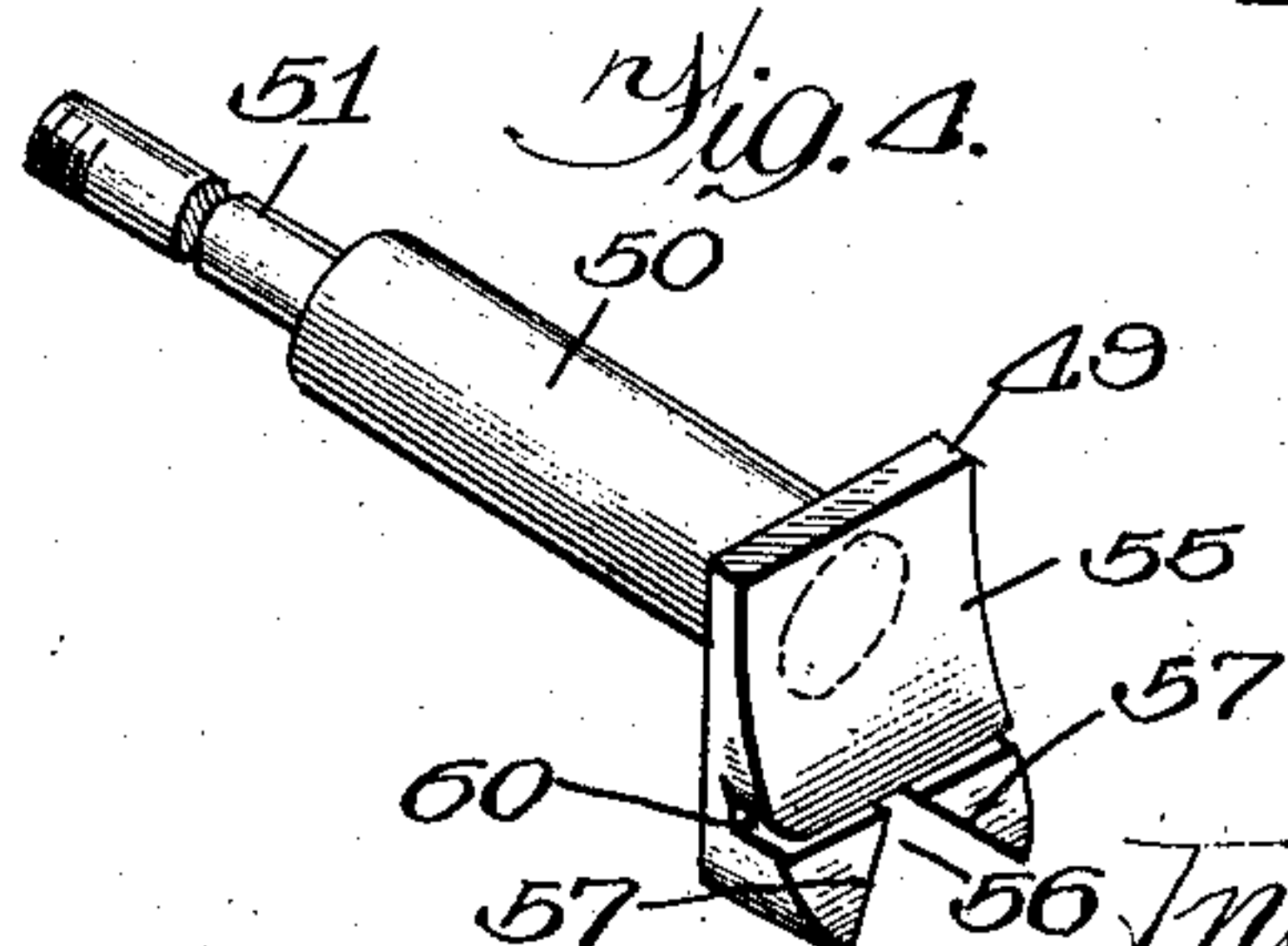


Fig. 4.



