

No. 847,959.

PATENTED MAR. 19, 1907.

W. A. LORENZ.  
PAPER BAG MACHINE.  
APPLICATION FILED DEC. 17, 1900.

4 SHEETS—SHEET 1.

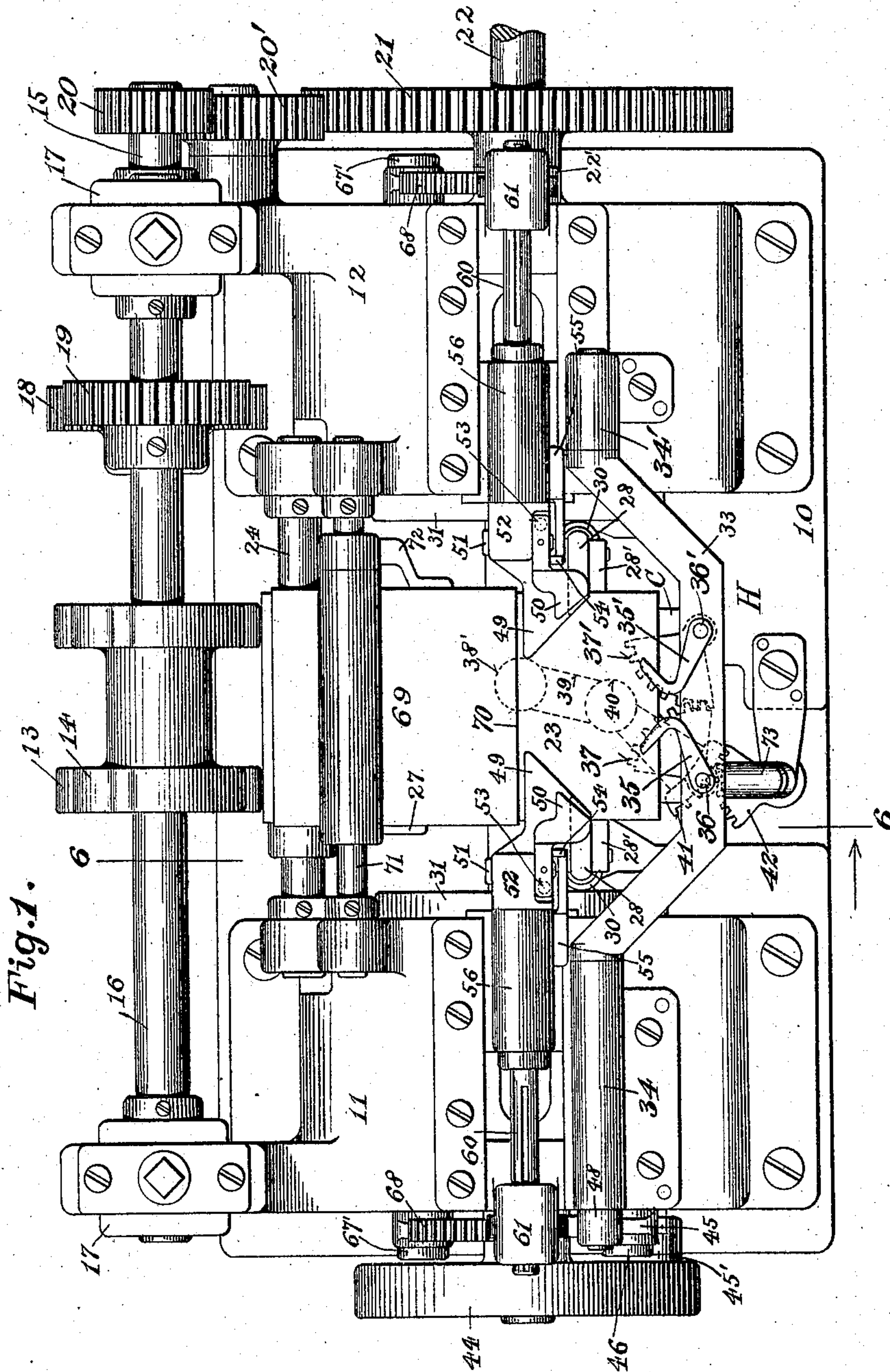


Fig. 1.

