

Aug. 8, 1961

V. CATINI

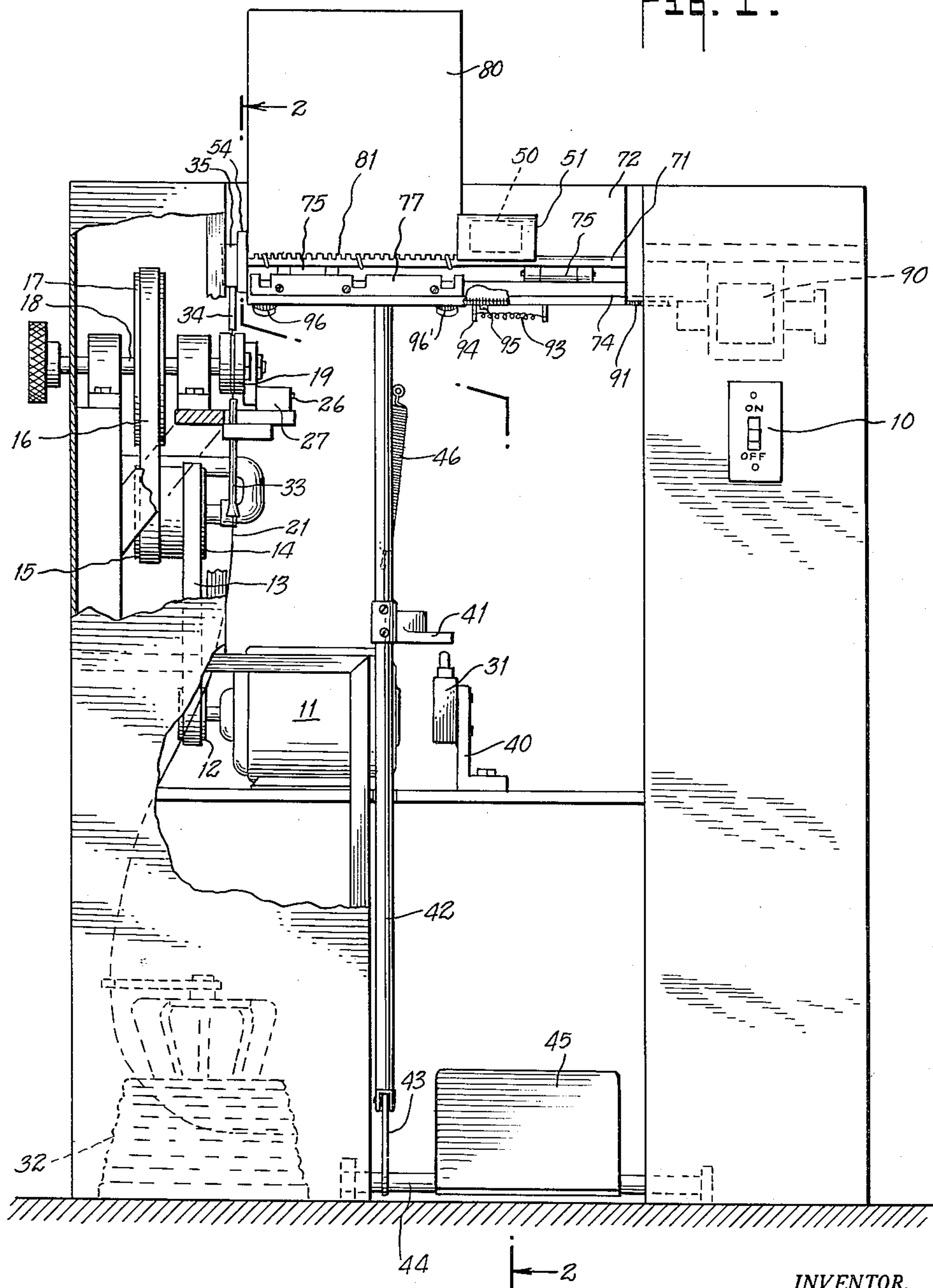
2,995,157

MACHINE FOR HELICALLY BINDING BOOKS

Filed March 14, 1957

4 Sheets-Sheet 1

Fig. 1.