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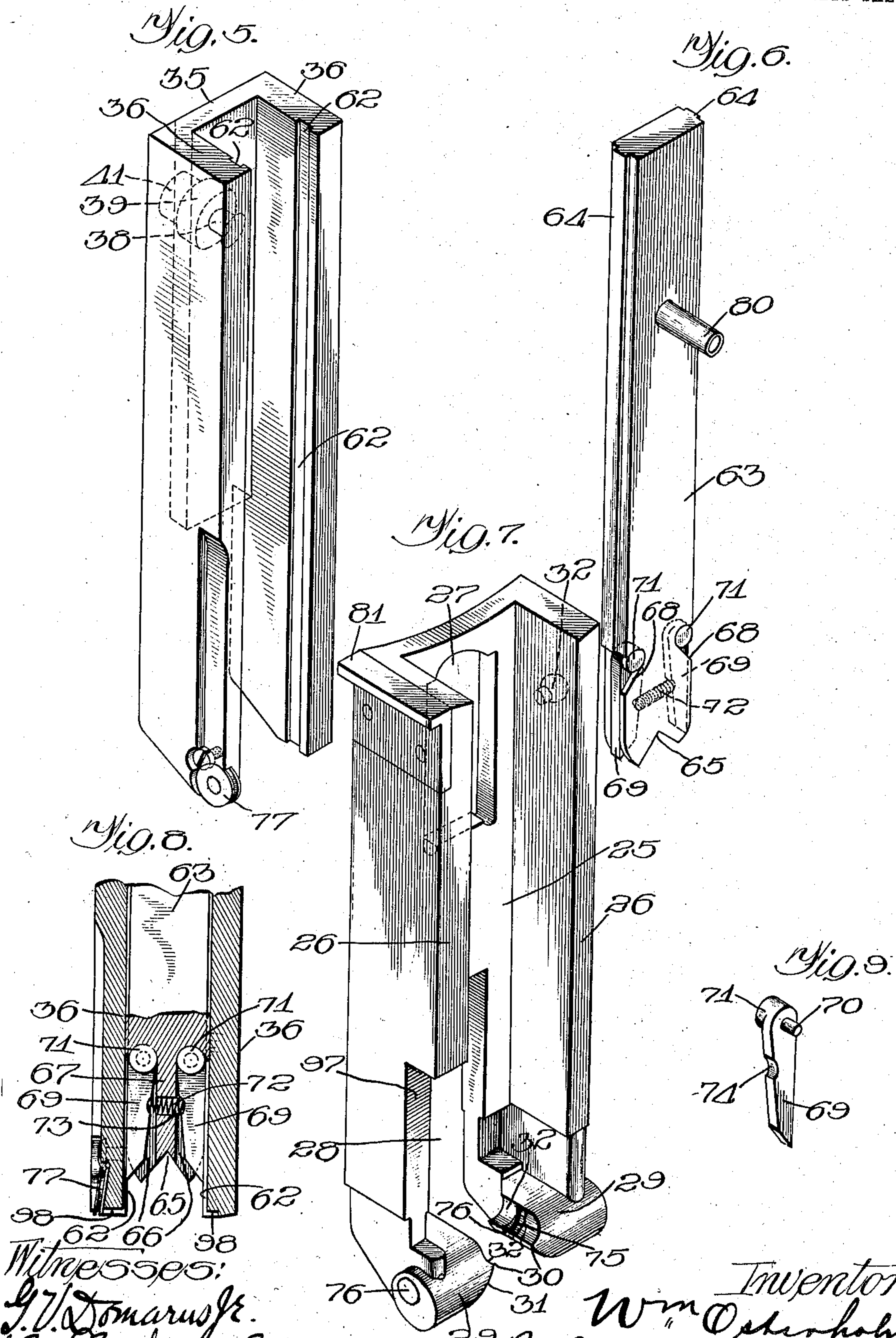
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4 SHEETS—SHEET 3.