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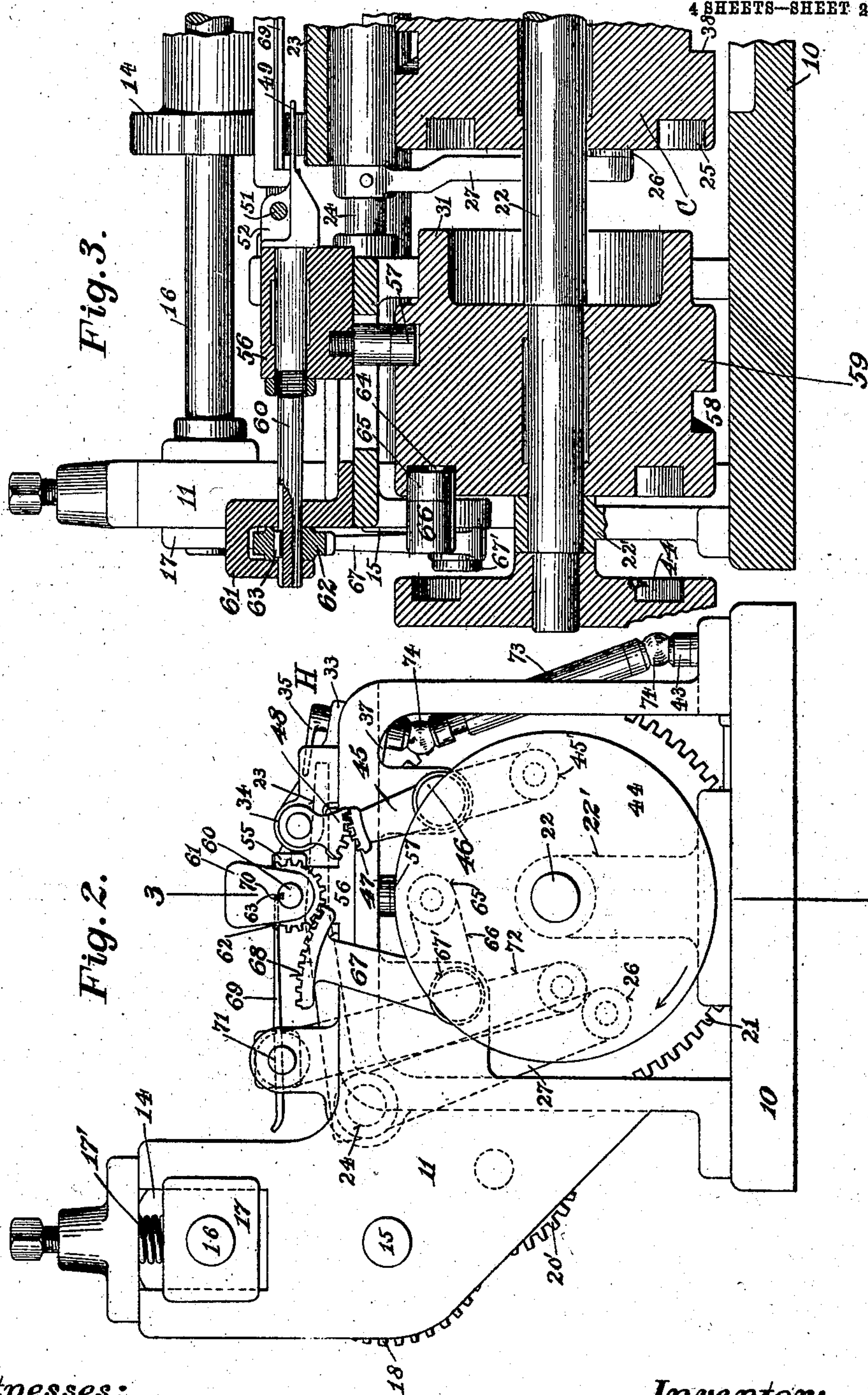
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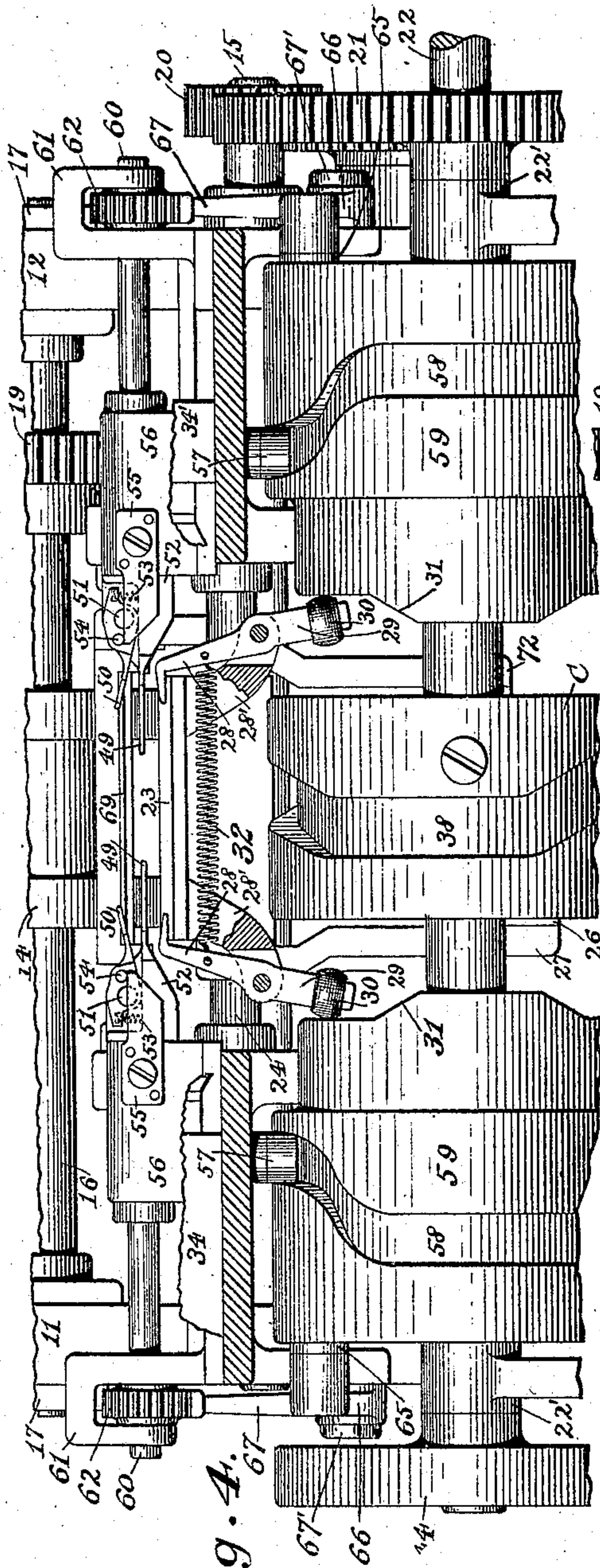


Fig. 4.