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4 Sheets-Sheet 2

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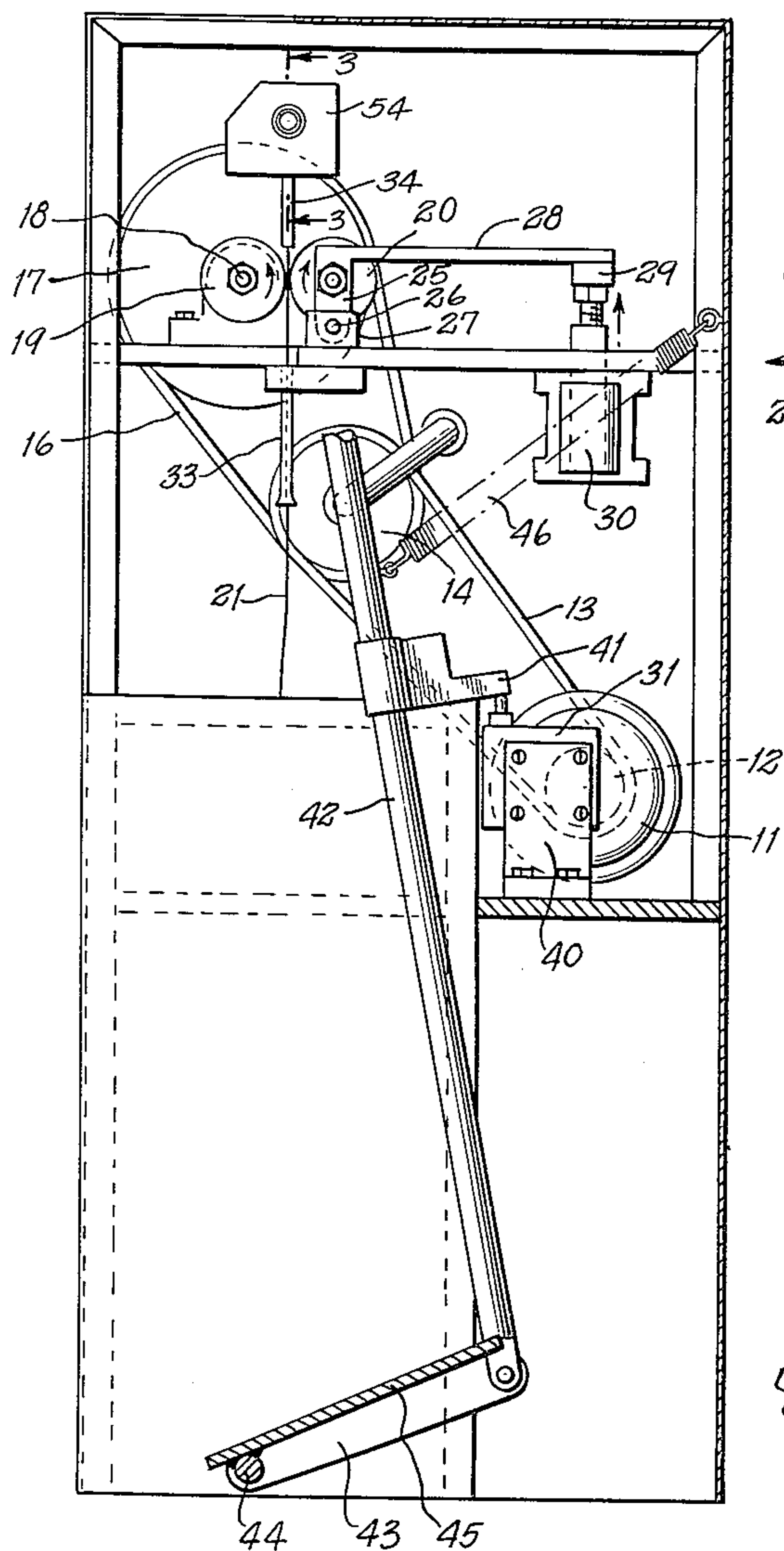


Fig. 3.