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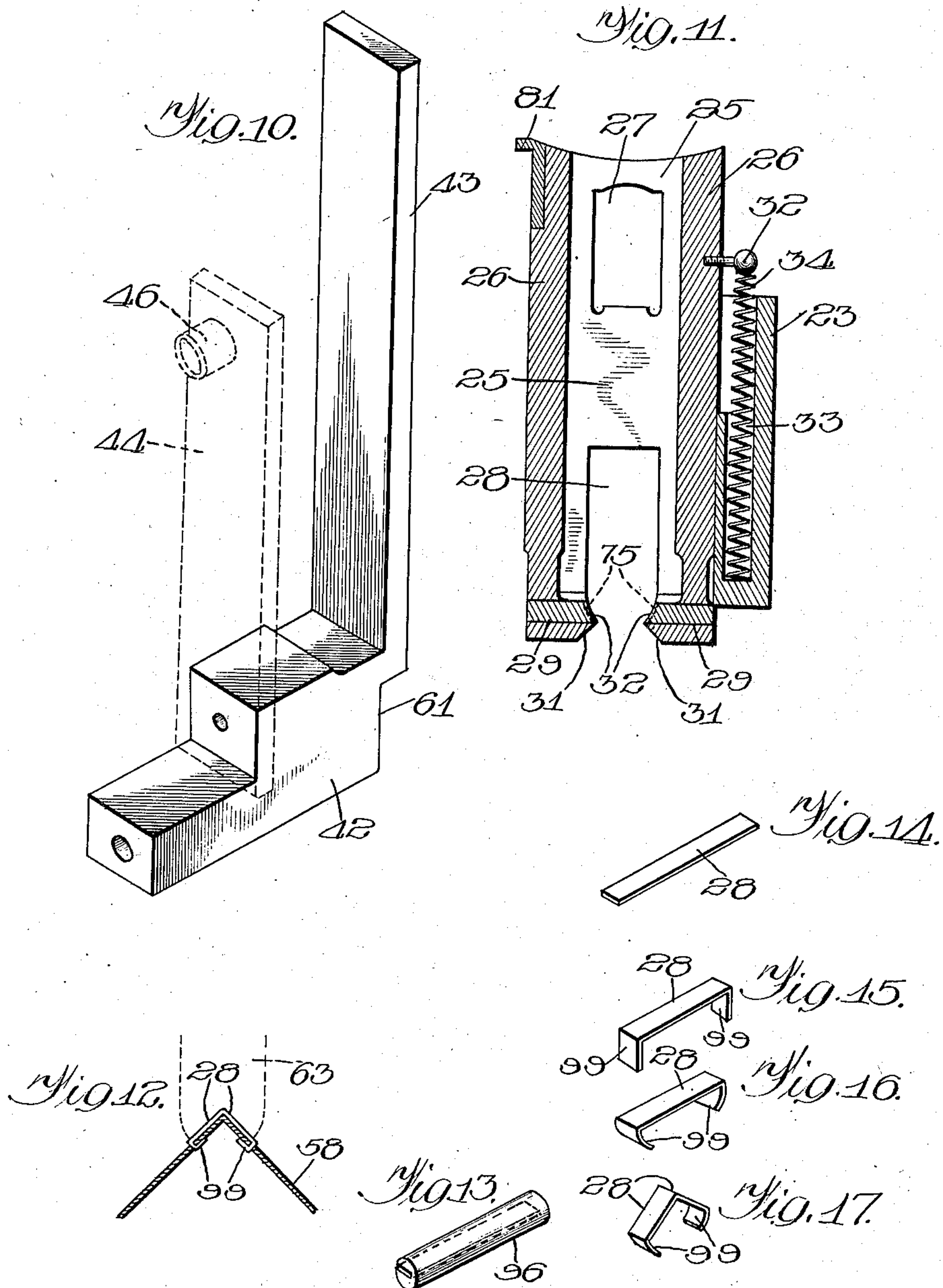
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

WILLIAM OSTERHOLM, OF CHICAGO, ILLINOIS, ASSIGNOR TO LATHAM MACHINERY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

BOX-STAPLING MACHINE.

980,553.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed July 7, 1908. Serial No. 442,325.

To all whom it may concern:

Be it known that I, WILLIAM OSTERHOLM, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Box-Stapling Machines, of which the following is a specification.

This invention relates to improvements in staple forming and driving mechanism particularly adapted for use in machines for stapling or fastening the corners of boxes and the like, and one of the objects of the invention is to provide improved means for shaping and holding the staple and for guiding and bending the legs thereof while the staple is being driven.

A further object is to provide an improved plunger or driver for the staple and improved means for guiding the plunger.

