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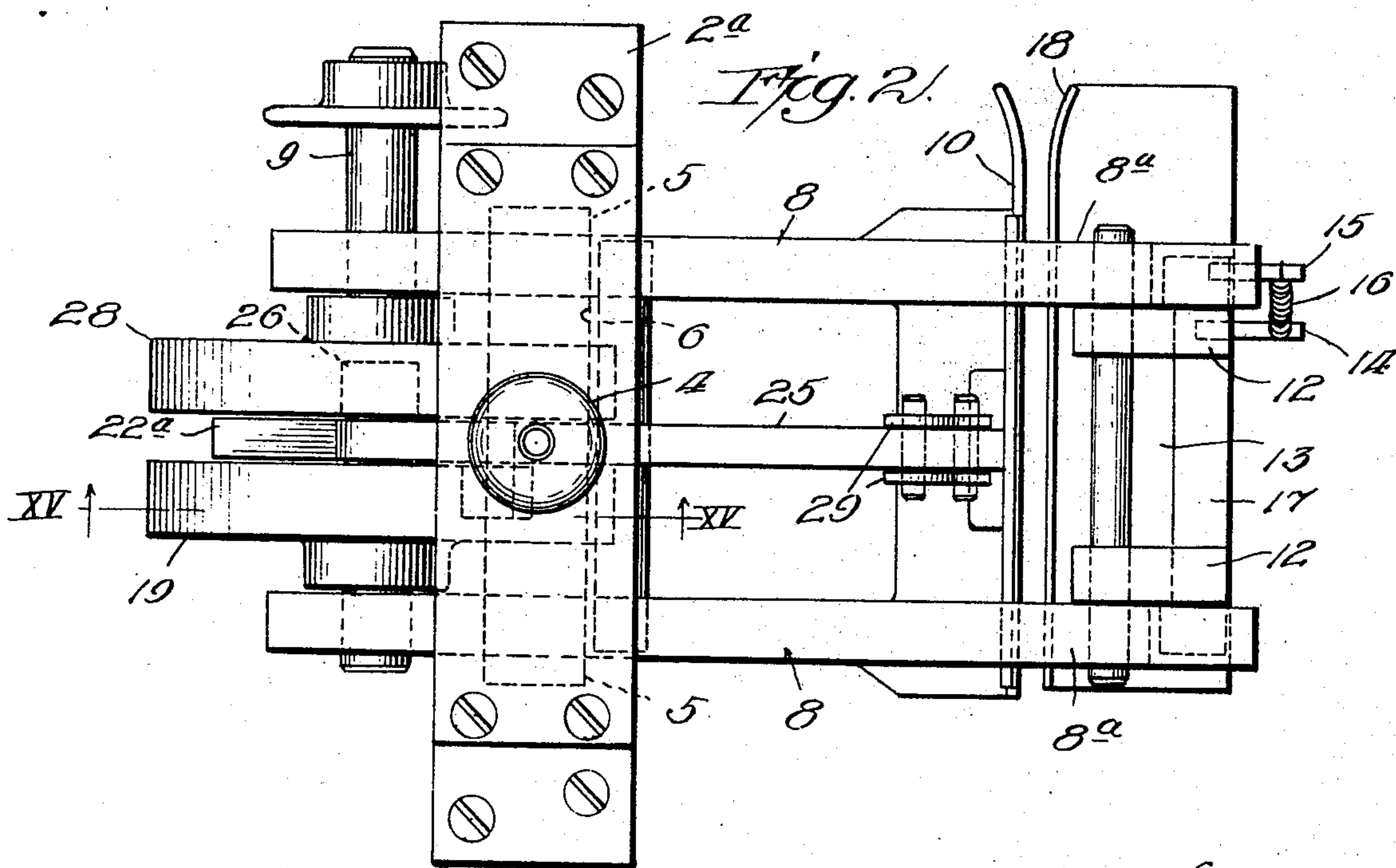
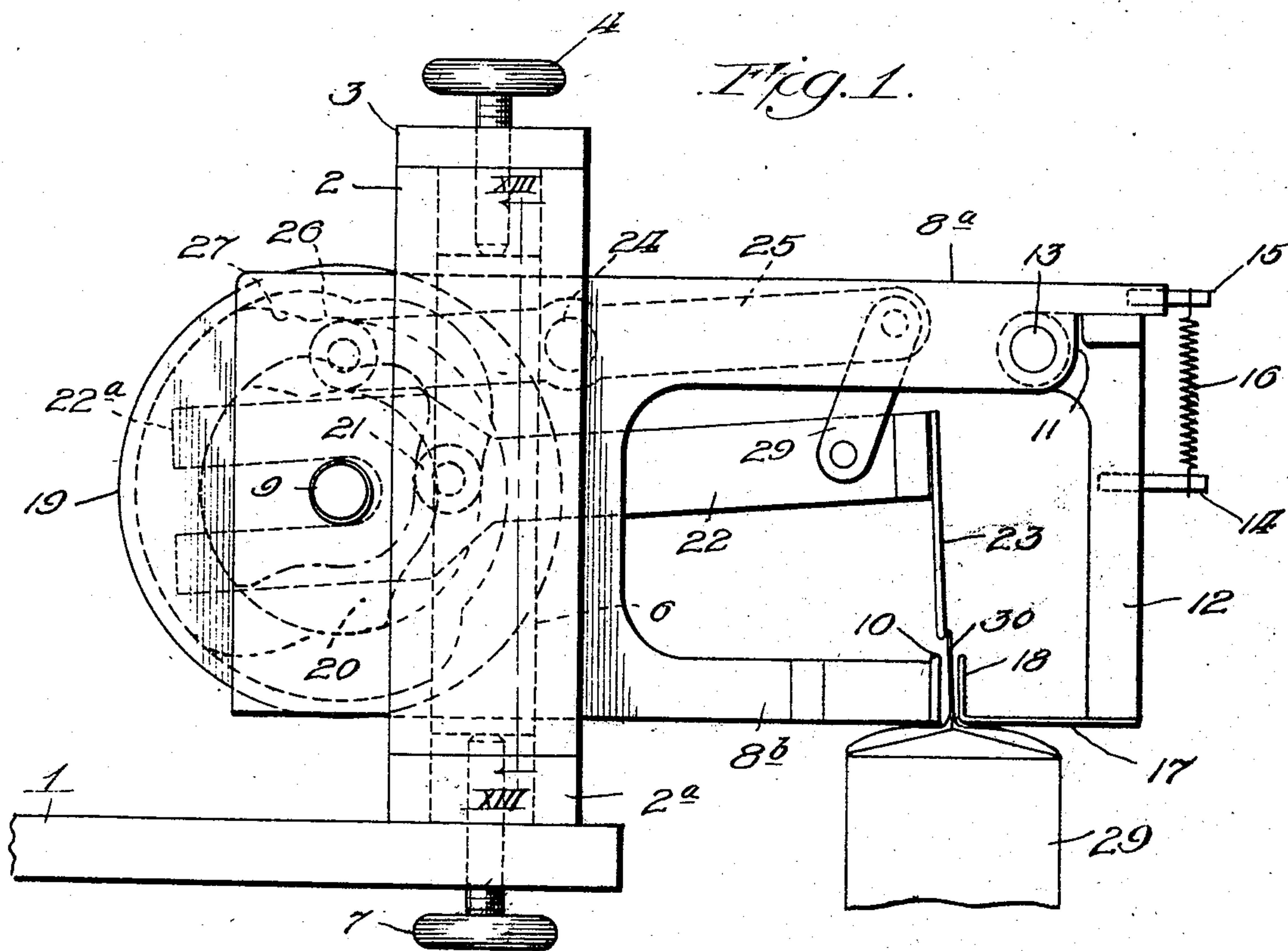
C. F. ALLISON

2,266,946

BAG FOLDING MECHANISM

Filed Aug. 28, 1939

5 Sheets-Sheet 1



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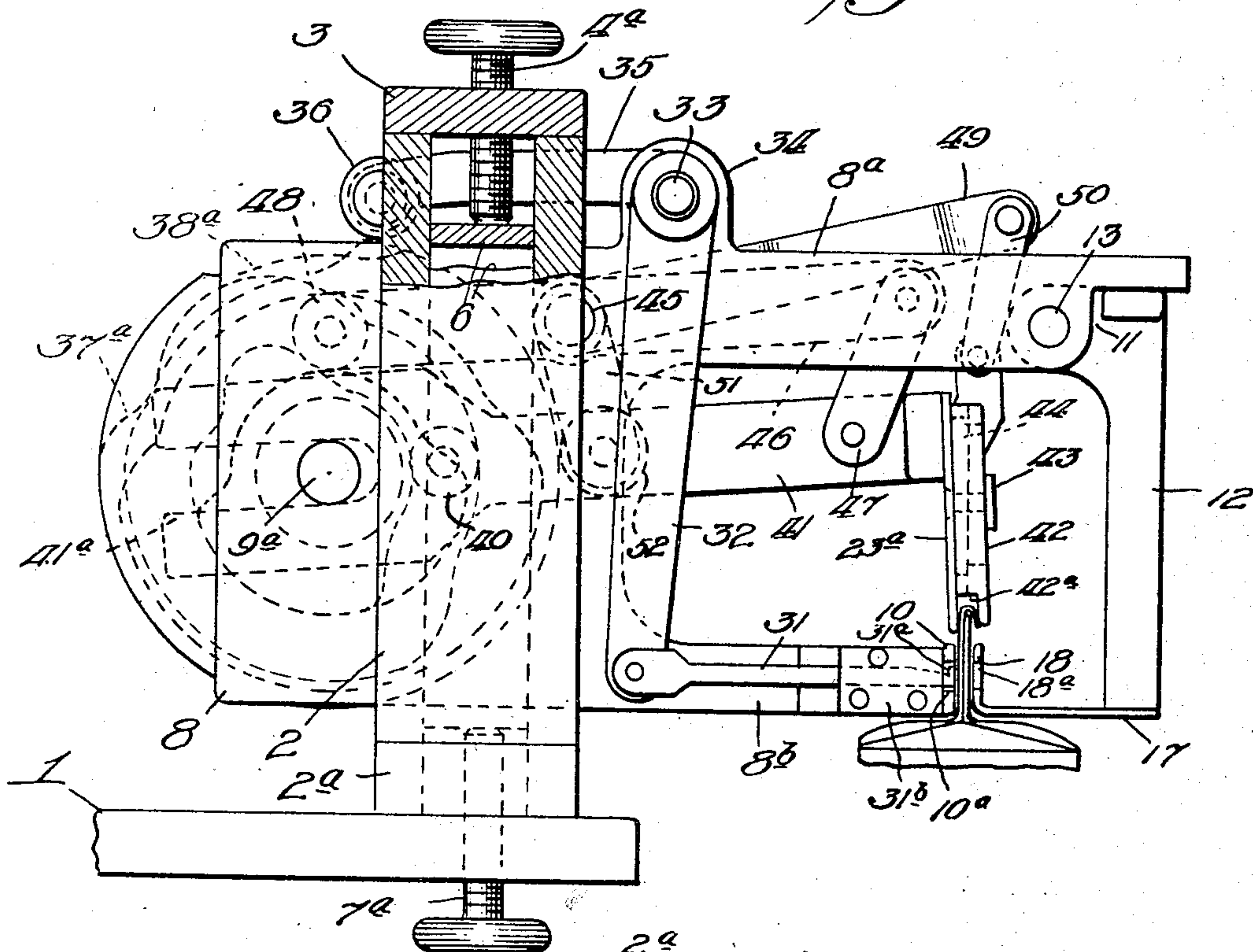
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BAG FOLDING MECHANISM