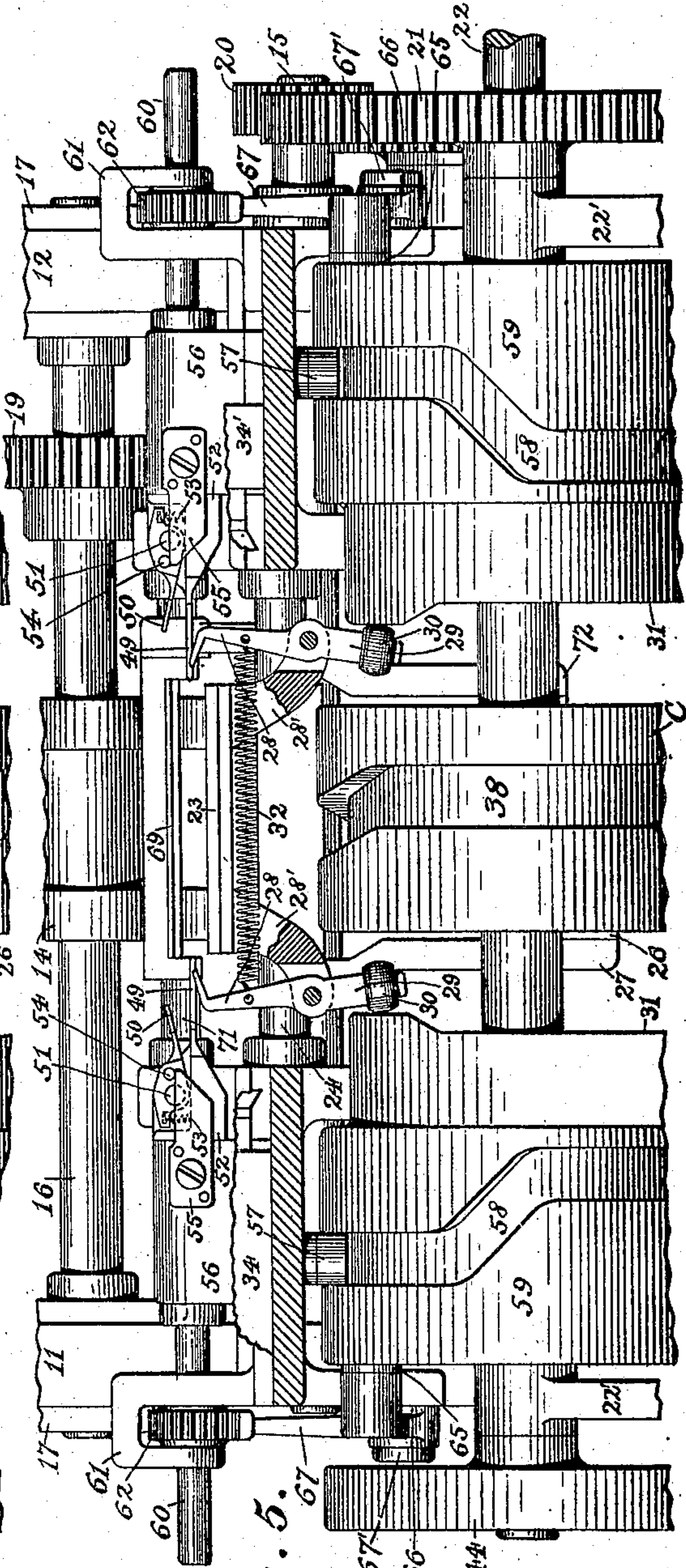


Fig. 5.