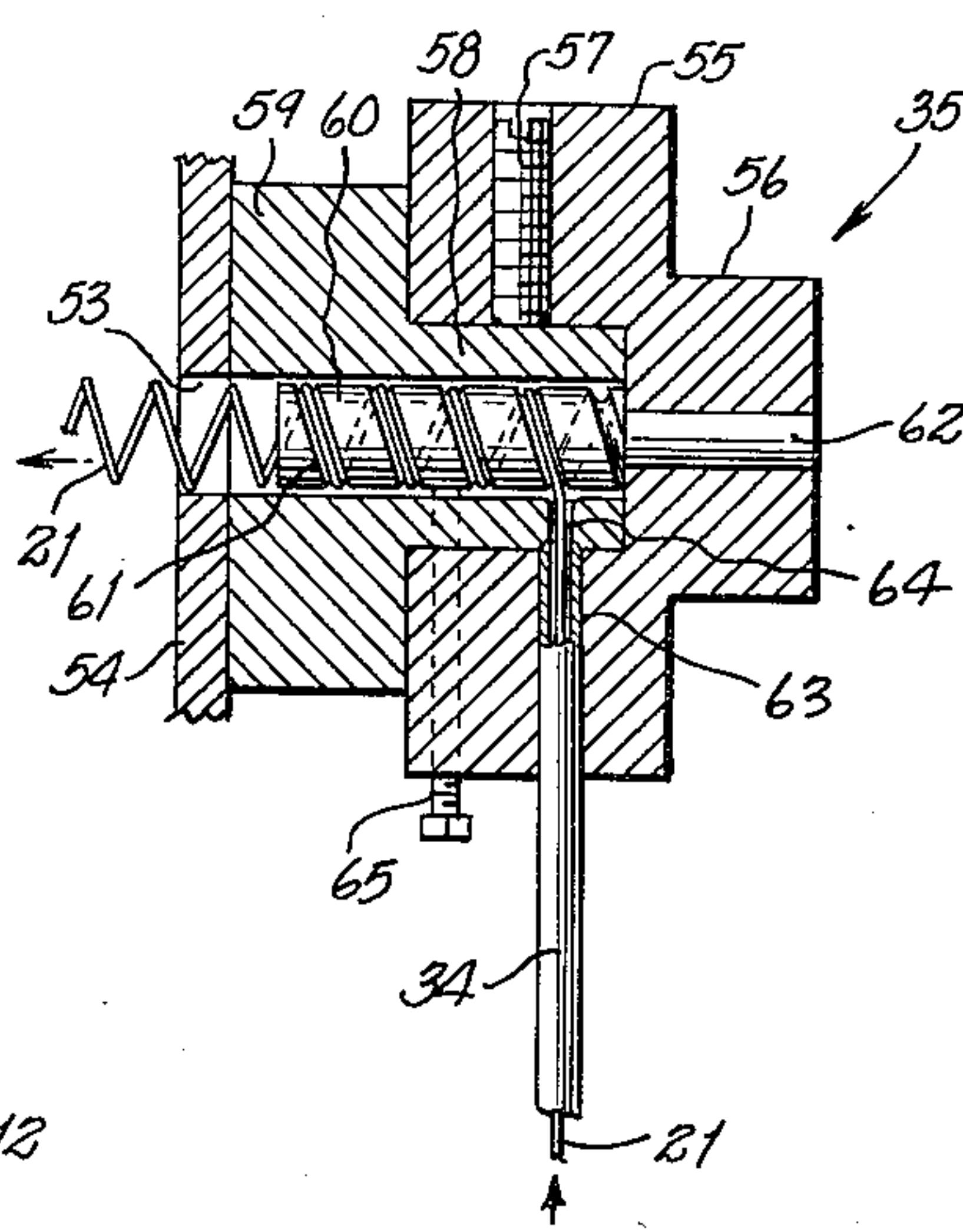