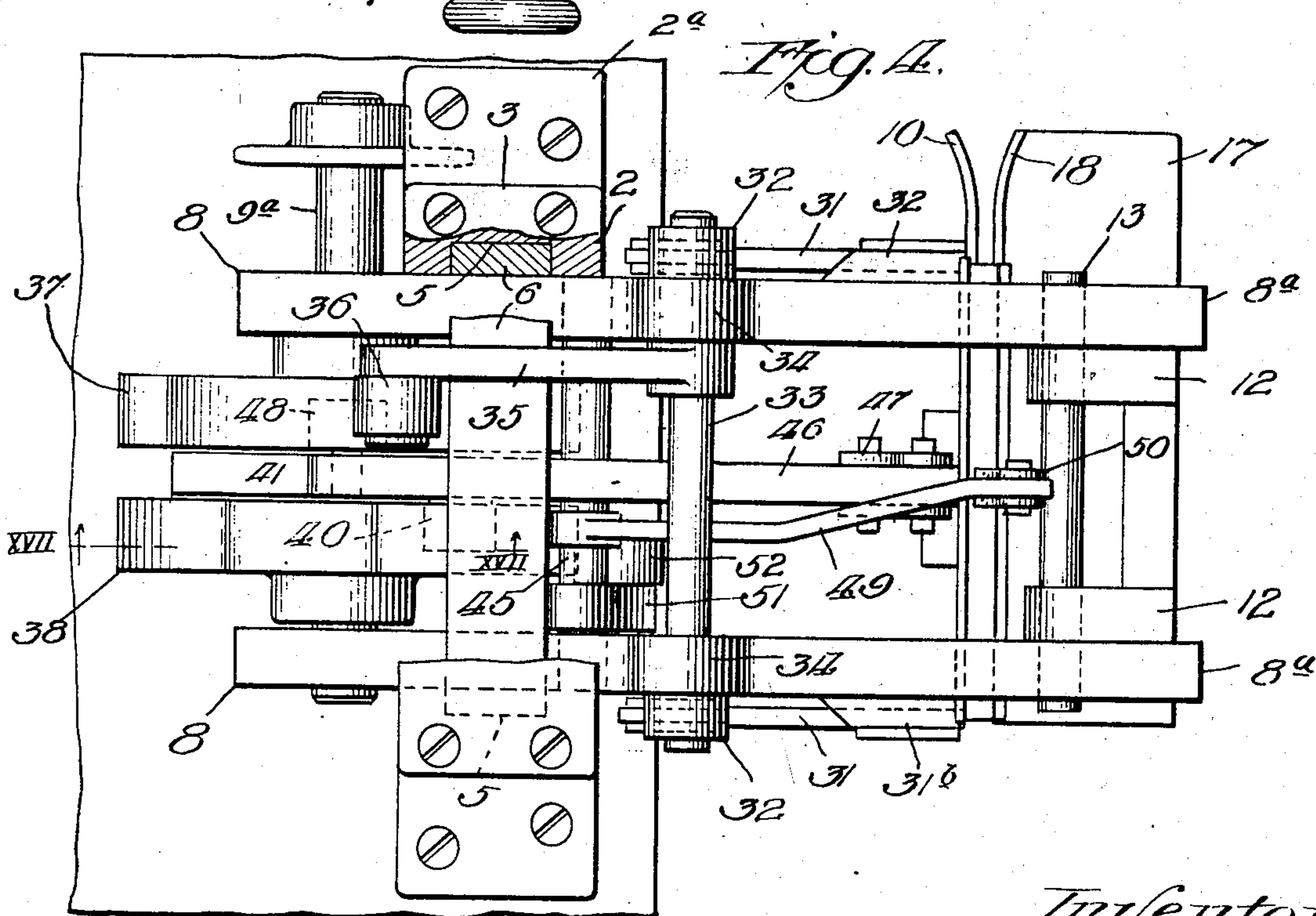
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*Fig. 3.*



*Fig. 4.*



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Filed Aug. 28, 1939

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Fig. 5.

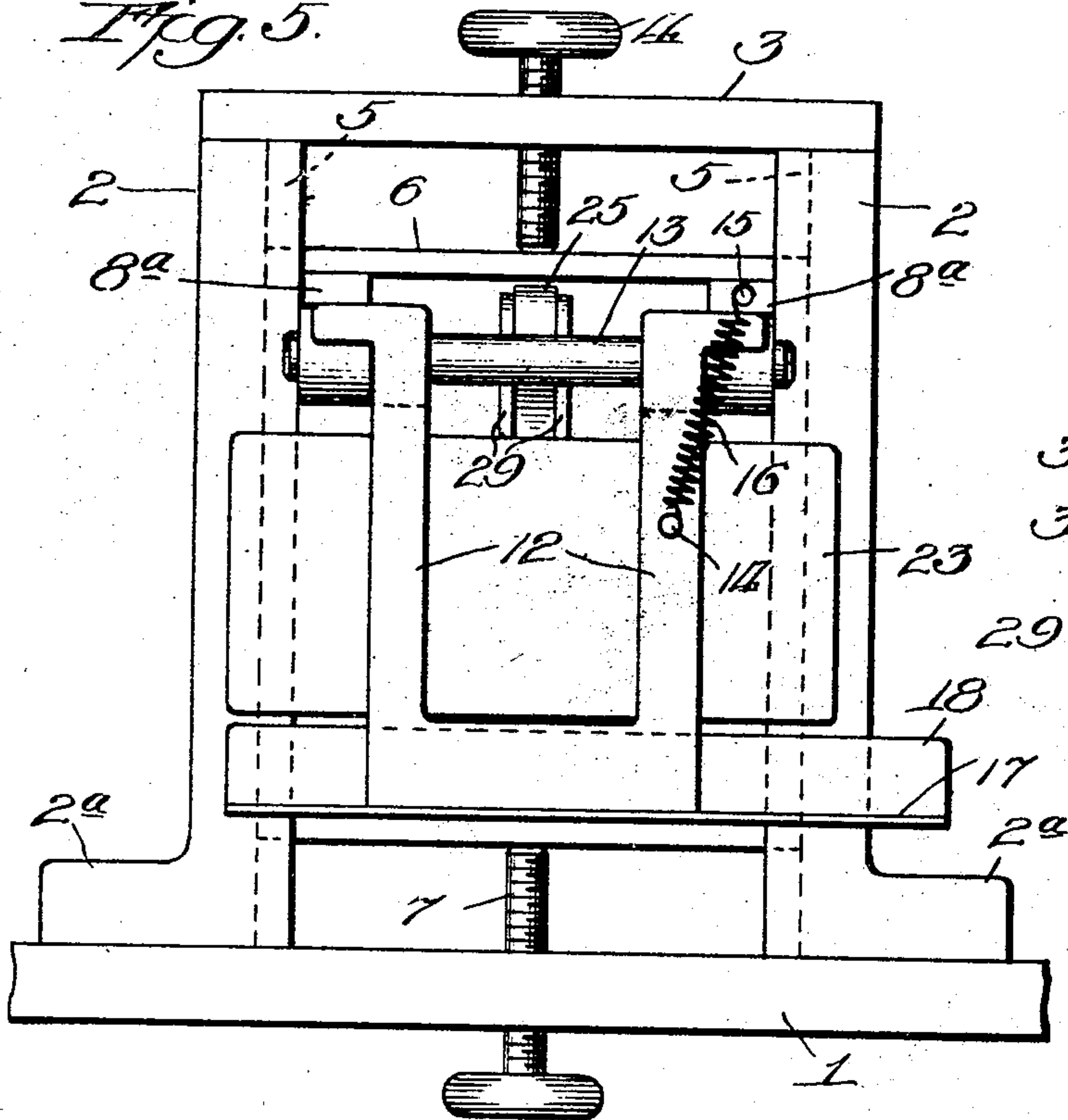


Fig. 6.

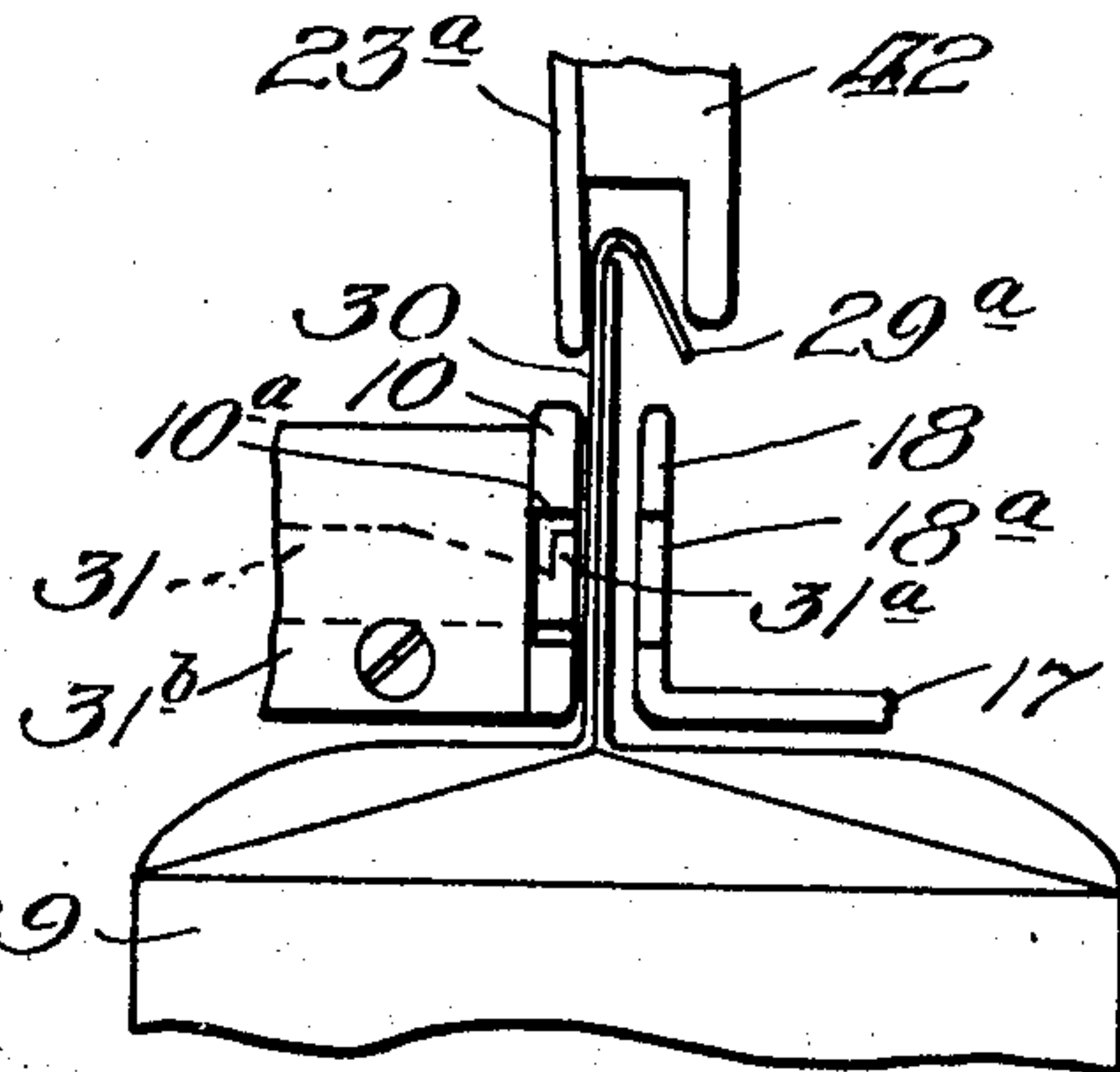


Fig. 7.