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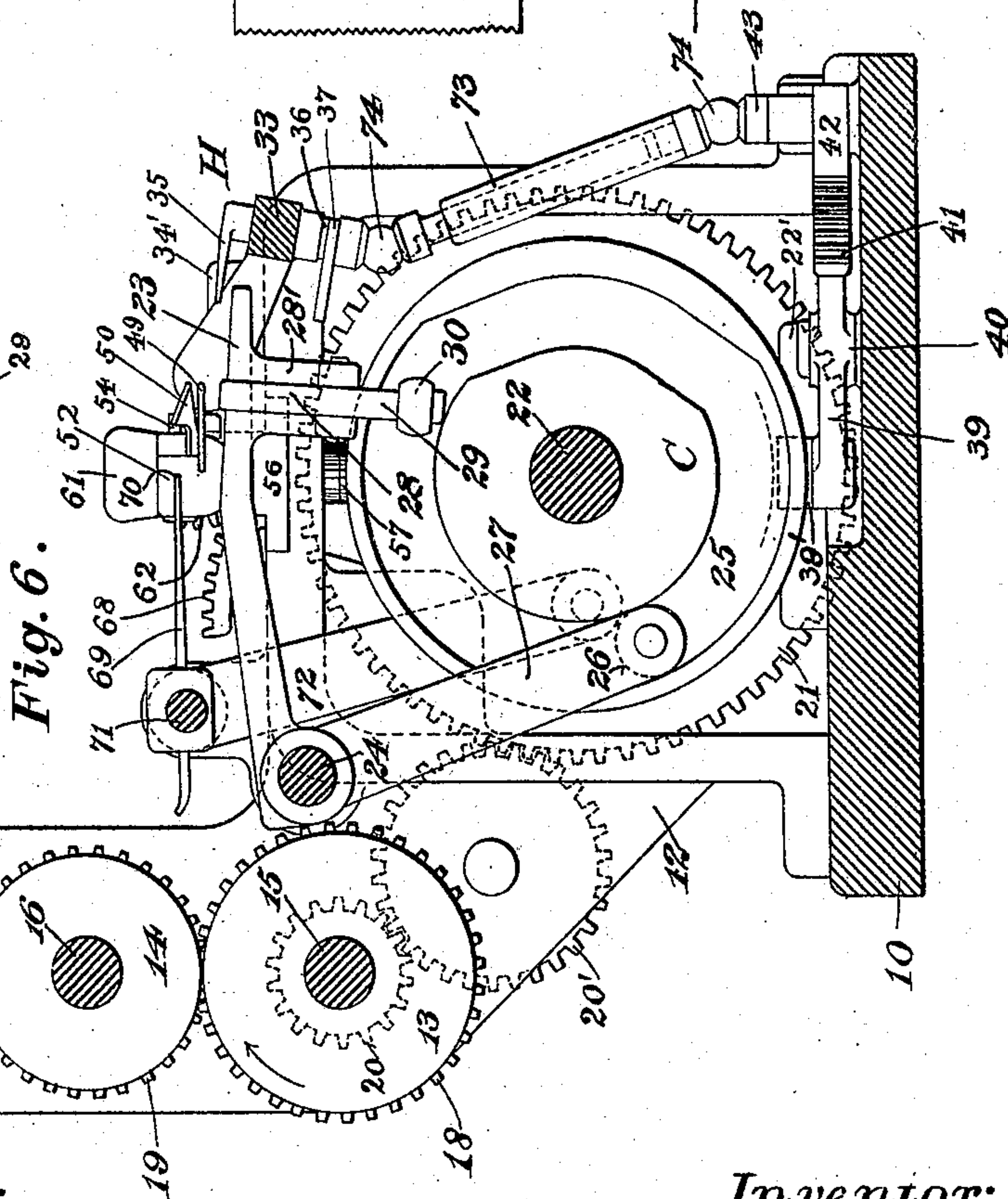
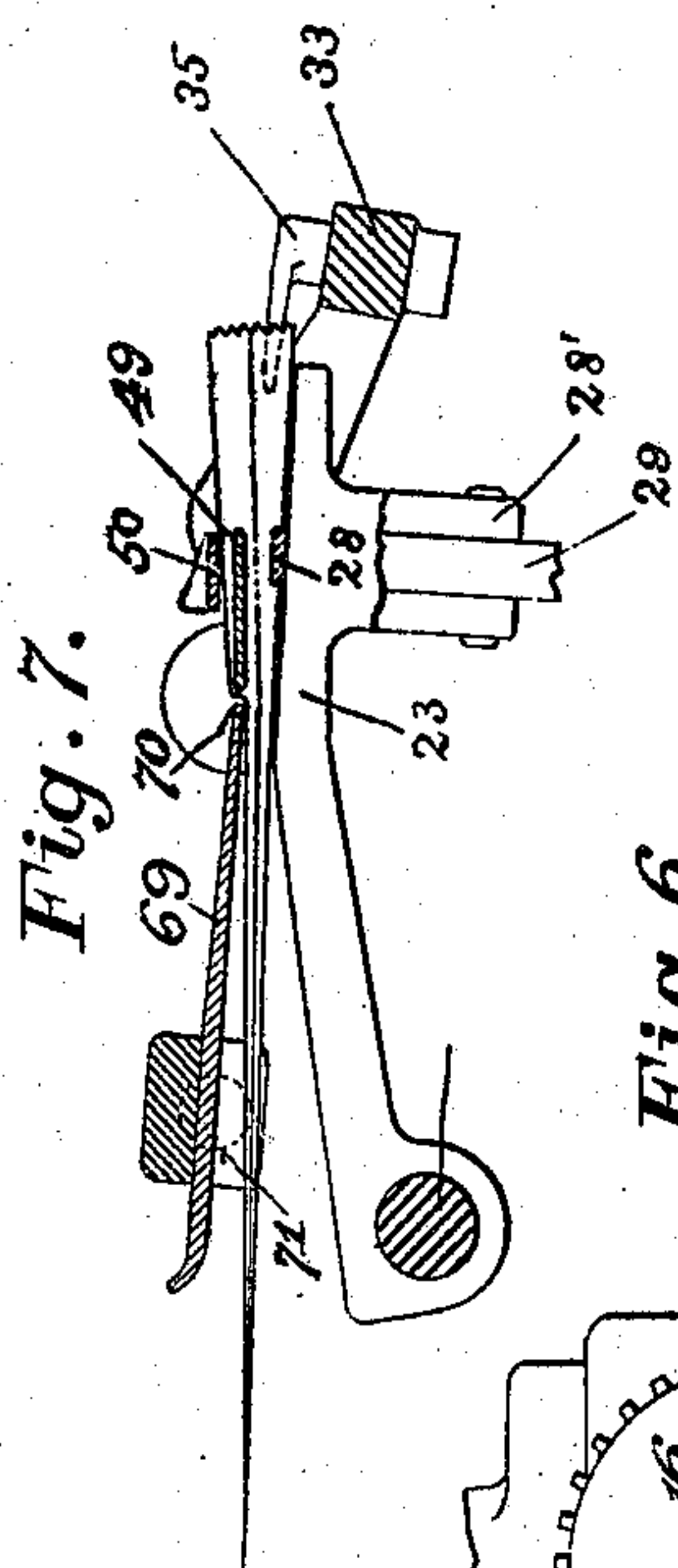