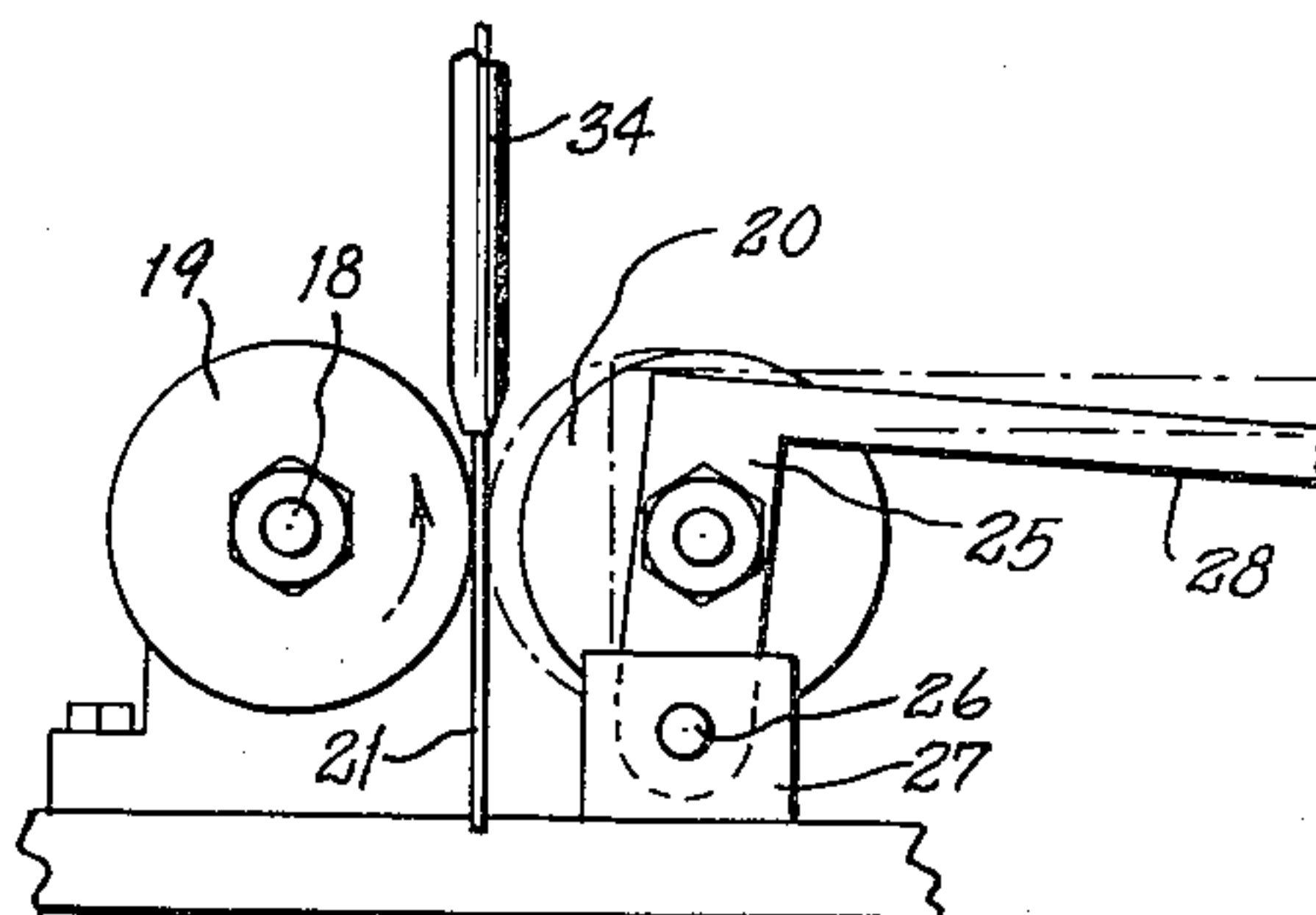