A further object is to provide an improved machine of this character which will be simple, durable and compact in construction and effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects, as will appear, the invention consists in the features of novelty in the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings, illustrating an embodiment of the invention, and in which—

Figure 1 is a detail front elevation of an improved machine of this character constructed in accordance with the principles of this invention. Fig. 2 is a detail sectional view on line 2—2 of Fig. 1. Fig. 3 is a detail sectional view on line 3—3 of Fig. 2. Fig. 4 is a detail perspective view of the staple forming anvil. Fig. 5 is a detail perspective view of the staple former. Fig. 6 is a detail perspective view of the plunger or staple driver. Fig. 7 is a detail perspective view of the slide or guide for the staple former. Fig. 8 is a detail sectional view of one extremity of the plunger or driver and the former, showing these parts assembled. Fig. 9 is a detail perspective view of one of the adjustable dogs or wings for guiding the lower extremity of the plunger or driver. Fig. 10 is a detail perspective view of the anvil support. Fig. 11 is a detail sectional view of the slide or guide for the former showing the spring for assisting in

returning the slide. Fig. 12 is a detail view of the finished staple secured in one corner of a box, the box being shown in section. Fig. 13 is a detail perspective view of the guide for guiding the material from which the staple is formed into the anvil. Figs. 14, 15, 16 and 17 are detail perspective views showing the different steps in the formation and shaping of the staple.

Referring more particularly to the drawings and in the present exemplification of the invention, the numeral 20 designates a suitable support for the mechanism, and 21 is an operating cam rotatably mounted thereon by means of a suitable shaft 22 to which power may be applied in any desired or suitable manner.

Secured to the support 20 in any desired or suitable manner are spaced guides 23, 24, and slidably mounted between these guides is a slide or guide 25, which is provided with spaced sides 26 to form an open channel or groove extending longitudinally thereof. The rear wall of the channel thus formed is provided with an aperture or opening located preferably adjacent the upper extremity thereof and the lower extremity of the rear wall is bifurcated as at 28 to form spaced portions, the lower extremities 29 of which are enlarged and project inwardly as at 30, one face of each of the inwardly projecting portions 30 being beveled or inclined as at 31 and the upper portions of these faces are cut away on a curve as at 32 to form a reduced opening adjacent the lower portion of the slide above the inclined faces 31.

Projecting laterally beyond one of the sides 26 of the slide, preferably adjacent the upper end thereof, is a lug or extension and arranged within a suitable recess preferably in the guide 23 on the support 20 is an elastic member 34, one extremity of which rests against the bottom of the recess and the other extremity engages under the lug or projection 32 and this elastic member tends normally to hold the guide or slide 25 elevated.

Slidably mounted within the guide 25 is a former designated generally by the reference numeral 35 and this former is provided with spaced sides 36 to form a channel and the sides 36 are so spaced as to engage the inner faces of the sides 26 of the sliding guide 25. The lower extremity of the rear

wall of the former 35 is cut away as at 37, shown more clearly in Fig. 2 of the drawings, so that the space between the sides 36 below the rear wall 35 of the former will register with the bifurcated portion 28 of the sliding guide 25. Projecting laterally beyond the rear wall of the former and at a point adjacent the upper end thereof is a stub shaft 38, which is of a length to project through the aperture or opening 27 in the rear wall of the sliding guide 25 and journaled upon this stub shaft 38 is an anti-friction roller 39, a portion of which stands within the aperture 27 of the sliding guide 25 and serves as a means for raising the guide when the former is raised. The cam 21 is provided on the face adjacent the sliding guide 25 with a cam groove 40 into which another portion 41 or a separate anti-friction roller is adapted to stand and which roller is journaled upon this stub shaft 38, so that when the cam 21 is rotated the former 35 will be raised or lowered and as the anti-friction roller 39 engages the upper or lower edge of the aperture 27 the sliding guide 25 will be respectively raised or lowered, but the former is arranged to initially move in either direction in advance of the guide 25.

A suitable anvil support having a body portion 42 is provided with an upright portion 43 of any desired or suitable length but preferably of a length substantially equal to the length of the former 35. The portion 43 of the anvil support is of a width substantially equal to the width of the space between the sides 36 of the former 35 and stands between the sides so as to move in the former when raised or lowered. The body portion 42 of the anvil support projects through the registering bifurcation 28 in the sliding guide 25 and the space 37 between the sides of the former which registers with the bifurcation 28 and preferably extends below the cam 21 and to a point beyond the rear face thereof. An operating member 44 is secured by one extremity as at 45 to the body 42 of the anvil support and extends upwardly from said body portion in close proximity to the rear face of the cam 21. Journaled to the free extremity of the member 44 is an anti-friction roller 46 which is adapted to stand and move within a cam groove 47 in the adjacent face of the cam 21, as shown more clearly in Fig. 2 of the drawings.