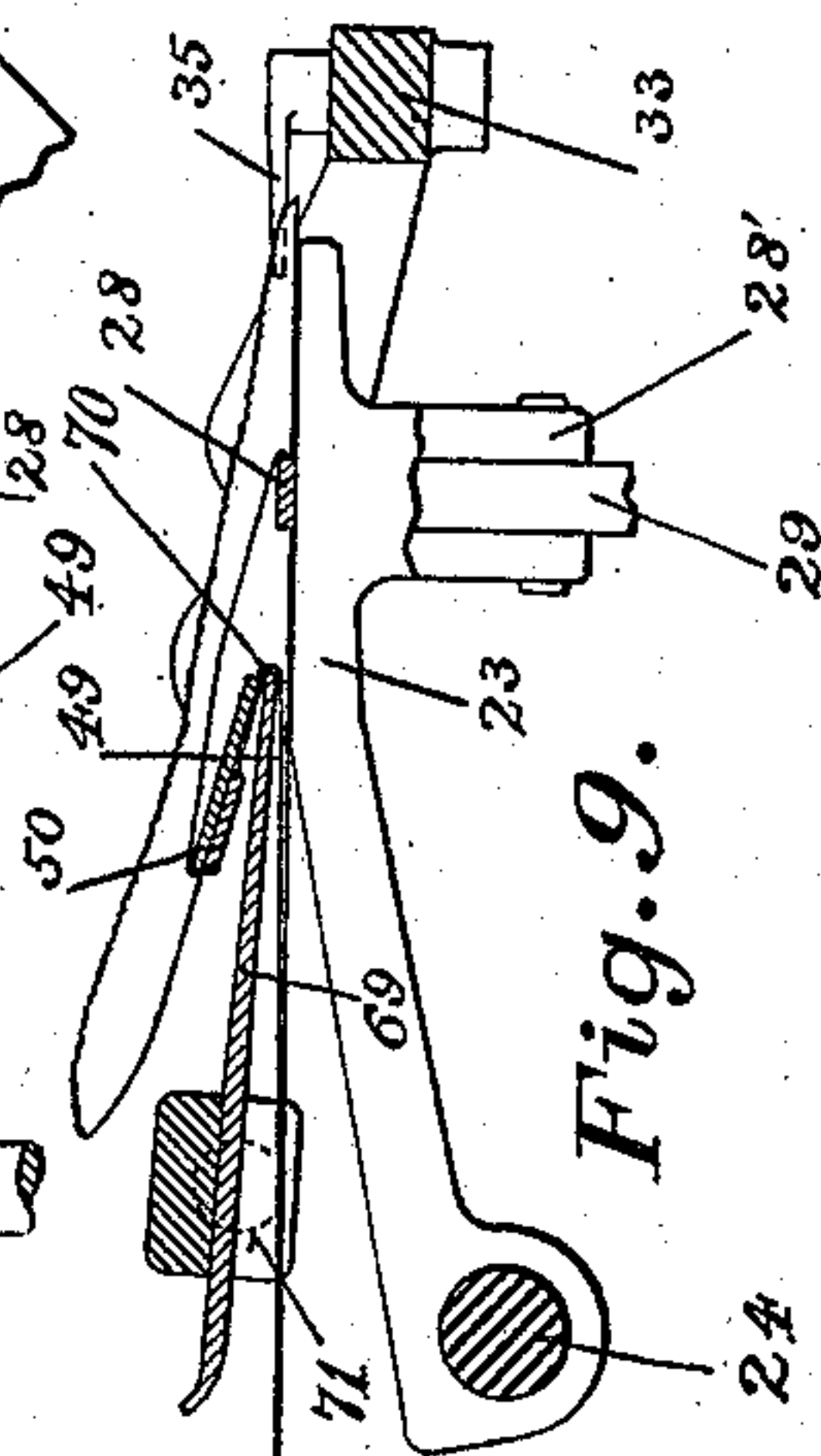
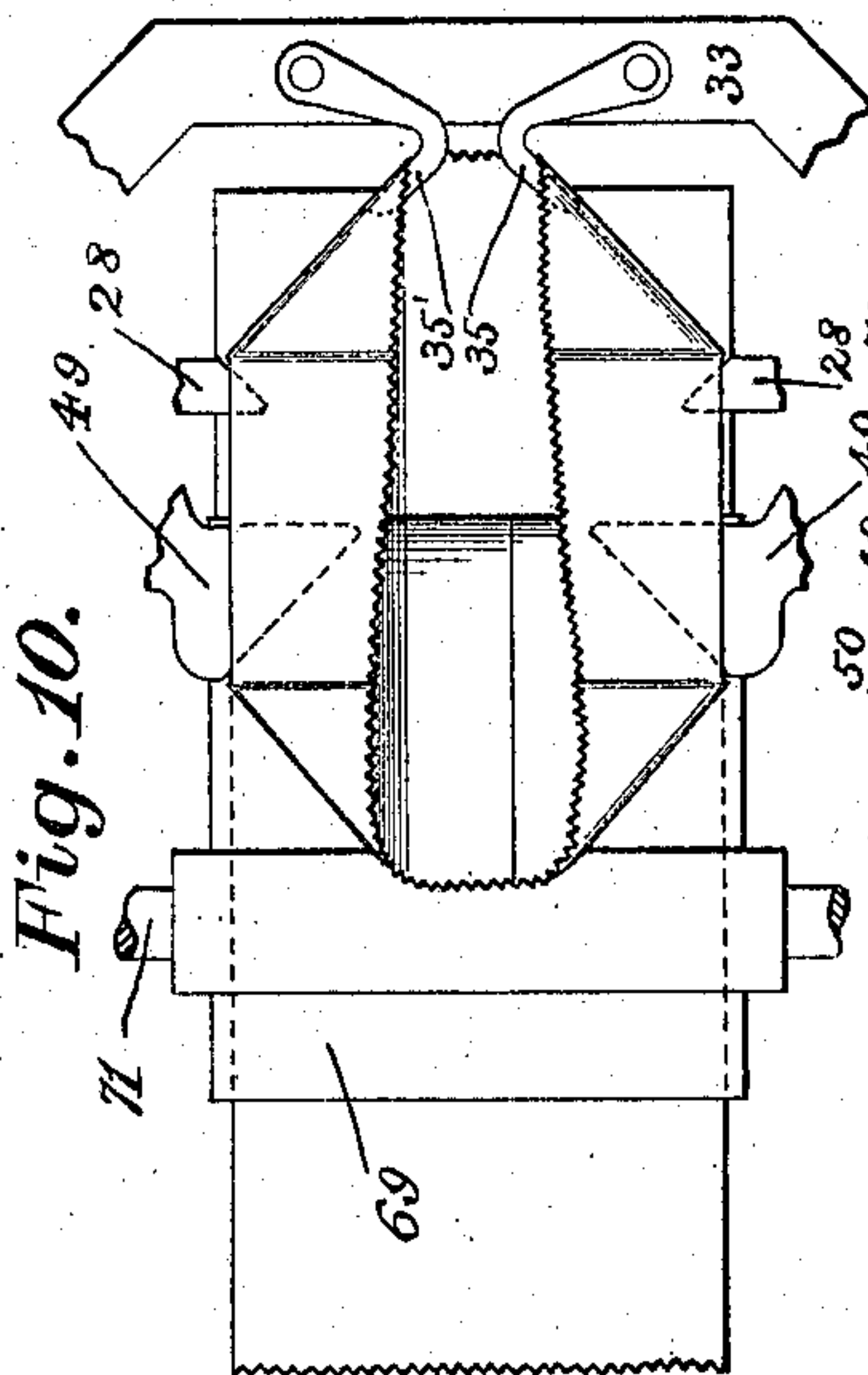
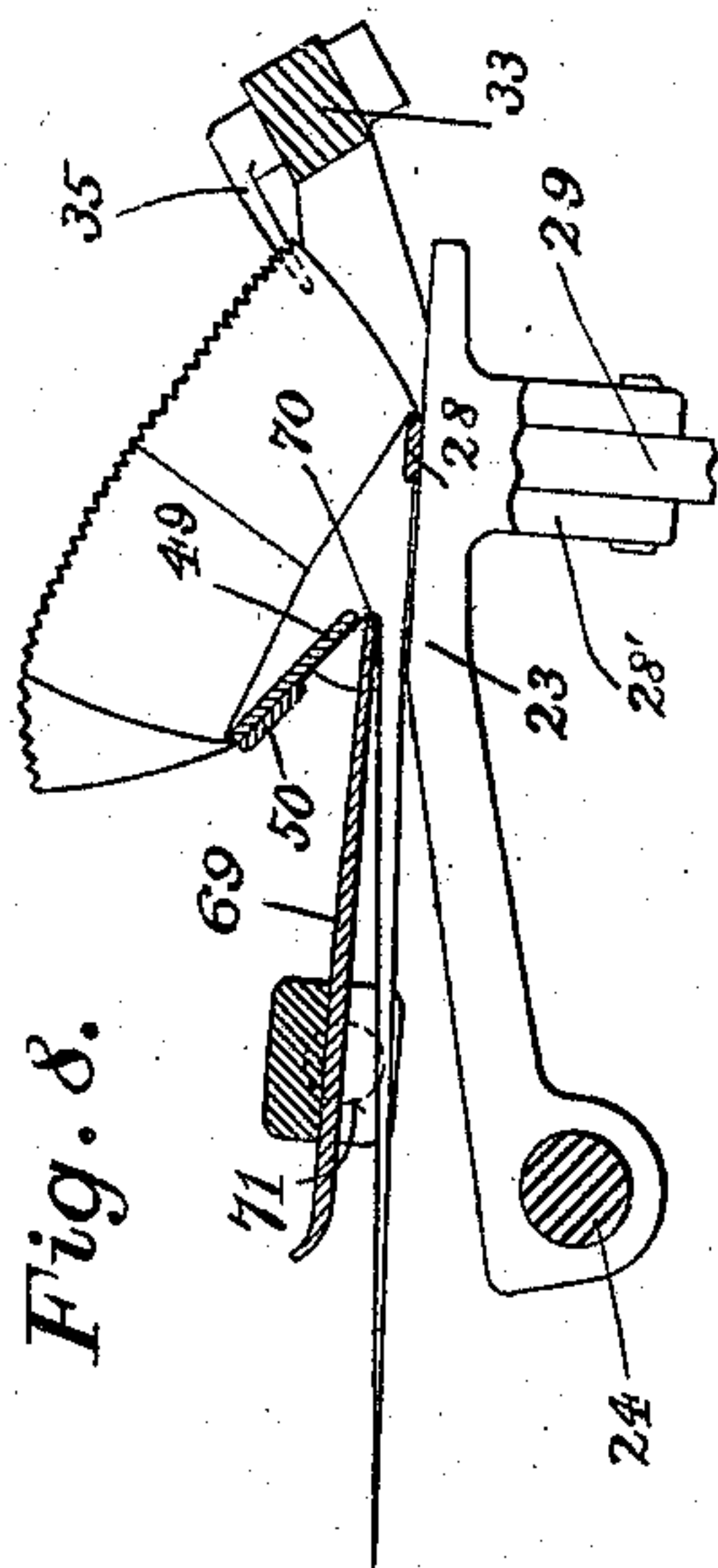