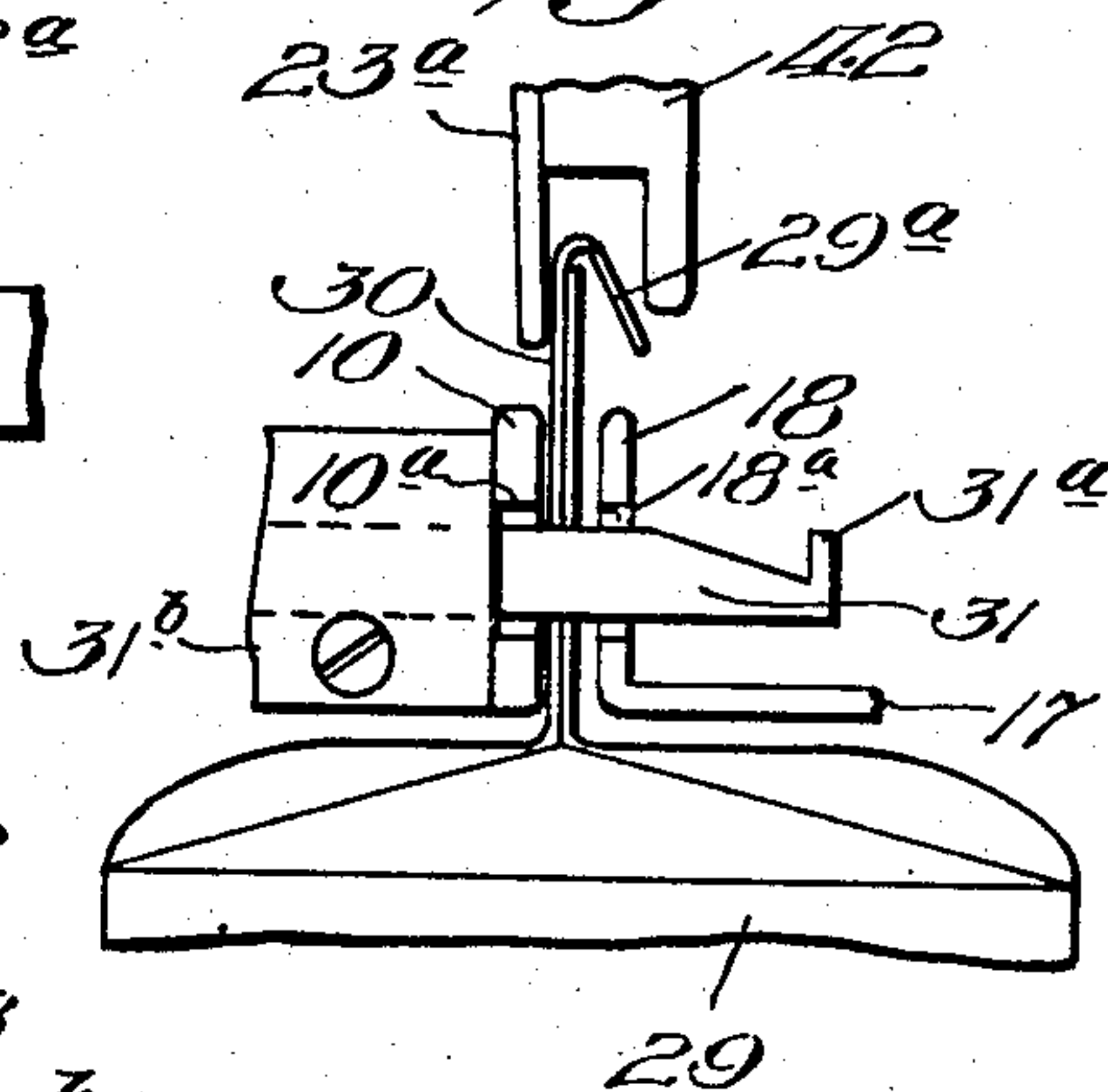


Fig. 8.

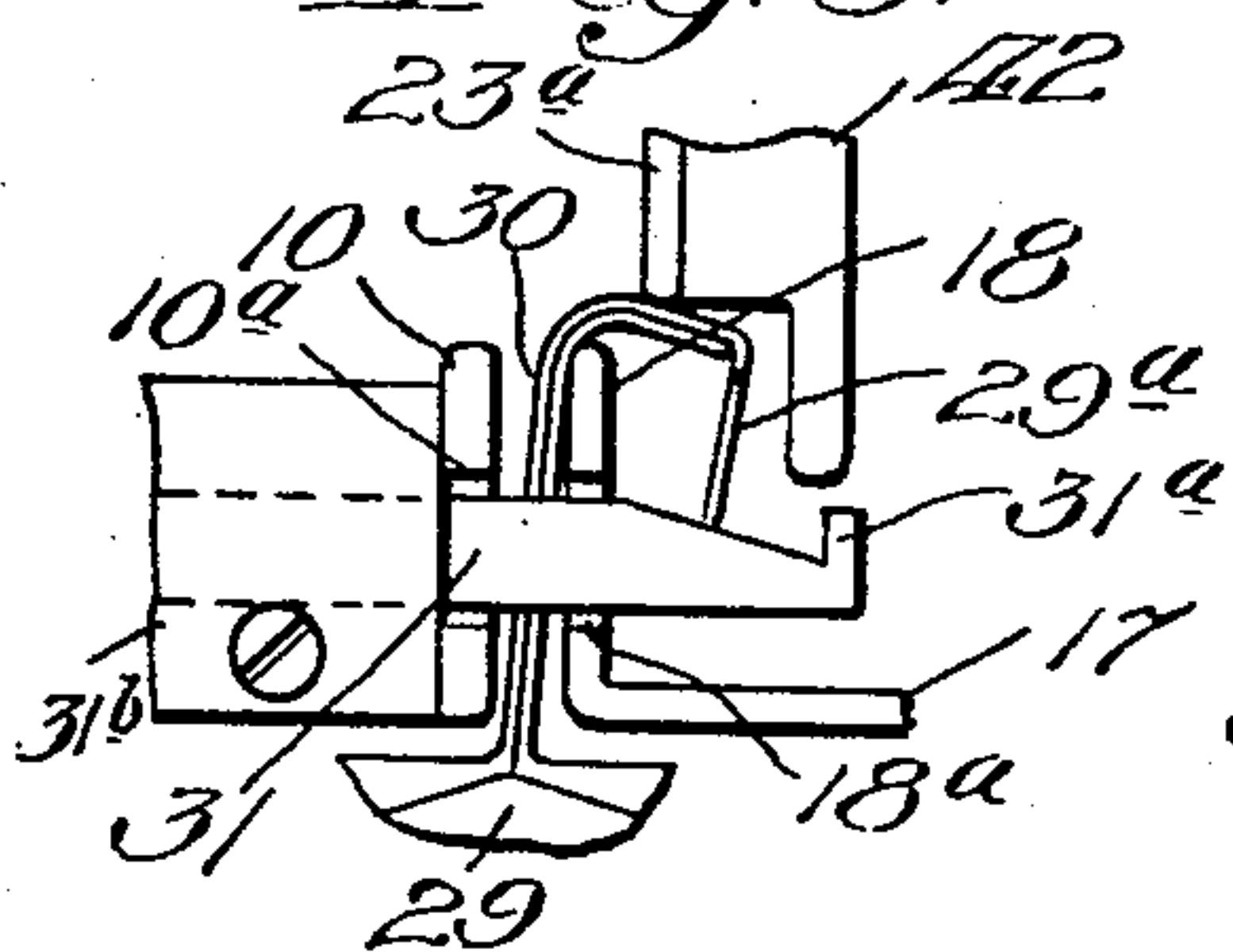


Fig. 9.

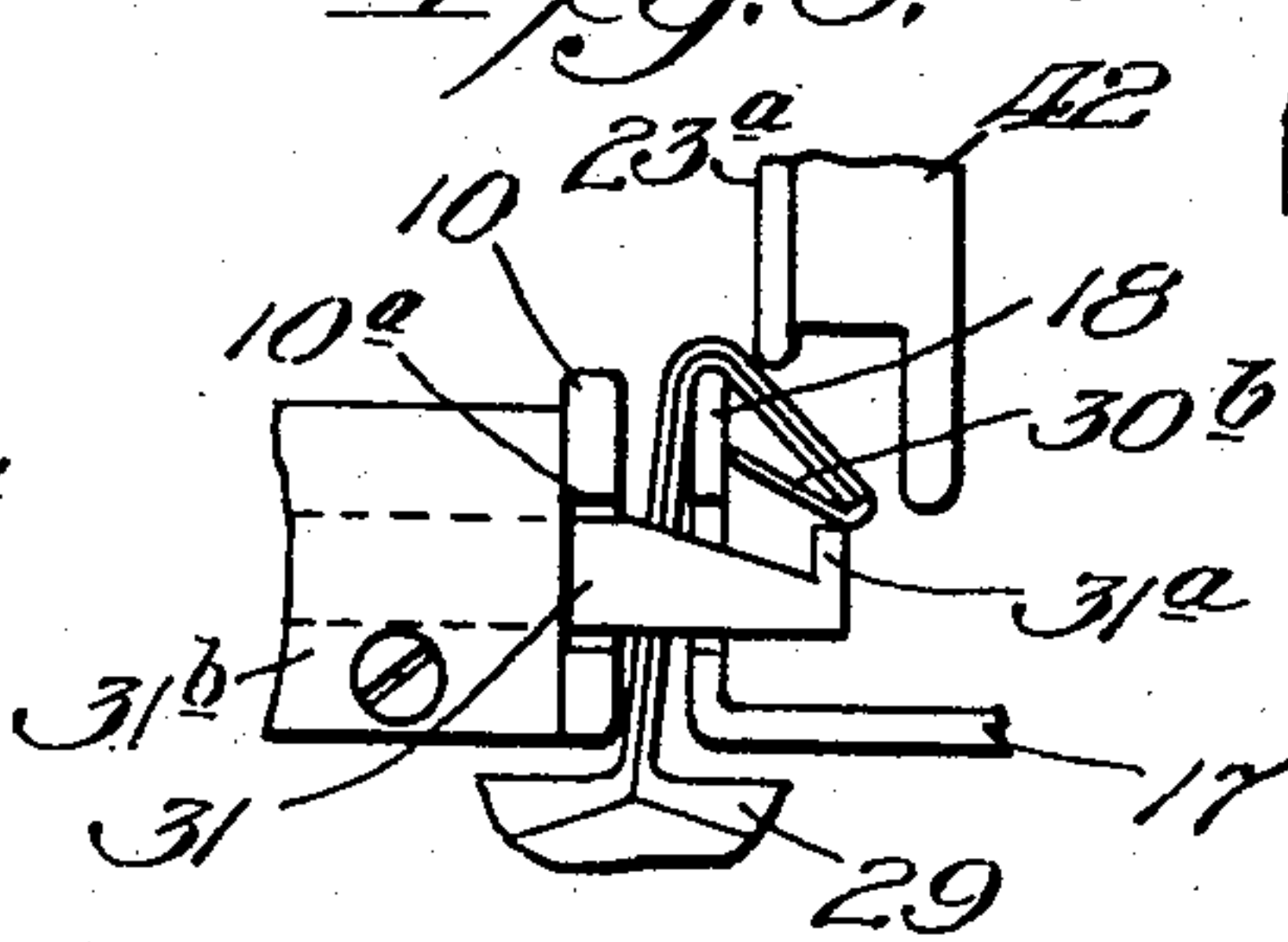


Fig. 10.