The cam grooves 40 and 47 in the cam 21 are so disposed with relation to each other that when the cam is operated the mechanism connected to one of the faces will be operated slightly in advance of the mechanisms connected to the other face whereby the operation of the parts will be so timed as to permit them to assume the proper position for forming the staple.

The body portion 42 of the anvil support is provided with an aperture 48 passing longitudinally therethrough and an anvil 49 provided with a supporting body 50 is held in position by the support by means of the body portion 50 being inserted into the aperture 48. One extremity 51 of the body of the anvil is preferably reduced, as shown, and projects through an aperture in the end 52 of the body portion 42.

A suitable elastic member 53, such as a coil spring or the like, surrounds the reduced portion 51 of the anvil within the aperture 48 so that one extremity of the elastic member will rest against the shoulder formed by the reduced portion and the other extremity will rest against the end of the body portion through which the extremity 51 of the anvil passes. This extremity preferably projects beyond the body portion 42 and is preferably threaded for the reception of a suitable fastening nut 54 which holds the anvil against displacement with respect to its support.

The anvil 49 is preferably somewhat larger than the body portion 50 and is provided with an inclined front face 55 which inclines forwardly from the upper edge to the lower edge and the lower edge of the anvil is bifurcated as at 56 and the sides 57 of the bifurcation are inclined, as shown more clearly in Fig. 4, to give the bifurcation a substantially inverted V-shape so that when the anvil is lowered to engage the corner of a box 58 (shown in dotted lines in Fig. 1) and which box rests upon a support 59, the sides 57 of the bifurcation will rest against the adjacent sides of the box. The anvil is also provided with a slot 60 passing through the anvil lengthwise thereof, transversely of the bifurcation 56 and this slot opens through the front of the anvil.

The body portion 42 of the anvil support is cut away as at 61 adjacent the front thereof and the anvil 49 is adapted to be moved into the cut away portion. When the anvil and its support are assembled, the elastic member 53 tends normally to hold the anvil forward so that the front face 55 adjacent the upper edge thereof will co-incide with the front face of the upright portion 43 of the support, which will cause the lower portion of the forwardly inclined face 53 to project beyond the front face of the part 43 of the support. The sides 36 of the former project beyond the portion 43 of the anvil support and are provided with longitudinal grooves 62 extending lengthwise thereof.

A plunger or driver 63 is provided with projecting ribs 64 which extend beyond the sides thereof and this plunger is adapted to move within the former 35 so that the ribs 64 will enter and move within the grooves 62, as shown more clearly in Fig. 3 of the drawings. The lower extremity of the

plunger or driver is notched as at 65 to form a V-shaped portion and the ribs 64 on the plunger or driver terminate short of this extremity of the plunger. The lower extremity of the plunger adjacent the notched portion 65 is provided with recesses 66 opening through the sides thereof and below the ribs 64. These recesses extend for some distance into the plunger from the sides thereof to form a division wall or partition 67 and one of the faces of the plunger adjacent the recesses and on each side of the partition 67 is cut away or notched as at 68 which notches open through the sides of the face. Arranged within each of the recesses 66 is a dog or wing 69 which is pivotally supported by means of lugs or trunnions 70, 71, projecting laterally therefrom adjacent one extremity. One of these lugs, preferably the lug 70, is adapted to be seated in a suitable recess in one of the walls of the recess 66 and the other lug 71 is adapted to be inserted into the open notch 68 in the other wall whereby the dogs or wings may be pivotally and removably held in position. These dogs or wings are of such a width with respect to the recesses 66 that they may be seated entirely within the respective recess to reduce the width of the operating extremity of the plunger or driver 63. A suitable elastic member 72 may be provided for normally projecting the edges of these dogs or wings beyond the edges of the recesses so that the projecting edges of the dogs or wings will coincide with the ribs 64 on the plunger to assist in guiding the extremity of the plunger and this elastic member 72 preferably passes through an aperture 73 in the wall or partition 67 and the extremities thereof are adapted to be seated within a suitable notch or recess in the respective dog or wing. As the plunger 63 is raised or lowered in the former 35 the elastic member will tend to hold the edges of the dogs or wings extended beyond the recesses so that the extended edges will project into the grooves 62 in the walls of the former above the enlarged portions 29 of the sliding guide 25 but when the plunger is lowered to cause the extremities of the dogs or wings 69 to engage the rounded faces 32 of the enlargements 29 on the sliding guide 25, the dogs or wings will be seated or forced within the recesses 66 against the tension of the elastic member 72 and thereby reduce the width of the lower extremity of the plunger to permit the said extremity to enter the reduced portion of the sliding guide to force the staple into the box and hold it while being clenched.