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4 SHEETS—SHEET 4.



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# UNITED STATES PATENT OFFICE.

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## PAPER-BAG MACHINE.

No. 847,959.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed December 17, 1900. Serial No. 40,069.

*To all whom it may concern:*

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a full, clear, and exact specification.

This invention relates to paper-bag machines, and more especially to that class thereof in which paper bags are manufactured from bellows-sided or tucked tubing; and it has for its object the provision of an improved machine whereby the so-called "diamond fold" is formed in a novel manner preparatory to having its flaps supplied with paste and subsequently folded to complete the bag.

My invention has, furthermore, for its object the provision of means whereby the blank as it is fed into the machine will be properly positioned relatively to the folding devices and whereby the open end of the tucked tube or blank will be opened out gradually, said position being such that the folding devices may engage the upper and lower plies of the blank.

My invention includes as some of its features a suitable blank-support, tuck-holders for holding the lower ply of the blank, folders for engaging and turning back the upper ply of the blank, and also a defining member independent of the box-holders but coöperative therewith, the organization of these elements being such that the defining edge and the blank-support will be maintained at opposite sides of and at a distance from the folders when the blank is being fed into the machine.

My invention has, furthermore, for its object the provision of means whereby said defining edge and the movement-axis of the folders are brought substantially into alignment with each other after the blank has been fed into the machine for the required distance, so that said defining edge may serve substantially as an axis around which the upper ply of the blank may be folded back to form what is generally known as the "box form" by developing the so-called "inside triangular folds" and subsequently to complete the diamond fold.

A further object of my invention resides in the provision of improved means whereby the sides of the blank are maintained in distended condition during the diamond-forming operation in order to facilitate the development of the inside triangular folds above referred to and to obviate wrinkling the material of which the bags are to be made.

My invention includes tuck-holders coöperative with the defining edge and folders in combination with means for maintaining said defining edge and the lower ply of the blank at a substantial distance from each other during the diamond-forming period, the amount of such distance depending upon the nature of the material used.

Another object of my invention may be found in the organization of a device whereby the front diamond flap may be engaged and which is adapted for movement transversely of the blank-support in order to relieve undue strain which may be brought upon the blank during the period of forming the "box," as will hereinafter be described.

Further objects of my invention reside in the particular construction of some of the elements forming a part of the machine, as will be described later on and is particularly pointed out in the claims.

In the drawings accompanying this specification Figure 1 is a top view of my improved machine. Fig. 2 is a side view of the same looking from the left of Fig. 1. Fig. 3 is a vertical section taken on line 3 3, Fig. 2. Fig. 4 is a fractional front view partly broken away and showing the tuck-holders in their moved-in position, while Fig. 5 illustrates the same in their withdrawn position. Fig. 6 is a vertical cross-section taken on line 6 6 of Fig. 1. Figs. 7 to 10, inclusive, are fragmentary views illustrating the operation of forming the diamond, Fig. 7 illustrating the position of the folders and tuck-holders ready to open out the open end of the blank. Fig. 8 illustrates the open end of the blank opened out sufficiently to form what is generally called the "box." Fig. 9 shows the diamond substantially completed, and Fig. 10 is a top view of Fig. 9.

In the drawings, 10 designates the bed-plate, to which are secured a pair of upright



side frames 11 and 12, in which several of the cooperating shafts for driving the various devices are supported. Suitable means are provided for feeding blanks or bellows-sided tubing into the machine, such means consisting in the present instance of feed-rollers 13 and 14, mounted on shafts 15 and 16, respectively, the latter being journaled in boxes 17, movably held in the side frames and acted upon by suitable springs 17'. (See Fig. 2.) The feed-rollers are caused to cooperate with each other by means of gears 18 and 19, mounted on said shafts, and are driven by a gear 20, mounted on the lower roll-shaft and obtaining motion through an intermediate 20', journaled on a stud which is held in the side frame 12, and obtaining motion from a gear 21, mounted upon a shaft 22, which constitutes the main driving-shaft of the machine, and to which power may be applied from any ordinary source, said shaft 22 being journaled in bearings 22', which are secured to the bed-plate 10. From the feed-rollers the blank or tube is conducted to a suitable blank-support serving as a folding-bed for the blank during the bottom or diamond forming operation. Connected for cooperation with the blank-support and more particularly with the tuck-holders 28, whereby said blank is retained and held in position, is blank-folding mechanism 49, adapted for engaging the upper ply of the blank, the tuck-holders and blank-folding mechanism coacting to open out the open end of the blank to form the diamond, as will hereinafter appear. The blank-support is in this instance of the non-traveling type in the sense that it does not advance the blank, and consists, substantially, of a platen 23, mounted for rocking movement, and is herein shown secured to a rock-shaft 24, to which proper movement may be imparted by a cam-groove 25 of the cam C, engaging a roller 26, which is journaled on an arm 27, secured to the shaft 24, referred to. The means for holding the lower ply of the tube on the blank-support consist, preferably, of a pair of tuck-holders 28, journaled in ears 28', which are formed on the under side of the platen 23, and having roll-receiving portions 29, on which cam-rollers 30 are journaled. These cam-rollers are in engagement with suitable cams 31, which cause the tuck-holders to engage the blank on both sides simultaneously and at the proper time, both tuck-holders being operated to close against the blank-support—as, for instance, by a spring 32, connected to both holders.