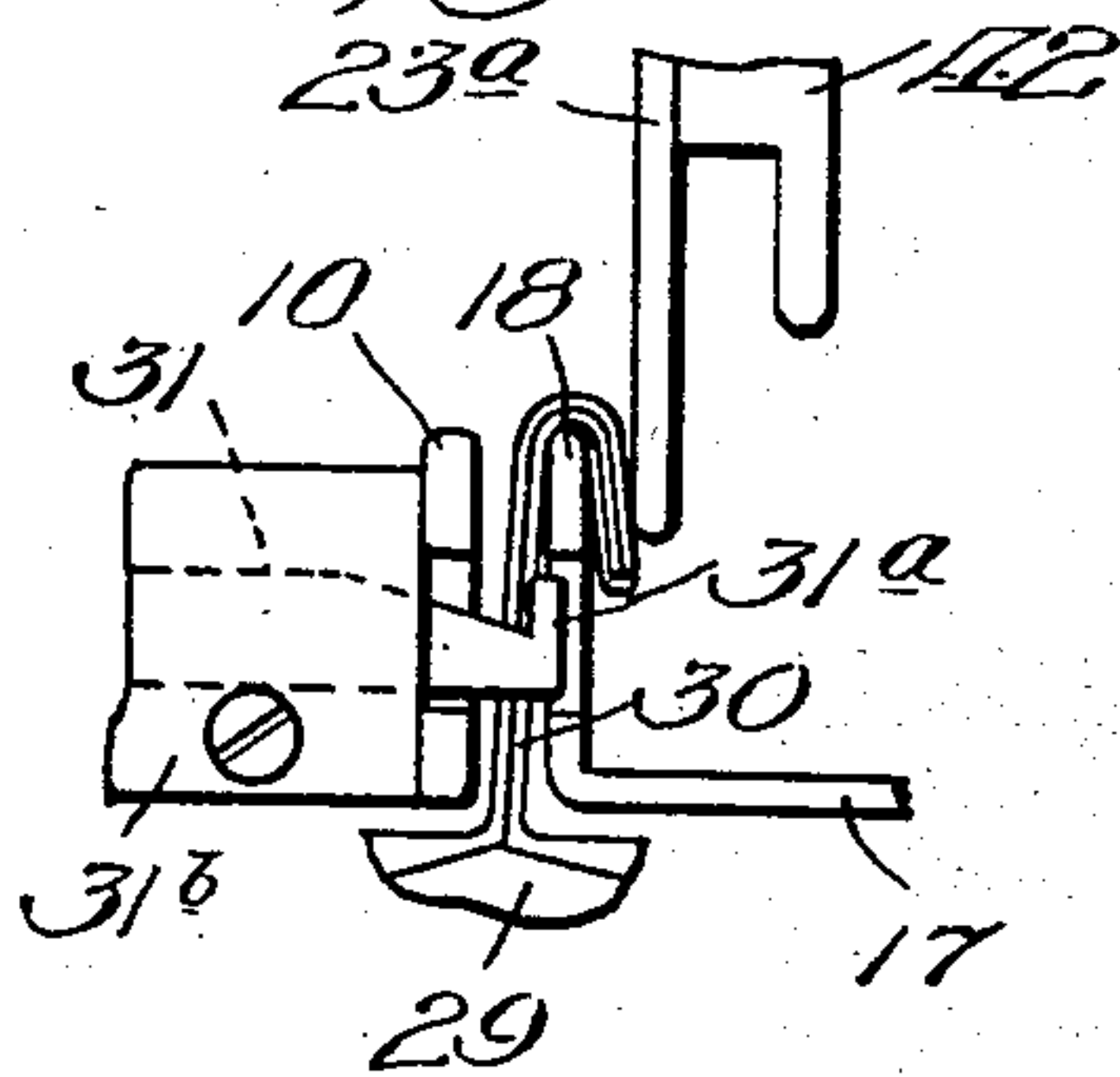


Fig. 11.

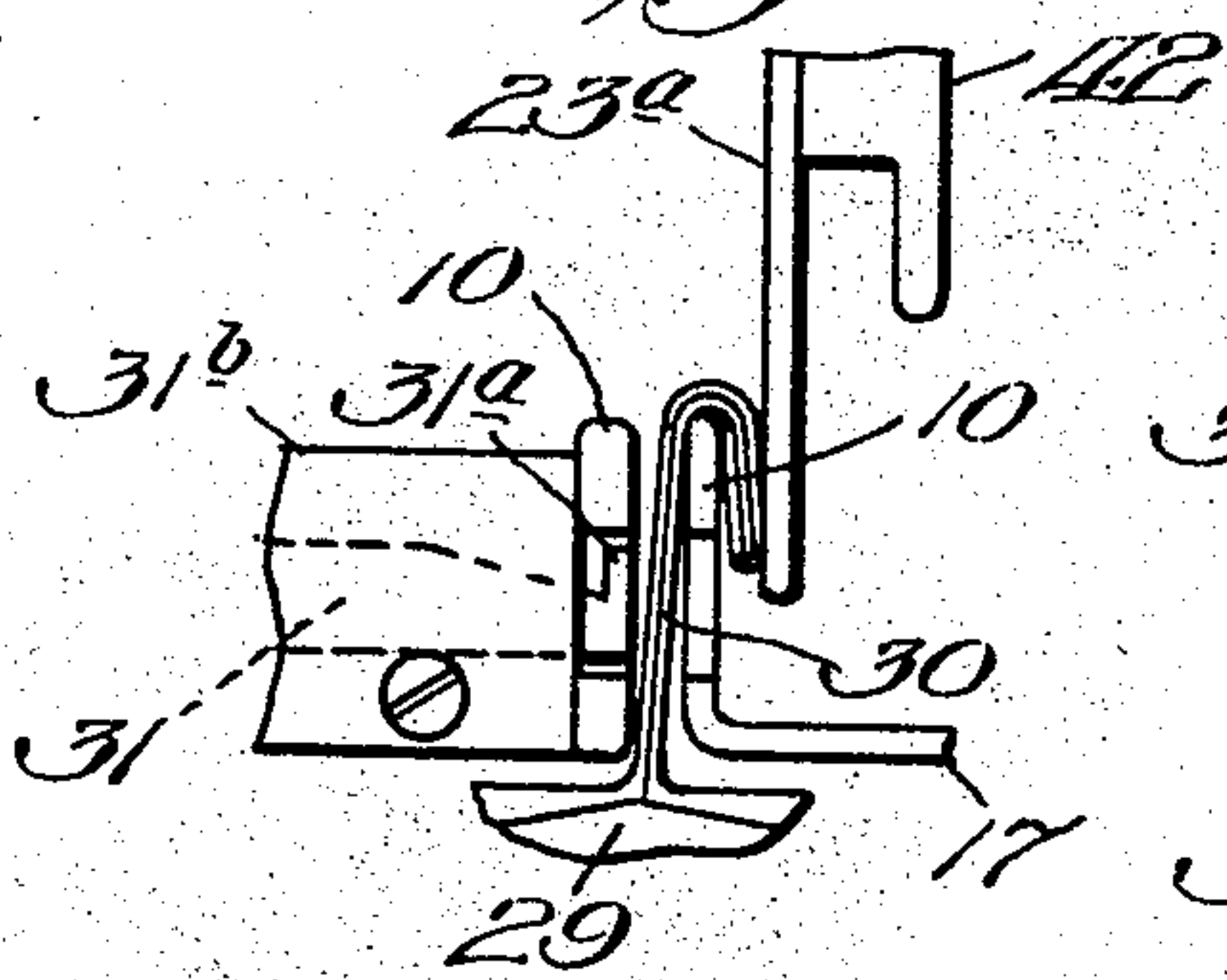
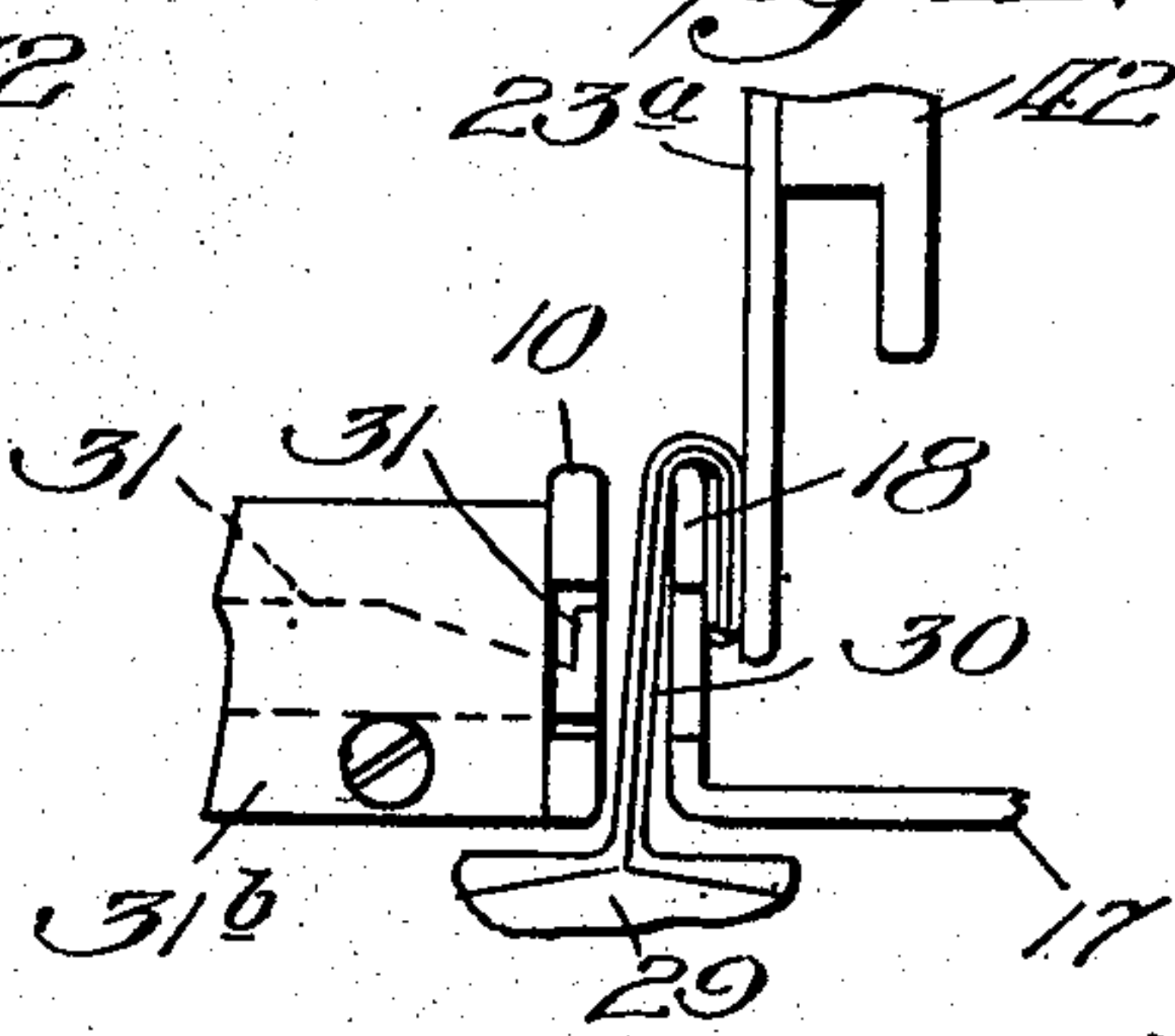