Fig. 4.



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4 Sheets-Sheet 3

Fig. 5.

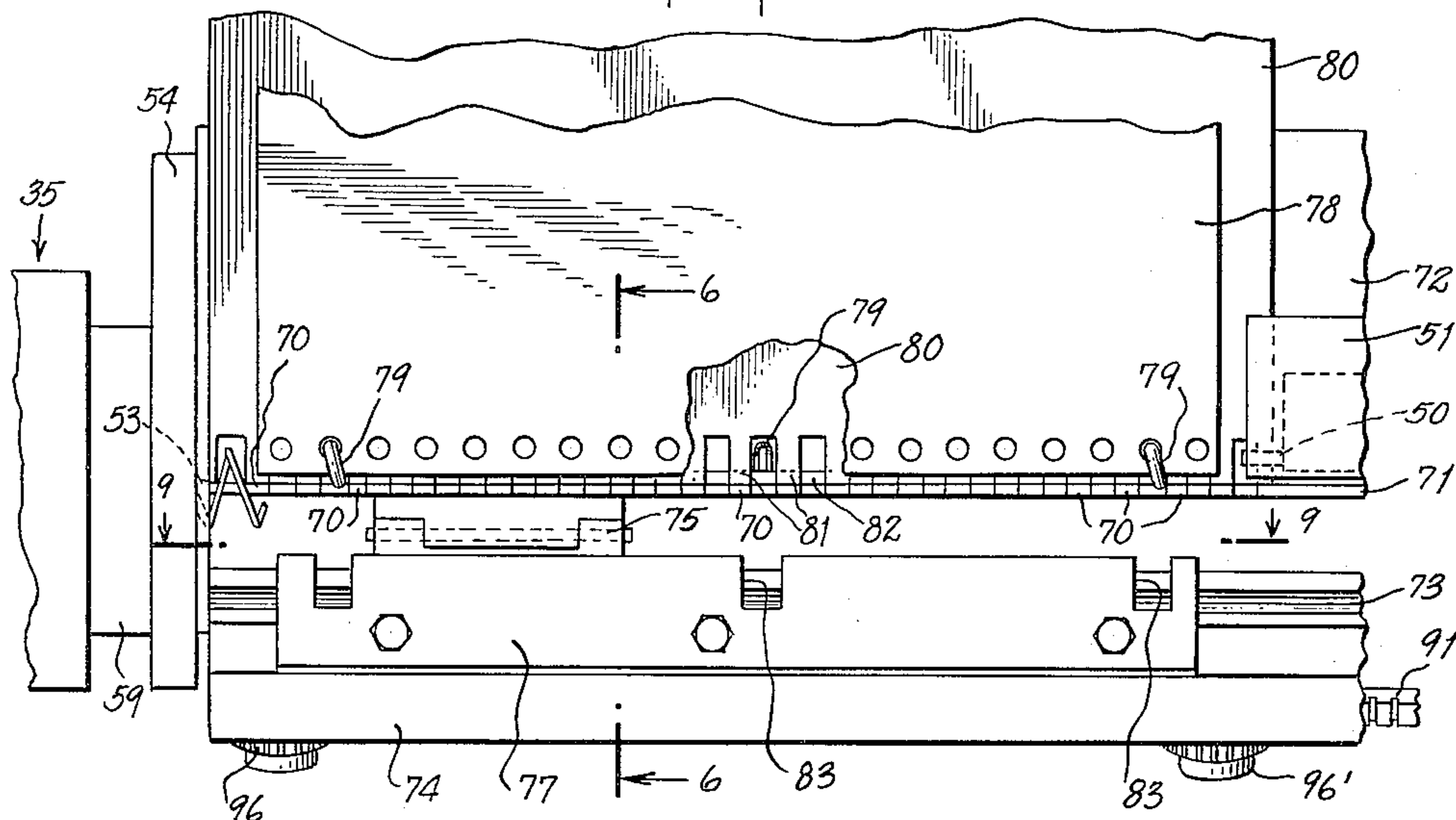


Fig. 6.