Means are provided for holding the front edge of the lower ply of the tube or blank, these means forming a feature of my present invention and shown herein as a front diamond-holder designated in a general way by H and comprising substantially a bar 33, which is journaled in brackets 34 and 34', se-

cured to the bed-plate of the machine, said bar carrying a pair of fingers 35 and 35', which are journaled at 36 and 36', respectively, in said bar and are caused to cooperate—as, for instance, by sectors 37 and 37'—while proper movement may be imparted to one of them, as 35, by a cam-groove 38, provided in the face of the cam C above mentioned. This cam-groove 38 engages a cam-roller 38', journaled on a lever 39, which is pivoted intermediate its ends, as at 40, on the bed-plate 10 of the machine, and the other end of which is provided with teeth 41 to engage a sector 42, secured to a short shaft 43, which is journaled in the bed-plate 10 and connected with the spindle 36 of the finger 35 in such a manner that the oscillating movement imparted to the shaft 43 will be transmitted to the spindle 36, while at the same time said bar 33 may be oscillated on its axis and the connection between the spindles 36 and 43 be yet maintained. As above stated, the bar 33 is pivotally supported in the bearings 34 and 34', and it may be rocked in said bearings by a cam 44, secured upon the main shaft 22 and engaging a cam-roller 45', pivoted on one end of a lever 45, which is fulcrumed intermediate its ends, as at 46, and is provided at its other end with teeth 47, engaging a sector 48, which may be secured to one of the trunnions of the bar 33 in any suitable manner.

Inasmuch as a great deal of strain is brought to bear upon the material from which the bag is to be made, particularly at the time when the box is being formed, I relieve the front-flap end of the lower ply preferably after the manner shown in Fig. 8, in which the bar 33 and the fingers 35 and 35', carried thereby, are shown in raised position, and the operating connection, whereby said fingers are operated to close upon or release the blank, must therefore be of such a character as to permit said fingers being raised and yet preserve their connection with the driving mechanism. Hence I preferably employ an extensible device whereby the spindle 36 on the finger 35 is coupled with the driving-shaft 43, this connection consisting substantially of a telescopically-organized transmission-shaft 73, provided at its ends with universal joints 74, so as to accommodate itself to any position of the front diamond-holder H.

The fingers 35 and 35', carried upon the bar 33, receive, therefore, a movement toward and from the blank-support or platen 23, thereby positioning these fingers away from or near to said platen during the diamond-forming operation. This position will depend upon the time during which the folding of the diamond takes place, a higher position being employed during the box folding and the position of the fingers being lowered during the completing of the diamond.



The blank-folding mechanism is connected for operation with the tuck-holders and is herein illustrated as a pair of plate-folders which enter the side tucks of the blank at opposite sides and are mounted for oscillation relative to the carrier to engage and turn back the upper ply of the blank during the diamond-forming operation. In the form of my invention disclosed each folding-plate has cooperating with it a clamping-finger or gripper 50, journaled at 51 on the plate-supporting brackets or heads 52, which also support the folders 49. The grippers 50 are adapted to be closed against the folder-plates 49 by springs 53, while they may be opened during the blank-receiving period by pins 54, engaging with abutments 55, secured to the bearings 56.

By comparison of Figs. 4 and 5 it will be seen that both bearings 56 constitute slides which are movable toward and away from each other, said slides being mounted in the side frames 11 and 12 and having at their under sides rolls 57, engaged by cam-grooves 58, which are provided in cams 59, mounted upon the main shaft 22 above referred to. Secured to each of the heads 52 is a spindle 60, which forms a trunnion on which the corresponding folder and gripper are oscillated and the outer end of which is journaled and guided in a bifurcated bracket 61, between the arms of which a pinion 62 is held from sidewise movement, so that when the slides 56 are reciprocated the spindle 60 may slide freely through the pinion 62, but has a spline connection therewith, as shown at 63. (See Fig. 3.) The pinion 62 is properly oscillated, preferably by a cam-groove 64 in the side of the cam 59, engaging a roller 65, which is carried by an arm 66, forming a part of a sector 67, which is pivoted at 67' in the side frame 11 and is provided with teeth 68 in engagement with said pinion.

From the above it will be understood that the folders have two distinct movements—viz., an oscillatory movement in their bearings and also a reciprocatory movement toward and away from each other with the slides 56.

Coöperatively connected with the blank-support 23 is a member 69, the edge 70 of which serves as the defining edge, substantially around which the upper ply of the blank or tube is folded back by the swinging movement of the folders, and which in the present construction is so organized as to be shiftable into alinement with the axis of oscillation of the folders during the diamond-forming operation. This member 69 serves at the same time as a guide-plate, whereby the sides of the blank as the latter is fed into the machine are prevented from springing apart too far and whereby the upper ply of the blank is properly guided into position to be engaged by the folders and grippers

when each folder and its gripper are spread apart and the two sets approach each other preparatory to opening out the end of the blank. The member or plate 69 is preferably secured to a shaft 71, to which a proper rocking movement may be imparted by a suitable cam-groove provided therefor in the cam C and engaging an arm 72, which is secured to said shaft 71. While in the present instance the defining edge 70 remains substantially in its position during the diamond-forming operation, I preferably maintain the blank-supporting surface of the blank-support 23 at a distance from said edge during that period, and by imparting a rocking movement thereto in the manner above described so that the inside triangular folds may be formed in an easy and rapid manner while the sides are in partially-distended condition substantially at the defining line.

The operation of my improved machine is as follows: Bellows-sided or tucked tubing is introduced into the machine by the feed-rollers 13 14 and guided by the plate 69, so that the upper ply of the blank will come into alinement with and into position to be engaged by the folders and grippers 49 and 50, while the lower ply of the blank will be in position to be engaged by the tuck-holders 28, the position of the several parts being substantially as shown in Fig. 5—viz., the tuck-holders and each plate-folder and its gripper being spread apart—while in addition thereto the folders are in their withdrawn or retracted position. The folders are now moved toward each other, the upper ply of the blank being received between the folders and the coöperating grippers, while the tuck-holders are closed by the spring 32 against the lower ply of the blank holding the same against the carrier and at the same time the fingers 35 and 35' are swung over the front flap thereof. The edge 70 is now dropped into alinement with the pivot-axis of the folders and the parts are now in position, as shown in Figs. 4 and 7, the blank-supporting surface of the blank-support 23 being at a substantial distance from the defining edge 70, thus maintaining the sides of the blank in distended condition.