The rounded faces 32 of the enlargements 29 may be provided with grooves 75 for guiding the legs of the staple and if desired the enlargements 29 may be provided with portions 76 constructed of chilled metal to protect the portions against wear. A suit-

able cutter 77 may be supported by one of the walls 36 of the former 35 for severing the material as it is fed into the anvil.

The plunger 63 may be reciprocated in any desired or suitable manner but preferably by means of a pitman rod 78 connected by one extremity as at 79 to the cam 21 and by its other extremity to a suitable lateral projection 80 in the plunger which extends beyond the former. The sliding guide 25 may be provided with a lateral projection 81 extending beyond one of the sides 26 thereof preferably at the upper extremity which is adapted to engage the upper extremity of one of the guides, preferably the guide 24, on the support and serves as a means for limiting the movement in one direction of the sliding guide and also acts as a support for the guide. If desired, the operating cam and the upper portions of the guide, former and plunger may be inclosed within a suitable casing 82 having a transparent front 83.

The staples are preferably formed from a continuous strip of material 84 which is of some width, as shown more clearly in Figs. 14 to 17, and which material is supplied from a spool 85 rotatably mounted upon a suitable support 86 and a suitable guide 87 may be provided for the material as it leaves the spool 85.

Any suitable means may be provided for feeding the material from the spool to the former and driver. A suitable and efficient means for accomplishing this purpose comprises an operating arm or lever 88 which is pivotally supported intermediate its ends as at 89 upon any portion of the supporting mechanism. One extremity of the arm 88 is enlarged as at 90 to form a support for the material 84 and cooperating with the support are a plurality of gripping devices 91 preferably in the form of rollers having corrugated peripheries, which rollers are arranged in tandem and in close proximity to the support 90. These rollers are preferably journaled upon eccentric bearings and cooperating with the rollers 91 is a similar roller 92 which in turn cooperates with a support 93 over which the material passes. The roller 92 and the support 93 are secured to a stationary portion 94 of the mechanism and is adapted to grip the material to prevent its slipping when the rollers 91 are moved backwardly for the purpose of securing a new grip upon the material. The rollers 91 and the roller 92 are so mounted with respect to each other that when the support 90 of the arm 88 is moved forward or in a direction to feed the material to the former the rollers 91 will grip the material while the roller 92 will yield to permit the material to slip between the roller and the cooperating support 93. When the support 90 is moved away from the former to secure

a new grip upon the material, the rollers 91 will yield while the roller 92 will grip the material.

The arm or lever 88 may be oscillated from the cam 21 by providing an anti-friction roller 95 on the free extremity of the arm on the opposite side of the pivot which anti-friction roller has engagement with the periphery of the cam.

Mounted within one of the guides, preferably the guide 24, is a guide 96 which projects through a suitable cut away portion 97 (see Figs. 1 and 7) in one of the walls 26 of the sliding guide 25 and the extremity of this guide 96 coöperates with the cutter 77 for severing the material into the proper length. This guide 96 is arranged in alignment with the slot 60 in the anvil 49 when the latter is in its raised position and the extremities of the sides 36 of the former 35 are provided with recesses 98 (shown more clearly in Fig. 8) which are also adapted to register with the slot 60.

In operation and assuming the parts to be in the position shown in Fig. 1 of the drawings, which is the normal position of the mechanism or the position the mechanism assumes when it is desired to start the machine, the material will be fed from the roll 85 through the guide 96 in the manner already set forth. As the material passes out of the guide 96 it will enter the slot 60 in the anvil 49, the cam 21 being so timed that the feeding operation will stop when the forming mechanism begins to operate. When the material is seated in the slot 60, the former 35 will be first lowered, causing the material to be severed by the cutter 77 into the proper length. As the former descends, the ends of the strip which has been severed will enter the recesses 98 and the former continues to descend, which will bend the extremities of the material over the sides of the anvil to form the legs 99 shown in Fig. 15. By the time the legs have been thus formed, the former will have assumed such a position with respect to the sliding guide 25 that the anti-friction roller 39 will engage the lower edge of the aperture 27 and a continued movement of the former in the same direction will lower the sliding guide to cause the inclined faces 31 to engage and rest upon and astride of the corner of the box 58. As the sliding guide 25 is being lowered by the former 35, the cam through the medium of the pitman 78 will lower the plunger 63. As the plunger is lowered, the rear edge thereof will move downwardly against the inclined face 55 of the anvil 49 and cause the anvil to recede against the tension of the elastic member 53. By the time the anvil recedes, the staple will be held against lateral movement by means of the recesses 98 in the former and the staple thus formed will be stripped from the