Fig. 12.



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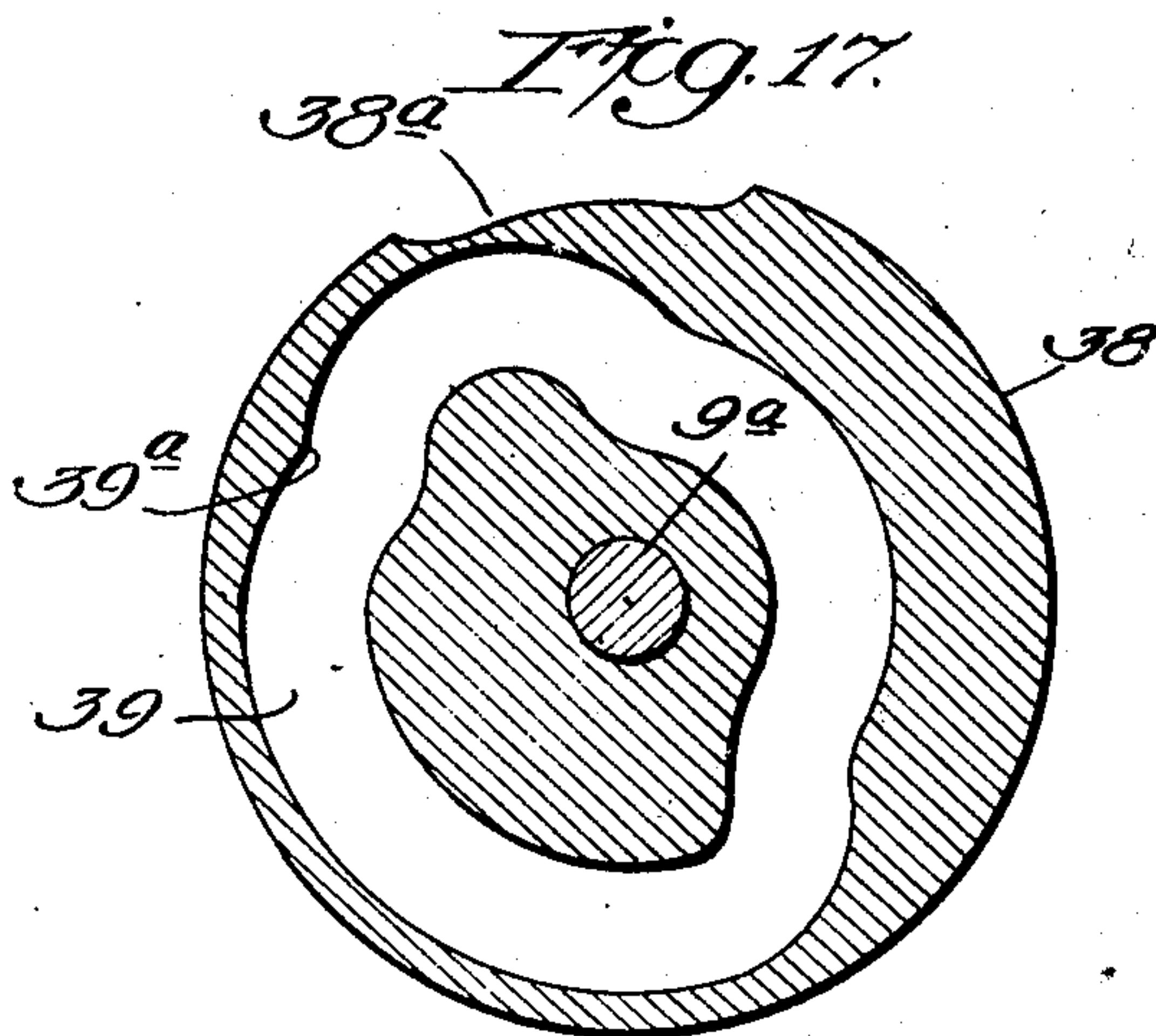
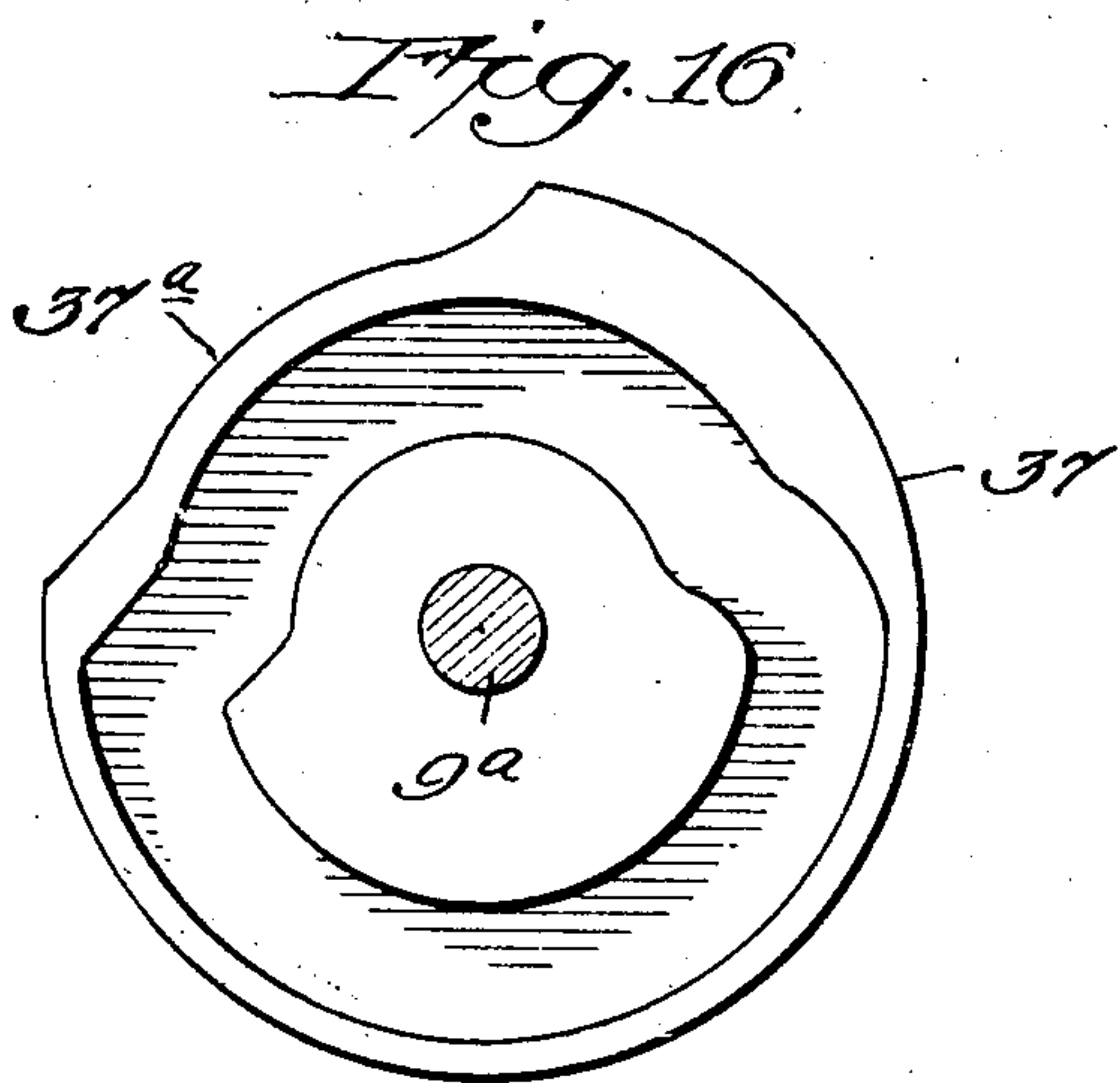
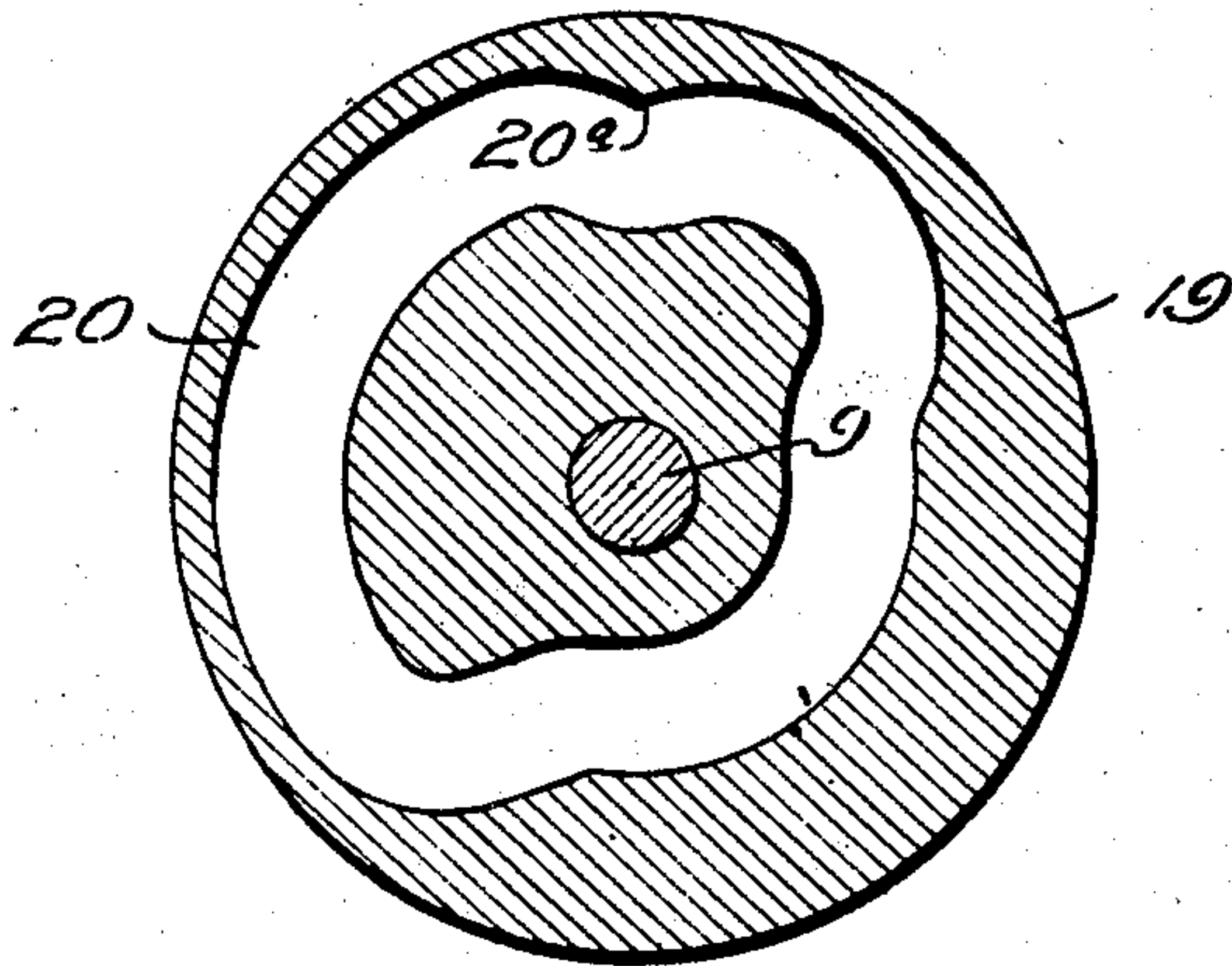