While the tuck-holders 28 and the blank-support 23 and also the front diamond-holder H remain substantially as shown in Fig. 7, the folders 49 will now be swung around their pivot-axes, thereby stretching out the blank sides and substantially until the position shown in Fig. 8 has been reached, when the fingers 35 will have been raised sufficiently to relieve the undue strain which is brought upon the material at this time, so as to facilitate the formation of the inside triangular folds and until the "box" has been completed. The blank-opening movement of the folders is now continued to the position shown in Fig. 9, while simultaneously



the front fingers 35 are depressed and the support 23 is raised to bring the distended sides of the tubes together, and the diamond is then in substantially completed condition. (Shown in Fig. 10.) The grippers 50 assist in the proper turning back of the upper ply by preventing the paper from slipping on the folders 49. The tuck-holders may now be opened to release the blank and the folders may be retracted and moved away from each other, so as to clear the blank entirely and to be then returned and swung back to their original or blank-receiving position. (Shown in Fig. 5.) The fingers of the front diamond-holder may at the same time be withdrawn from the blank, which may be then transformed into a completed bag by suitable devices. (Not shown.)

In my Patent No. 840,073 and in my co-pending application, Serial No. 38,396, filed December 3, 1900, I have shown, described, and claimed certain novel improvements in paper-bag machines, which in modified forms are shown and described, but not claimed, in this application. This application therefore is to be understood as being subordinate to the said copending application and patent in so far as they show and describe in common the novel features referred to.

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

1. The combination, with a blank-support having tuck-holders coöperative therewith, of folders mounted for oscillation upon a fixed axis, a guide-plate having a defining edge movable toward and from the axis of oscillation of the folders, and coöperative means for bringing said defining edge and the said axis into and out of substantial alignment, means for oscillating the folders, and means for moving the blank-support and the lower ply of the blank away from the said defining edge to maintain the sides of the blank in distended condition during the oscillation of the folders.

2. The combination, with a blank-support provided with tuck-holders for engaging the lower ply of the blank, of oppositely-disposed blank-folding members mounted for oscillation on a fixed axis and provided with grippers for engaging the upper ply of the blank, a member having a defining edge movable toward and from the said fixed axis of the blank-folding members, means for swinging the said folding members upon their axis while the said defining edge is in substantial coincidence with the said axis, and means for moving the blank-support and the lower ply away from the said axis to separate the side plies of the blank during the operation of the folding members.

3. In a paper-bag machine, the combination of a blank-support mounted for oscillation upon a fixed axis and provided with

tuck-holders, means mounted above the blank-support for oscillation upon a fixed axis, for engaging the upper ply of the blank and turning it back to form the diamond fold, a transverse fold-defining member having a defining edge movable into and out of coincidence with the said fixed axis of the turning-back means, and means for moving the blank-support and its tuck-holders to carry the edges of the lower ply away from the said defining edge during the turning-back operation.

4. In a paper-bag machine, the combination of a blank-support mounted for oscillation upon a fixed axis and provided with tuck-holders, folders mounted above the blank-support for oscillation upon a fixed axis, a transverse fold-defining member having its defining edge movable to and from the said axis of oscillation of the folders, and means for moving the blank-support and its tuck-holders away from the axis of oscillation of the folders during the formation of the diamond fold.

5. In a paper-bag machine, mechanism for forming diamond folds on bellows-folded blanks, having in combination a blank-support mounted for rocking movement upon a fixed axis, and provided with tuck-holders for holding the lower ply of the blank upon the support, folders mounted above the blank-support for oscillation upon a fixed axis, a transverse fold-defining member having its defining edge movable to and from the pivot-axis of the folders, means for oscillating the folders while the defining edge is substantially coincident with their axis of oscillation, and a cam for moving the blank-support to carry the edges of the lower ply away from the defining edge and the coincident axis of oscillation of the folders during the diamond-forming operation.

6. In a paper-bag machine, mechanism for forming diamond folds on bellows-folded blanks, having in combination a blank-support mounted for rocking movement upon a fixed axis, tuck-holders carried by the blank-support, for holding the edges of the lower ply of the blank thereon, folders mounted above the folding-bed for oscillation upon a fixed axis, a transverse fold-defining member mounted for oscillation with its defining edge movable into and out of coincidence with the axis of oscillation of the folders, means for oscillating the folders to turn back the upper ply of the blank to form the diamond fold, and a cam for rocking the blank-support to drop the lower ply of the blank and distend the side tucks of the blank adjacent to the defining edge during the diamond-folding operation.

7. The combination, with a non-traveling blank-support, and tuck-holders coöperative therewith, of a member having a defining edge, a front diamond-holder, means for



moving said front diamond-holder toward and from said support, and means for turning back the upper ply of a blank carried by the support.

5 8. The combination, with a non-traveling blank-support, and with tuck-holders cooperative therewith, of a member having a defining edge, folders, a plurality of fingers for engaging the front flap end of the blank, 10 means for moving said fingers toward and from the support, and means for operating the other named members of the combination in coaction with the said fingers.

15 9. The combination, with a non-traveling blank-support, and with tuck-holders cooperative therewith, of a member having a defining edge, folders, a front diamond-holder for engaging the front flap end of the blank, a cam for moving said diamond-holder to- 20 ward and from the support, and means coacting with the cam for operating the other named members of the combination.

25 10. The combination, with a non-traveling blank-support, and with tuck-holders cooperative therewith, of a member having a defining edge, folders, a plurality of fingers for engaging the front flap end of the blank, means for oscillating said fingers over the front flap end of the blank, means for moving 30 said fingers toward and from the support, and means for operating the other named members of the combination to coact with the said fingers.

35 11. The combination, with a non-traveling blank-support, and with tuck-holders cooperative therewith, of a member having a defining edge, folders, a plurality of fingers for engaging the front flap of the blank, means for moving said fingers toward and from the 40 support, cam-operated mechanism for oscillating said fingers over the front flap of the

blank, and cooperating mechanism for actuating the other named members of the combination.

12. The combination, with a blank-sup- 45 port, and with tuck-holders cooperative therewith, of a member having a defining edge, folders, a plurality of fingers for engaging the front flap end of the blank, means for moving said fingers toward and from the 50 support, extensible mechanism for oscillating said fingers over the front flap end of the blank, and cooperating mechanism for actuating the other named members of the combination. 55

13. The combination, with a non-traveling blank-support, and with tuck-holders cooperative therewith, of a member having a defining edge, folders, a plurality of fingers for engaging the front flap end of the blank, 60 means for moving said fingers toward and from the support, a telescopic device for oscillating said fingers over the front flap end of the blank, and cooperating mechanism for actuating the other named members of the 65 combination.

14. The combination, with an oscillatory blank-support having tuck-holders, of an oscillatory guide-plate having a defining edge, folders mounted for oscillation and coopera- 70 tive therewith, means for moving the support to and maintaining it at a substantial distance from the defining edge during the diamond-forming operation, means for actuating said tuck-holders, means for moving 75 said edge into alinement with the axis of the folders, and coacting means for operating the other named members of the combination.

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