anvil. A continued movement of the plunger in the same direction will then force the staple downwardly against the curved faces 32 of the enlargements 29 on the lower extremities of the sliding guide, which will tend to curve the legs 99 inwardly toward each other, as shown in Fig. 16. As the plunger or driver follows the staple to force it through the material 58, the dogs or wings 69 will be forced into their respective recesses in the manner already set forth and the sides of the plunger below the ribs 64 will engage the rounded portions 32 of the enlargements 29. A continued movement of the plunger in the same direction will cause the staple to assume the shape shown in Fig. 17 of the drawings and a still further movement of the plunger will force the staple through the material 58 so that the legs 99 thereof will be clenched against the inner face of the material, as shown in Fig. 12, by means of a suitable clenching mechanism, which forms no part of the present invention and which mechanism it is unnecessary to illustrate. After the staple has been thus formed and driven, the plunger 63 and former 35 will be raised by the cam 21 and the elastic member 34 will start to raise the sliding guide 25 to permit the work to be removed from the support and the sliding guide will be further raised by means of the anti-friction roller 39 engaging the upper edge of the aperture 27. The grooves 75 in the rounded faces 32 of the enlargements 29 of the sliding guide 25 serve to direct the staple through the material and with this improved construction it will be apparent that the legs of the staple will be completely housed at all times after the staple is shaped and while being driven through the material, thereby preventing the legs from spreading or buckling. If desired a suitable cap plate 100 may be provided and which extends across the front face of the forming mechanism to protect and hold the latter against displacement and may itself be held removably in position by means of suitable fastening devices 101 passing there-through and into the guides 23 and 24. If desired, a suitable guard 102 may be provided for protecting the extremity of the arm 88 as it moves.

In order that the invention might be fully understood the details of the foregoing embodiment thereof have been thus described, but

What I claim as new is—

1. In a stapling machine, the combination of a reciprocating staple former, and a staple driver, means for reciprocating the same, a movable guide for the staple former, means for moving the guide, an anvil bodily movable into engagement with the work and over which the staple is formed, said anvil being capable of such movement independ-

ently with respect to the guide, and means for imparting such bodily movement to the anvil.

2. In a stapling machine, the combination of a reciprocating staple former, and a staple driver, means for reciprocating the same, a bodily movable anvil over which the staple is formed, said anvil being adapted to engage and rest upon the work, means for imparting such bodily movement with the former after the staple is formed, a movable guide for the former and means for imparting an intermittent movement to the guide.

3. In a stapling machine, the combination of a reciprocating staple former and staple driver, means for reciprocating the same, a bodily movable guide, for the former, means for moving the guide into and out of engagement with the work, and additional means for initially moving the guide out of engagement with the work.

4. In a stapling machine, the combination of a reciprocating staple former and staple driver, means for reciprocating the same, a movable guide for the former adapted to engage the work, elastic means for normally holding the guide out of engagement with the work and positive means for moving the guide into engagement with the work and against the tension of said elastic means, said positive means being also adapted to move the guide away from the work and said elastic means being adapted to move the guide out of engagement with the work in advance of the operation of the said positive means.

5. A stapling machine, including a movable guide, a staple former movable in the guide, said guide and former having an open end, the said opening in the end of the guide being contracted to form a portion projecting across the end of the former and said portion being provided with inclined faces extending across the plane of the open end of the staple former, a driver movable in the former and having a driving face stationary with respect to the driver, said driver and former being provided with a cooperating tongue and groove for holding the parts assembled, said tongue terminating short of the extremity of the respective element, means supported by said element to form a continuation of the tongue, said means being movable into a plane within the edges of the element to permit the width of the extremity of the plunger to be reduced whereby said extremity will enter the contracted portion of the guide, and means for operating the respective parts.