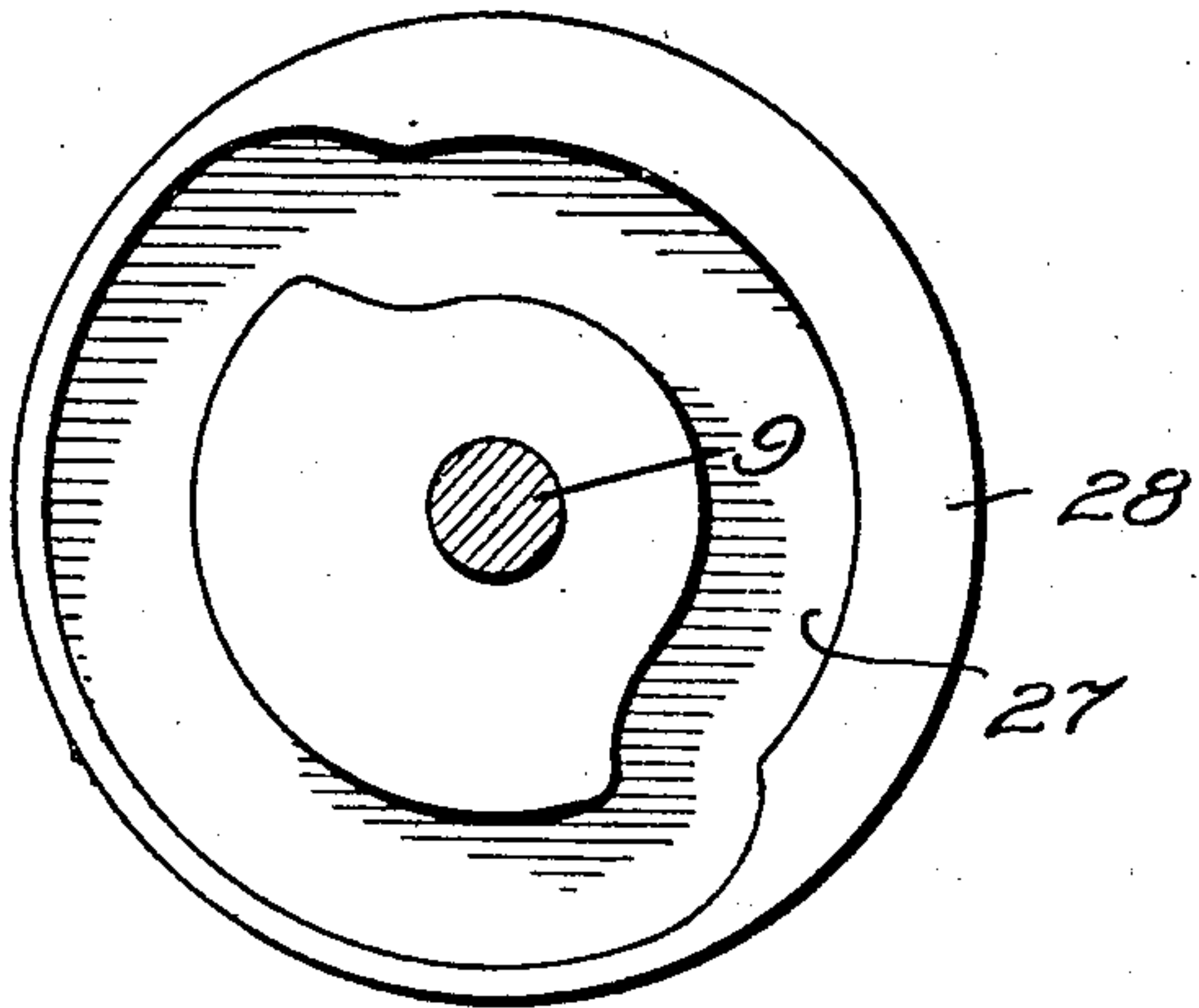
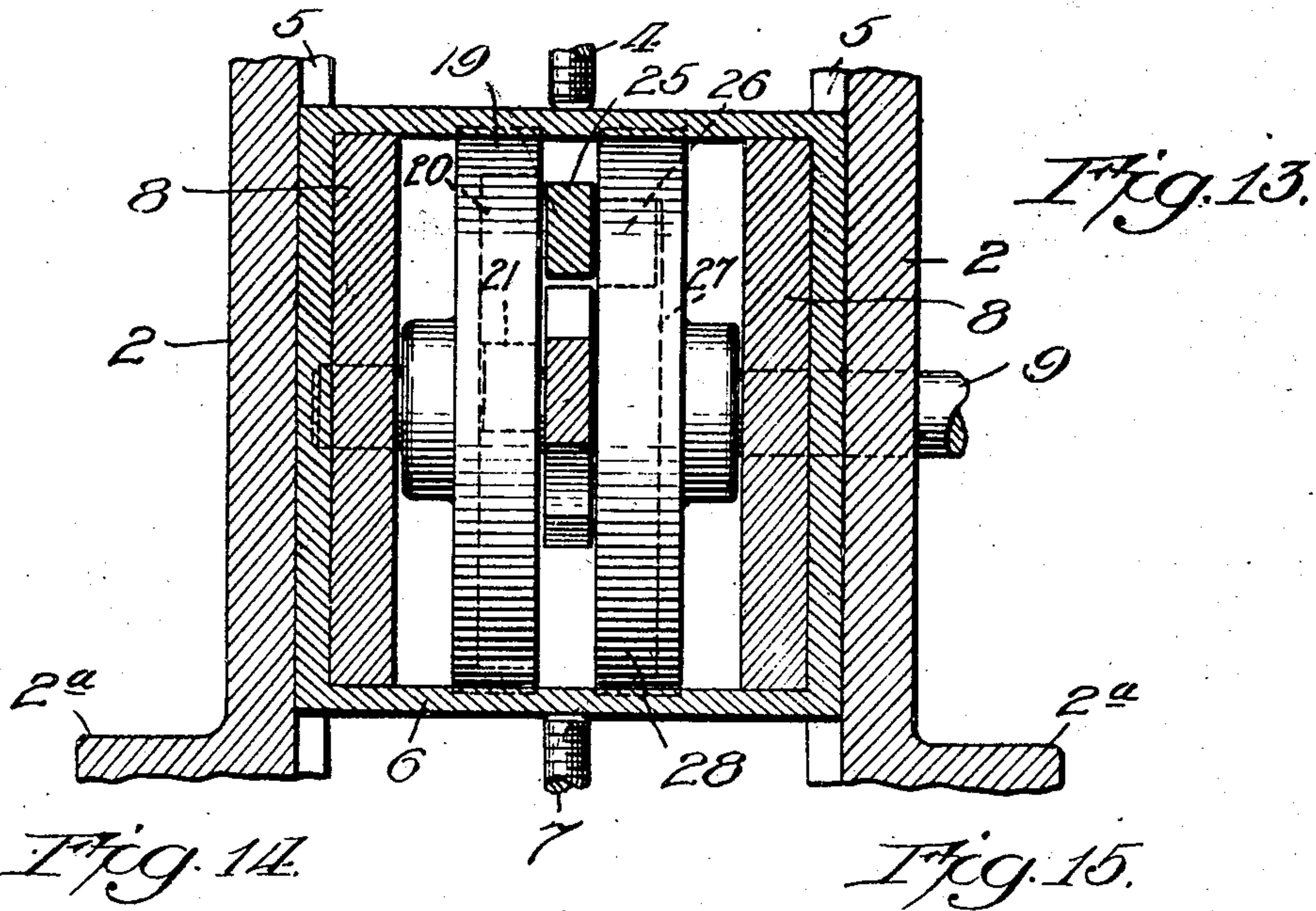
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**2,266,946**