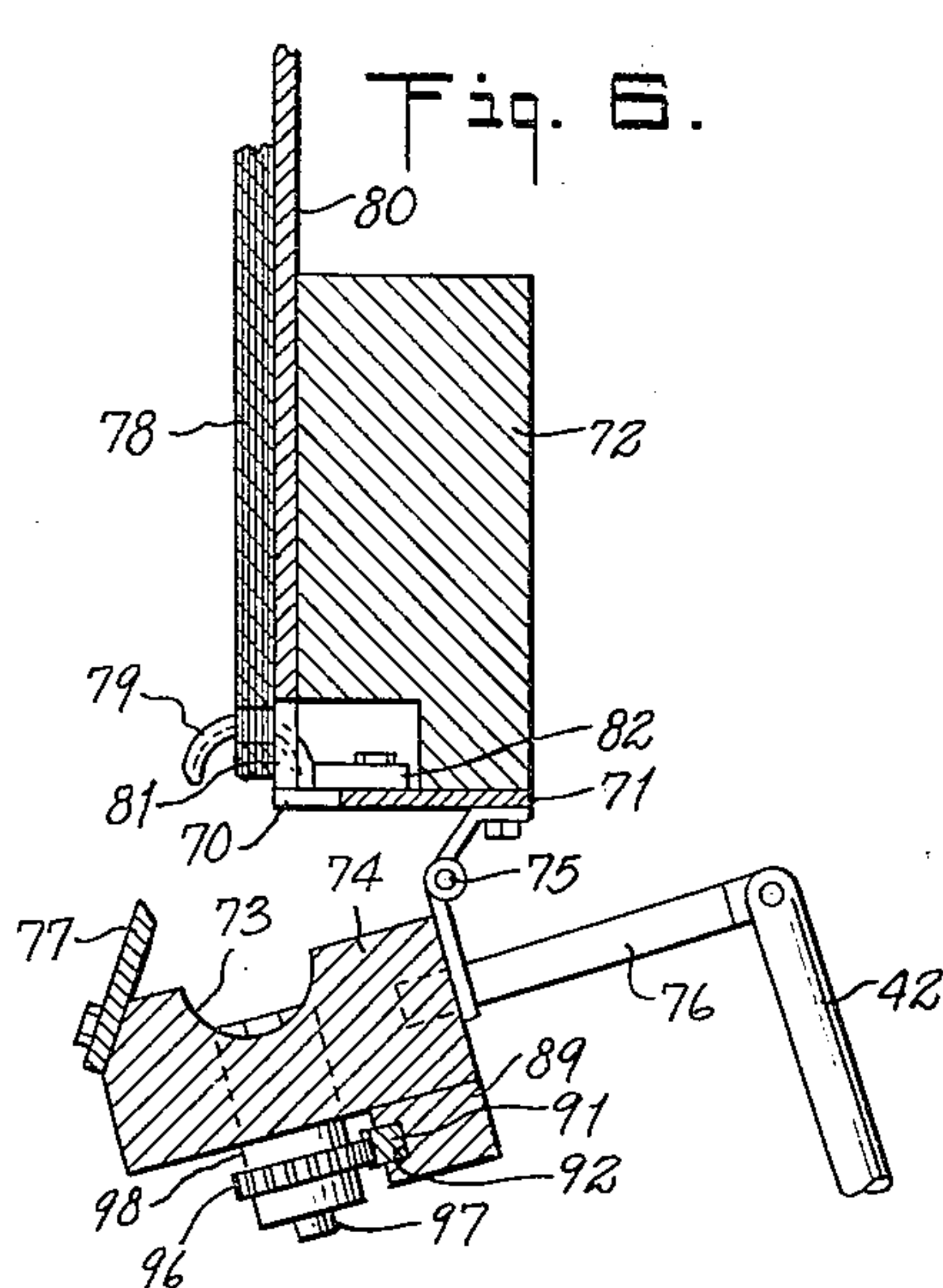
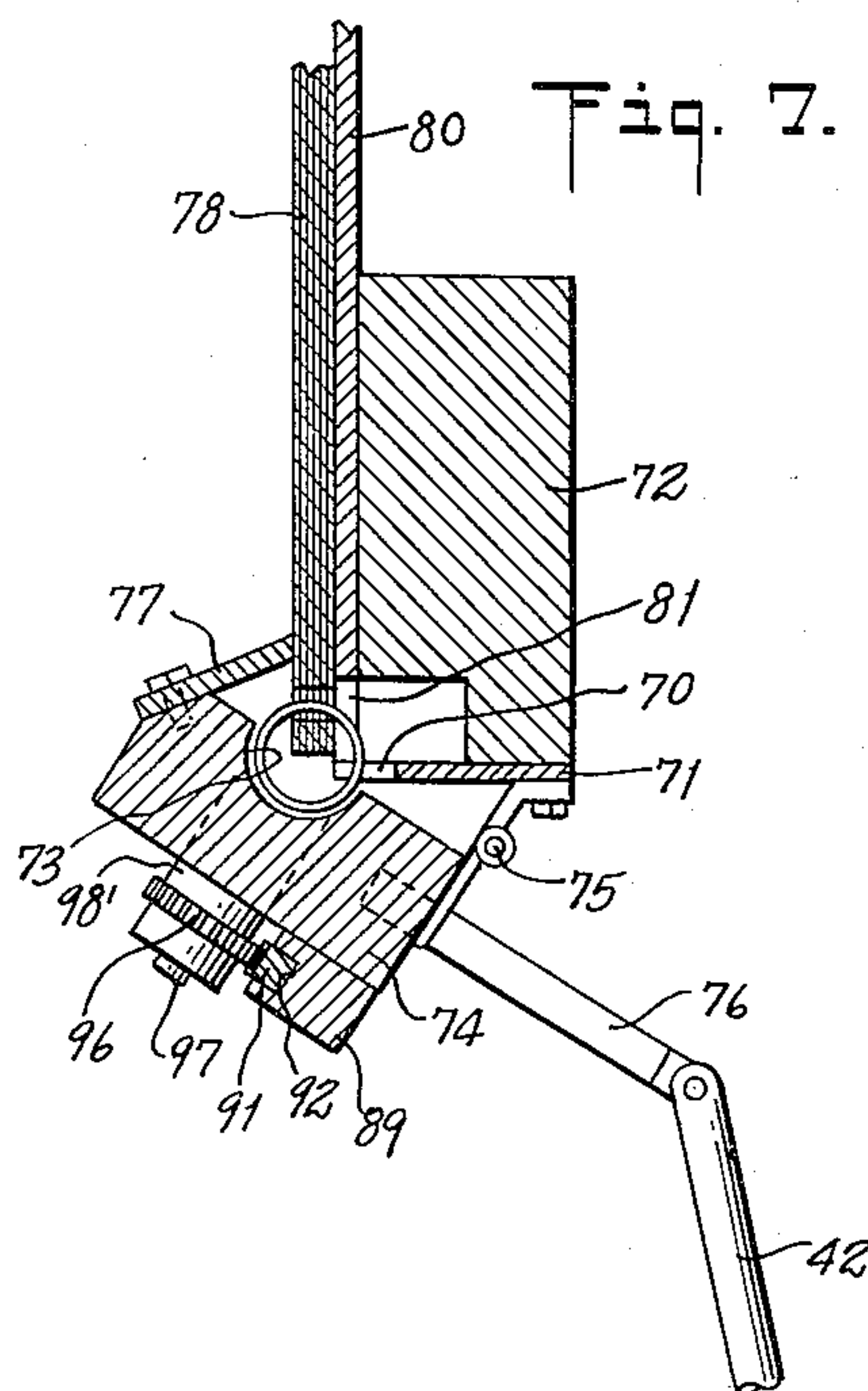