6. A stapling machine, including a movable guide, a staple former movable in the guide, said guide and former having an open end, the said opening in the end of the guide being contracted to form a portion project-

ing across the end of the former and said portion being provided with inclined faces extending across the plane of the open end of the staple former, a driver movable in the former and having a driving face stationary with respect to the driver, said driver and former being provided with a cooperating tongue and groove for holding the parts assembled, said tongue terminating short of the extremity of the respective element, yielding means supported by said element to form a continuation of the tongue, said means being movable into a plane within the edges of the element to permit the width of the extremity of the plunger to be reduced whereby said extremity will enter the contracted portion of the guide, and means for operating the respective parts.

7. A stapling machine including a movable guide, a staple former movable in the guide, said guide and former having an open end, the said opening in the end of the guide being contracted to form a portion projecting across the end of the former and said portion being provided with inclined faces extending across the plane of the open end of the staple former, a driver movable in the former and having a driving face stationary with respect to the driver, said driver and former being provided with a cooperating tongue and groove for holding the parts assembled, said tongue terminating short of the extremity of the respective element, a wing pivotally supported by the driver to form a continuation of the tongue, and elastic means normally holding the wing projected, said wing being adapted to be moved into a plane within the edges of the driver against the tension of the elastic means to permit the extremity of the driver to enter the contracted portion of the guide, and means for operating the respective parts.

8. A stapling machine, including a movable guide, a staple former movable in the guide and having a driving face stationary with respect to the driver, said guide and former having an open end, the said opening in the end of the guide being contracted to form a portion projecting across the end of the former and said portion being provided with inclined faces extending across the plane of the open end of the staple former, said former being provided with spaced walls having longitudinal grooves extending to the open end, a driver movable in the former and provided with tongues adapted to enter the grooves, said tongues terminating short of the end of the driver, wings pivotally supported by the driver and adapted to be projected beyond the edges thereof to form continuations of the respective tongues, and means for normally holding the wings projected, said tongues being opposed to each other and adapted to engage a por-

tion of the guide to be moved within the plane between the edges of the driver to permit the extremity thereof to enter the contracted portion of the guide.

- 5 9. A stapling machine, including a movable guide, a staple former movable in the guide, said guide and former having an open end, the said opening in the end of the guide being contracted to form a portion
10 projecting across the end of the former and said portion being provided with inclined faces extending across the plane of the open end of the staple former, said former being provided with spaced walls having longitudinal
15 grooves extending to the open end, a driver movable in the former and having a driving face stationary with respect to the driver, said driver being also provided with tongues adapted to enter the grooves, said
20 tongues terminating short of the end of the driver, wings detachably pivoted to the driver and adapted to be projected beyond the edges thereof to form continuations of the respective tongues, and an elastic mem-
25 ber disposed between the wings for normally holding the wings projected, said tongues being opposed to each other and adapted to engage a portion of the guide to be moved within the plane between the edges of the
30 driver to permit the extremity thereof to enter the contracted portion of the guide.

- 35 10. A stapling machine including a staple driver having a driving face stationary with respect thereto, a guide for the driver, a portion of the guide being contracted, and means whereby the diameter of a portion of the driver may be reduced to permit such portion to enter the contracted portion of the guide.

11. A stapling machine including a reciprocating staple driver having a driving face stationary with respect thereto, means for reciprocating the same, a guide for the driver, said driver substantially filling the guide, a portion of the guide being contracted, and yielding means whereby the diameter of one extremity of the driver may be reduced to permit said extremity to enter the contracted portion of the guide.

12. A stapling machine, including a staple driver having a reduced extremity, a guide for the driver, said guide being provided with a contracted portion adjacent one extremity adapted to receive the reduced extremity of the driver, and means forming an extension of the reduced extremity of the driver for causing said extremity to substantially fill the guide beyond the contracted portion thereof.

13. A stapling machine including a staple driver having a reduced extremity, a guide for the driver, said guide being provided with a contracted portion adjacent an extremity adapted to receive the reduced extremity of the driver, and a yielding member adapted to be projected beyond the edge of the reduced extremity of the driver to cause said extremity to substantially fill the guide when the extremity moves in the guide beyond the contracted portion thereof.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 27th day of June A. D. 1908.

WILLIAM OSTERHOLM.

Witnesses:

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C. H. SEEM.