## BAG FOLDING MECHANISM

Filed Aug. 28, 1939

5 Sheets-Sheet 4



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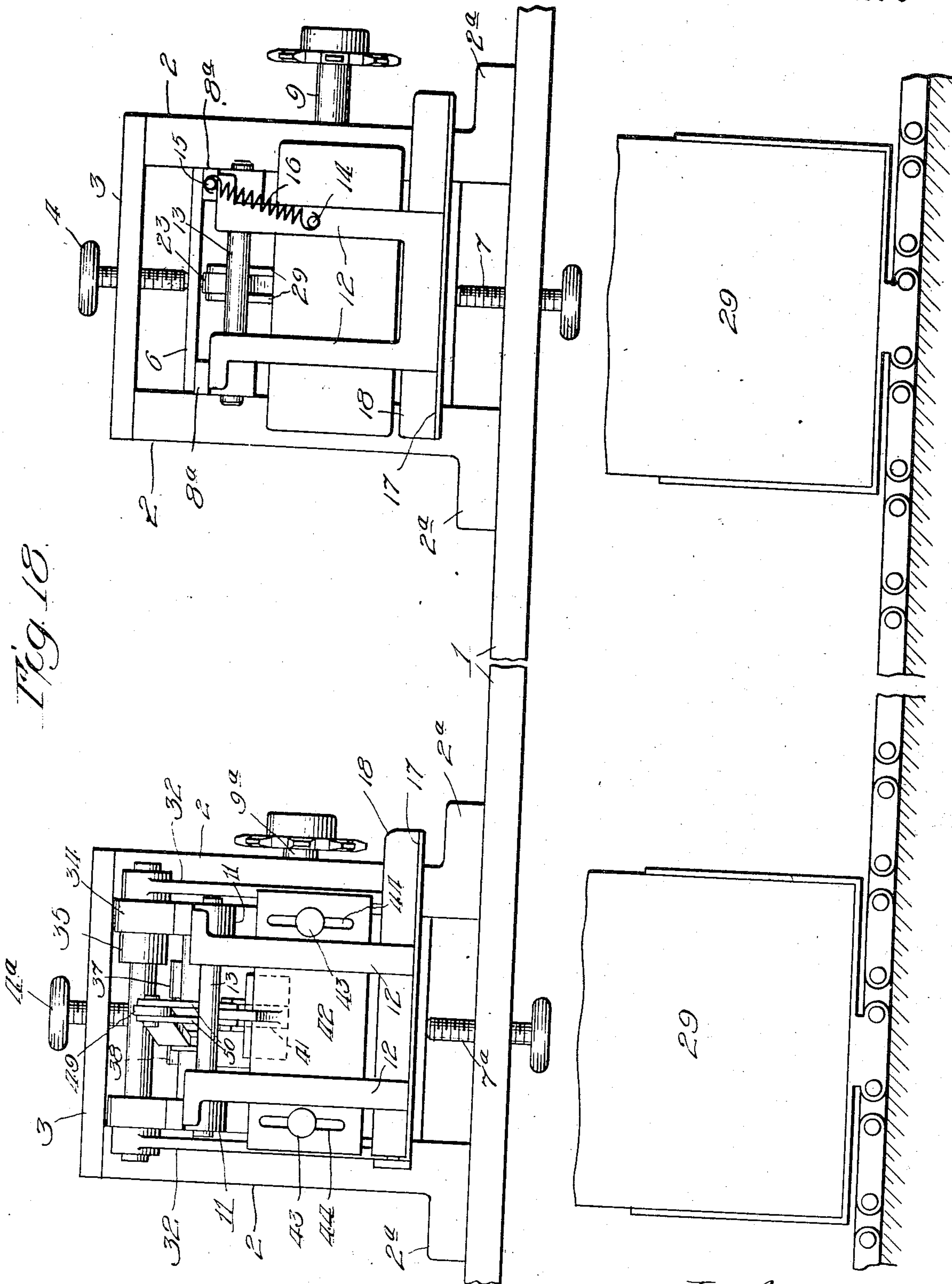
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**2,266,946**

# BAG FOLDING MECHANISM

Filed Aug. 28, 1939

5 Sheets-Sheet 5



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## UNITED STATES PATENT OFFICE

2,266,946

## BAG FOLDING MECHANISM

Charles F. Allison, Chicago, Ill., assignor, by mesne assignments, to American Bag Closing Machine Company, Chicago, Ill., a corporation of Illinois

Application August 28, 1939, Serial No. 292,250

27 Claims. (Cl. 93—6)

This invention relates to a bag folding mechanism adapted for use in connection with a bag closing machine for properly folding the neck portion thereof.

In practice, it has been found that there are variations in the lengths of the neck portions of bags containing a definite weight of material. There are various causes for this variation in the lengths of the unfilled neck portions of the bag, but they need not be mentioned.

This invention concerns itself with a folding mechanism for folding the neck portion of filled bags irrespective of such variations in length of the neck portions as may occur. The mechanism is so designed that bags following each other to such folding mechanism will have their neck portions properly folded though considerable variations in length exist in such neck portions.

The invention comprises the novel structure and combination of parts hereinafter described and more particularly pointed out and defined in the appended claims.

In the accompanying drawings which illustrate a preferred form of this invention and in which similar reference numerals refer to similar features in the different views:

Fig. 1 is a side elevation view of the first unit of the folding mechanism for making the initial fold in the neck portions of the bag.

Fig. 2 is a top plan view of the mechanism shown in Fig. 1.

Fig. 3 is a side elevational view of the second folding unit for making the final fold on the neck of the bag.

Fig. 4 is a top plan view of the mechanism shown in Fig. 3.

Fig. 5 is a front elevational view of the first folding unit.

Fig. 6 to Fig. 12 are detail views illustrating the various steps of the second folding unit in completing the folding of the neck portion of the bag.

Fig. 13 is a sectional view taken substantially upon the line XIII—XIII of Fig. 1 looking in the direction of the arrows.

Fig. 14 is an elevational view of a cam of the first folding unit.

Fig. 15 is a sectional view of the other cam on the first folding unit taken substantially upon the line XV—XV of Fig. 2.

Fig. 16 is a side elevational view of a cam of the second folding unit.

Fig. 17 is a sectional view of the other cam on the second folding unit taken substantially upon the line XVII—XVII of Fig. 4.

Fig. 18 is a fragmentary front elevational view of a bag closing machine showing the two folding units.

In the drawings which illustrate one embodiment that this invention may assume Figs. 1 and 2 represent the first folding unit which it will be understood is primarily designed for use with the second unit, both of which may constitute a part of a bag closing machine for folding and securing the neck portion of a filled bag.

This first unit is sustained upon a suitable support 1 which may be a part of bag closing machine. From the support 1 rise two standards 2 having bottom flanges 2a bolted to the support 1, a cross piece 3 extends across the top of these standards and a screw 4 is threaded thru this cross piece for a purpose that will later appear.

The standards 2 are provided with grooves or guide ways 5 upon their confronting faces as best shown in Fig. 13. These guide ways extend in vertical directions. A square or rectangular slide frame 6 is mounted between said standards 2 and with the sides located in said guide ways. This slide frame abuts the upper screw 4 and is supported by a lower screw 7 which is threaded thru the support 1. By properly adjusting the screws 4 and 7 the slide frame 6 can be raised or lowered for varying the height of the first folding unit.

The slide frame 6 carries a pair of parallel plates 8, one against each side which may be secured in such frame in any suitable manner. The rear parts of these plates 8 which constitute frame members support a cam shaft 9. The forward parts of these plates are bifurcated to provide an upper arm 8a and a lower arm 8b and they support at their forward ends a guide plate 10 which forms one wall of a guide way for the empty neck portion of a bag.

The outer ends of the arms 8a are cut away at their lower portions as indicated at 11. Dependent arms 12 extend at their upper ends adjacent these arms at the cut out portions. These arms 12 are secured to a rod or shaft 13 journaled in the arms 8a. One arm 12 is provided with a peg 14 and the end of the adjacent arm 8a is provided with a peg 15. A spring 16 is connected between these pegs for the purpose of slightly moving the arms 12 to the right for a purpose that will later appear.

A plate 17 is secured to the lower ends of the arms 12. The inner edge of this plate has an upstanding flange 18 that cooperates with the plate 10 for forming a guide way for the neck portion of the bag.



A cam 19 is secured upon the shaft 9. This cam has a groove 20 in which a roller 21 travels. The roller 21 is rotatably mounted upon a pitman 22 which has a bifurcated rear end 22a that straddles the shaft 9 and that is supported thereby. The forward end of the pitman carries a downwardly extending plate 23 that serves as a folder for making the initial fold on the neck of the bag.

A cylindrical bearing 24 (Fig. 1) extends inwardly from a frame member 8 and pivotally supports a lever 25 above the pitman 22. The rear end of this lever carries a roller 26 that travels in a cam groove 27 in a second cam 28 secured upon the shaft 9. A link 29 connects the forward end of the lever 25 with the pitman 22.

In the operation of this unit, the rotation of the shaft 9 and cams 19 and 28 will operate the parts to make the initial fold. Assume that a filled bag 29 with its neck portion 30 collapsed and in the guide way formed by plates 10 and 18 has come to rest in the position shown in Fig. 1. At this time the folder 23 will be in the position shown in Fig. 1, or upon the left side of the fold. It will be apparent that the collapsed neck portion 30 of the bag may extend various amounts above the guideway. Now as the cams revolve, the pitman 22 will be first advanced to bend the neck portion of the bag that projects above the flange 18 over such flange 18, at which time the lever 25 will be actuated to force the pitman 22 downwardly for causing folding plate 23 to fold the previously bent neck portion of the bag downwardly and against flange 18; the spring 16 being put under slight tension as inward pressure is applied against flange 18. At this point in the operation, a knoll 20a in the cam groove 20 acts upon the lever 22 to draw the plate 23 against the fold. Thereafter the parts return to positions for another operation and the spring 16 acts to slightly draw member 12 and flange 18 to the right to release the bag for movement to the armed folding unit.

The bag with its initial fold reaches the second folding mechanism upon base 1 when the parts are substantially in the positions as shown in Fig. 3. The frame work of this second unit is somewhat similar to that of the first unit and this second unit can be raised or lowered by the screws 4a and 7a just as in the first unit. The main differences between these units resides in the folding mechanisms and the cooperative parts and the operation thereof as will now be set forth.

In this second unit, two fulcrum bars 31 are slidably supported in suitable guideways formed in clocks 31b attached to the outer sides of the arms 8b of a frame plate 8. The outer ends of these bars 31 are hook shaped as indicated at 31a or shown more clearly in Fig. 7. The plates 10 and flange 18 that form the guide way for the neck of the bag are provided with suitable slots 10a and 18a as best shown in Figs. 8 and 9 to allow the bars 31 to pass therethrough. The bars 31 are respectively pivoted at their rear ends to pendant arms 32 which are respectively secured to the ends of a shaft 33 journaled in bearings 34 which may be integral with or attached to the arms 8 (Figs. 3 and 4). A lever arm 35 is secured to the shaft 33 and this lever arm carries a roller 36 at its free end that is adapted to lie engaged by the periphery of a cam 37 secured upon a shaft 9a which may be a continuation of shaft 9 supported by the frame plates 8. The cam 37 has a depressed portion 37a on its periphery as shown in Fig. 16. When this depressed portion

37a reaches the roller 36, the weight of the arm 35 and roller 36 causes the same to descend so that the roller will ride upon the depressed portion. This descent will cause the shaft 33 to partially revolve for swinging the arms 32 forwardly and advancing the bars 31 thru the slots in the guide way as shown in Fig. 7.

The shaft 9a has rigidly mounted thereon a second cam 38 provided with a cam groove 39 (Fig. 17) in which a roller 40 (Fig. 3) travels. The roller 40 is mounted upon a pitman 41 which has its rear end bifurcated for straddling shaft 9a for support therefrom as indicated at 41a. This pitman has attached to its forward end a plate 23a and upon this plate there is fastened a folding member 42 having a right angled cut away part 42a at its lower end for forming a groove between the plate 23a and the uncut-away part of the member 42. The member 42 is fastened to the plate 23a by means of a rivet 43 which extends through a long slot 44 defined by the dotted lines shown on member 42. Obviously, the member 42 can slide or move relative to the plate 23a.