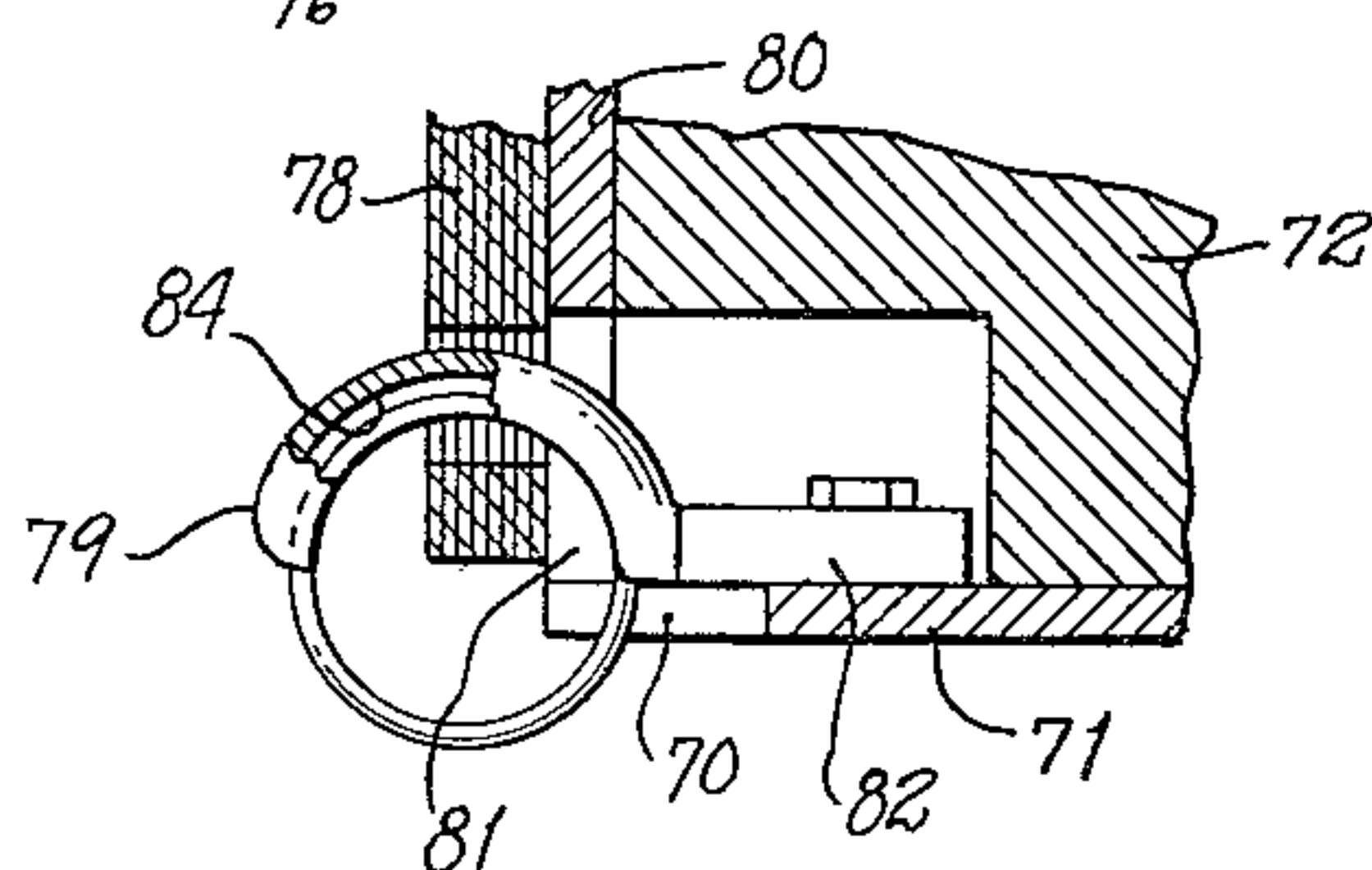