A shaft 45 is supported between the frame members 8a. A lever 46 is loosely journaled at an intermediate point upon this shaft. The forward end of this lever is connected by a link 47 with the pitman 41. The rear end of the lever 46 carries a roller 48 located in the cam groove 39 of cam 38. The rotation of the cam 38 will rock lever 46 for raising and lowering the bag folding parts connected thereto.

An arm 49 is rigidly secured at its rear end to the shaft 45. The forward end of this arm is connected by a link 50 with the folding member 42 and constitutes the means for producing relative movement between the parts 23a and 42. For actuating the arm 49, it is necessary to rock shaft 45 and for this purpose a short arm 51 is rigidly secured upon the shaft 45. The lower end of this arm carries a roller 52 which is engaged by the periphery of the cam 39 which is provided upon its periphery with a depressed portion 39a (Fig. 17) that allows the arm 51 to recede or move to the left for rocking shaft 45 and causing arm 49 to descend. This cam 38 actuates the pitman 41 and it will be noted that the groove thereof has a knoll 39a that causes the folding plate 23a to pinch or press the fold of the bag against the flange 18, as will later more fully appear.

During the operation of this second folding unit, the bag with the initial fold in the neck portion is positioned with respect to the folding mechanism as shown in Figs. 3 and 6. The operation of the shaft 9a and cams 37 and 38 operate the folding parts in properly timed relation. It will be understood that the bags to be folded in the present instance are provided with metal ties 29a (Fig. 6) a feature well known in the art.

In the position of the parts as shown in Fig. 3 the action of the operating mechanism will move the slide bars 31 to the positions shown in Fig. 7. At about the same time, the pitman 41 and the folding mechanism with the initial fold of the bag confined in the groove thereof will be moved to the right to bend the initial folded portion of the bag over the flange 18 substantially as shown in Fig. 8. Then the lever 46 is actuated to lower the folding mechanism to turn the bent over portion downwardly substantially as shown in Fig. 9. At about this time, the slide bars 31 move to the left, the hooks 31 engaging the ends of the metal tie and causing an upward turning movement thereof to turn the same with the fold. In other words,



these hooked bars 31 are designed to prevent the part 30b (Fig. 9) of the fold from dropping down or straightening out. Thus the bars 31 also serve as fulcrum members for the bars while the fold is turned downward and inward against the bag.

While the folding members 23a and 42 are moving to the right as shown in Figs. 8 and 9, the arm 49 will be rocked to cause member 42 to move downwardly relative to plate 23a to act as a confining guard for the fold. And as the folding plate 23a is lowered to complete the fold, the arm 49 will be elevated by its cam to raise the part 42 as shown in Figs. 10 to 12. As soon as the folding member 23a has completed its downward movement in making the final fold, a knoll 39a on the cam 38 will come into play to press the member 42 against the folded portion as shown in Fig. 12. Then as the cams continue to revolve the folding member 23a will be released from its pressing engagement and all the parts will return to their normal positions for another operation.

It will be appreciated that the folding units can be adjusted to accommodate different heights of bags and that they are capable of folding the neck portions of the bags irrespective of variations in the neck portions of the bag, as is obvious from the structure and operation set forth.

I am aware that many changes may be made and details of construction may be varied without departing from the principles of this invention and I do not propose limiting the patent granted otherwise than necessitated by the prior art and appended claims.

I claim as my invention:

1. In a bag closing mechanism, a folding unit comprising a member and means for moving said member for transversely bending, then folding down the neck portion of a bag and compressing the same, in combination with a second folding unit comprising a member having a groove to receive the folded portion of the bag, and means for operating said second member in a lateral, then downward and then in a reverse lateral direction for completing the folding of the bag.

2. In a bag folding mechanism, means for bending over and turning down the neck portion of the bag against the bag, in combination with a folding unit comprising a member having a guide way for receiving the turned down neck portion of the bag, and mechanism for moving said member laterally, then downward and in a reverse lateral direction.

3. In mechanism for folding a bag having a metal tie at its upper end, means for bending over and folding down the neck portion of the bag in combination with a folding unit having a member with a groove for receiving the initial fold, means for moving said member laterally and downwardly and means for engaging said metal tie during such downward movement and maintaining the same within the folded portion.

4. In mechanism for folding a bag, means for making an initial fold upon the top of the neck portion of a bag, mechanism for further folding the neck portion comprising relatively slidable associated members having a groove therebetween for receiving the initial fold of the bag and means for moving said members laterally and downwardly for completing the folding of the neck portion of the bag.

5. Mechanism for folding varying neck portions of a filled bag comprising means for bending over and folding downwardly the neck portion of a bag extending above a predetermined point, a folding mechanism comprising a folding device having a

groove to receive said folded down portion, and means for moving said device laterally and downwardly and in a reverse lateral direction.

6. In a bag folding mechanism, means defining a guideway comprising spaced walls for receiving the empty neck portion of a bag, said walls having slots, hooked shape bars, means for moving said bars thru said slots, in combination with folding mechanism for folding the neck portion of a bag having a metal tie downwardly to bring said tie into engagement with said bars and means for withdrawing said bars and moving said metal tie toward the bag during the completion of said fold by said mechanism.

7. In a mechanism for folding the neck portion of a bag carrying a metal tie, means for making an initial fold, a folding device having a groove for receiving the initial folded portion of the bag, means for actuating said device laterally and then downwardly, and means for engaging the tie upon said bag during such downward movement for controlling the folding operation.

8. In mechanism for folding the neck portion of a bag carrying a metal tie, means for making an initial fold, a laterally and downwardly movable member for further folding said neck portion and movable means engageable with said tie during said downward movement for controlling such further folding operation.

9. In mechanism for folding the neck portion of a bag, means for bending over and folding down the neck portion of a bag above a predetermined point on the bag, in combination with folding mechanism comprising a device having a groove for receiving the folded neck portion, means for actuating said device for causing the same to move laterally in one direction and then downwardly to further fold the neck portion of the bag and reciprocable members engageable with the neck portion of the bag for controlling the downward folding of said neck portion.

10. In mechanism for folding the neck portion of a filled bag, a folding unit for making an initial fold, a second folding unit having a laterally and downwardly movable device provided with a groove for receiving the initial fold, said device comprising relatively movable members and means for causing relative movement of said members during the downward movement of said device.

11. In mechanism for folding the neck portion of a filled bag, a folding device for bending over and folding down the empty neck portion of the bag above a predetermined point, a second folding device having a groove to receive the initial fold, said second device comprising relatively slidable members and means for moving said members as a unit and causing relative movement thereof for further folding the neck portion of the bag.

12. In mechanism for folding the neck portion of a filled bag comprising a folding device for making an initial fold upon said neck portion, a second folding device comprising relatively movable members with a groove therebetween for receiving the initial fold and means for actuating said device in a lateral and downward direction and causing relative movement between said members.

13. Mechanism for folding the neck portion of a bag comprising a folding device for making an initial fold upon the neck portion of the bag, a second two-part folding device having a groove for securing the initial folded neck portion of the bag, means for actuating said second folding



device laterally and a part thereof downwardly and means for holding the folded portion of the bag against outward movement during the operation of the second folding mechanism.

14. Mechanism for completing a partially folded neck portion of a bag comprising a two-part folding device having a groove to receive the partially folded neck portion of the bag, means for actuating said device in a lateral and a part thereof in a downward direction and movable means for retaining the folded portion of the bag against unfolding during the operation of said folding device.

15. Mechanism for completing folding a partially folded neck portion of a bag comprising a folding device having relatively movable parts with a groove between said parts for receiving the partially folded neck portion of the bag, and means for actuating said folding member in a lateral direction and causing a relative movement of the parts with one part descending in a downward direction.

16. Mechanism for completing the folding of a partially folded neck portion of a bag comprising a folding device having relatively movable parts with a groove between said parts for receiving the partially folded neck of the bag, means for actuating said device in a lateral direction and causing a downward movement of the innermost part for completing the folding operation.

17. Mechanism for completing the folding of a partially folded neck portion of a bag comprising a folding device having relatively movable parts with a groove therebetween for receiving the partially folded neck portion of the bag, and means for actuating said device in a lateral direction and causing relative movement of said parts for causing one part to descend and means for controlling the fold during the folding operation.

18. Mechanism for completing the folding of a partially folded neck portion of a bag comprising a folding device having relatively movable parts with a groove for receiving the folded portion of the bag and means for operating said device in a lateral direction and causing relative movement of said parts and then causing a movement reverse to the first movement for compressing the folded portion.

19. Mechanism for completing the folding of a partially folded neck portion of a bag comprising a folding device having relatively movable parts with a groove for receiving the partially folded neck portion of the bag, means for moving said device laterally and causing relative movement of the parts and causing one part to move downwardly and a movable device for controlling the folded portion of the bag during the folding thereof.

20. Mechanism for completing the folding of a partially folded neck portion of a bag comprising a folding device consisting of two relatively movable parts normally forming a guide groove therebetween for receiving the partially folded neck of the bag, and means for shifting said device laterally and causing a downward movement of the innermost part for completing the folding operation.

21. In mechanism for folding the neck portion of a filled bag comprising a folding unit for bending over and down the upper part of the empty neck portion of the bag in combination with a second folding unit comprising a folding device having a groove for receiving the initially folded neck portion, said device consisting of relatively movable parts and being laterally movable and the parts relatively movable for completing the folding of the neck of the bag, and a movable member engaging the fold during a limited period during the operation of the second unit to prevent unravelling of the partially folded neck portion of the bag.

22. In a bag folding mechanism, a guideway for receiving the collapsed empty neck portion of a bag, said guideway comprising a stationary wall and a movable wall and means for yieldingly supporting said movable wall for movement toward and from the stationary wall.

23. In a bag folding mechanism, a folding unit comprising spaced vertical standards having confronting grooves, a frame slidably mounted between said standards and having parts extending into said grooves, and spaced plates rigidly mounted in said frame and extending beyond both sides of said standard, folding mechanism carried by said plates including spaced guideways for receiving the empty neck portion of a filled bag, and means for raising or lowering said frame.

24. In a bag folding mechanism, a folding unit, means for supporting said unit for vertical adjustments comprising spaced vertical members, a frame slidable between said members, and devices on said frame for supporting said folding unit, and spaced walls forming a guide way for the neck portion of a bag carried by said devices whereby the unit can be adjusted for different heights of bags.

25. In a bag folding mechanism, adjustable frame members, a plate carried by said members for forming one wall of a guideway for receiving the neck portion of a bag, a pair of arms pivotally and yieldably suspended from upper portions of said frame members and a plate carried by said arms for forming the other wall of said guide way.

26. In bag folding mechanism, folding mechanism for making an initial fold on the neck of the bag, a second folding mechanism having a groove for receiving said initial fold, and comprising relatively movable members, means for operating said second folding mechanism in a lateral and downward direction and means for engaging the folded portion of the bag during a period of the folding operation to prevent unravelling of the initial fold.

27. In a bag folding mechanism, a folding member comprising relatively movable parts forming a groove therebetween for receiving a partially folded neck portion of a bag, means for operating said member and causing relative movement of said parts and means cooperating therewith for preventing unravelling of the fold on the bag.

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