Fig. 7.



1. 1. 1.



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4 Sheets-Sheet 4

Fig. 9.

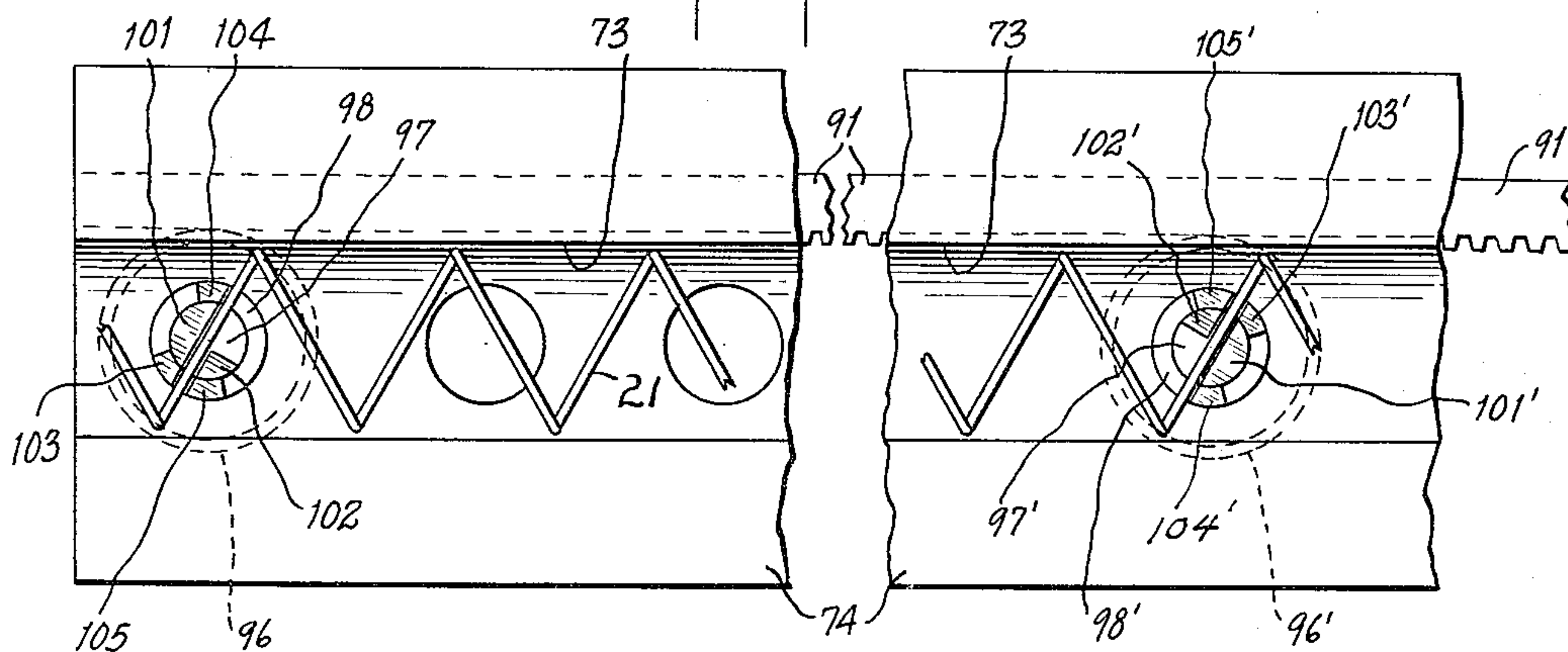


Fig. 10.

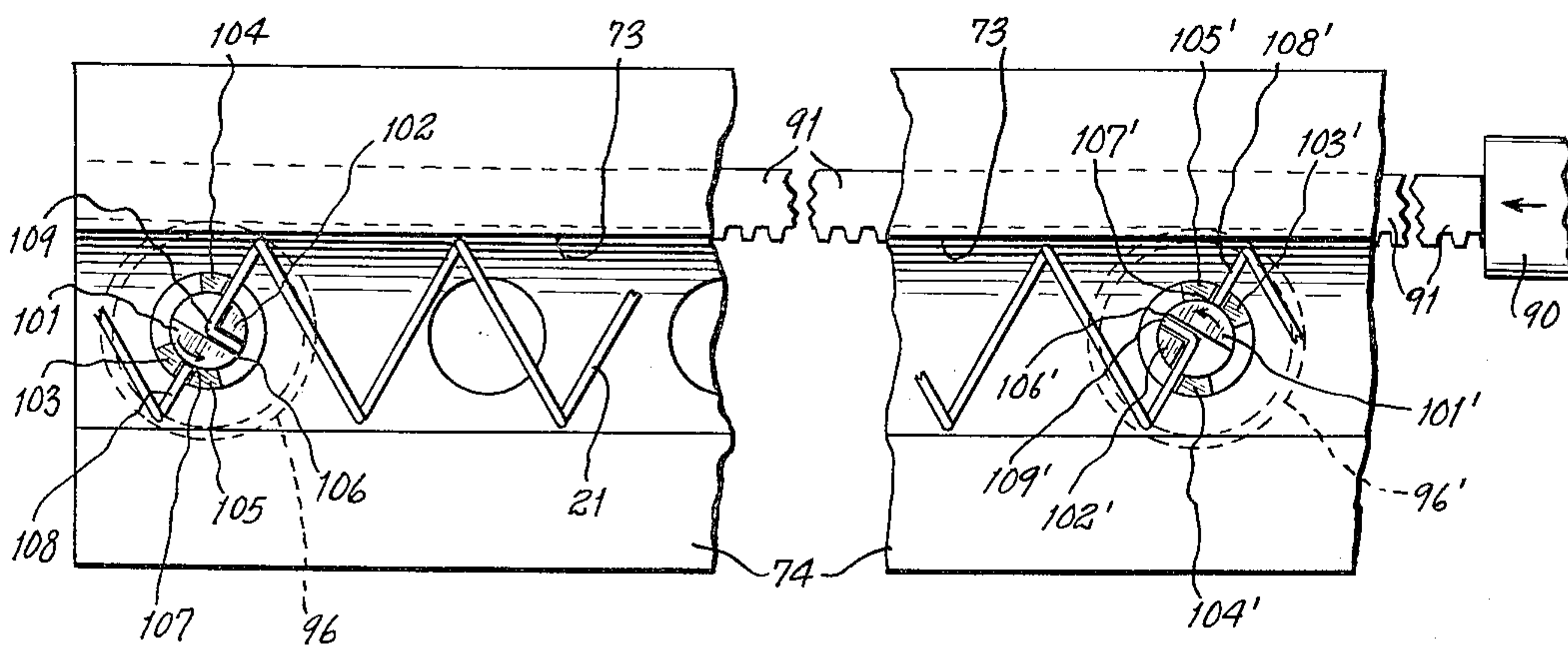
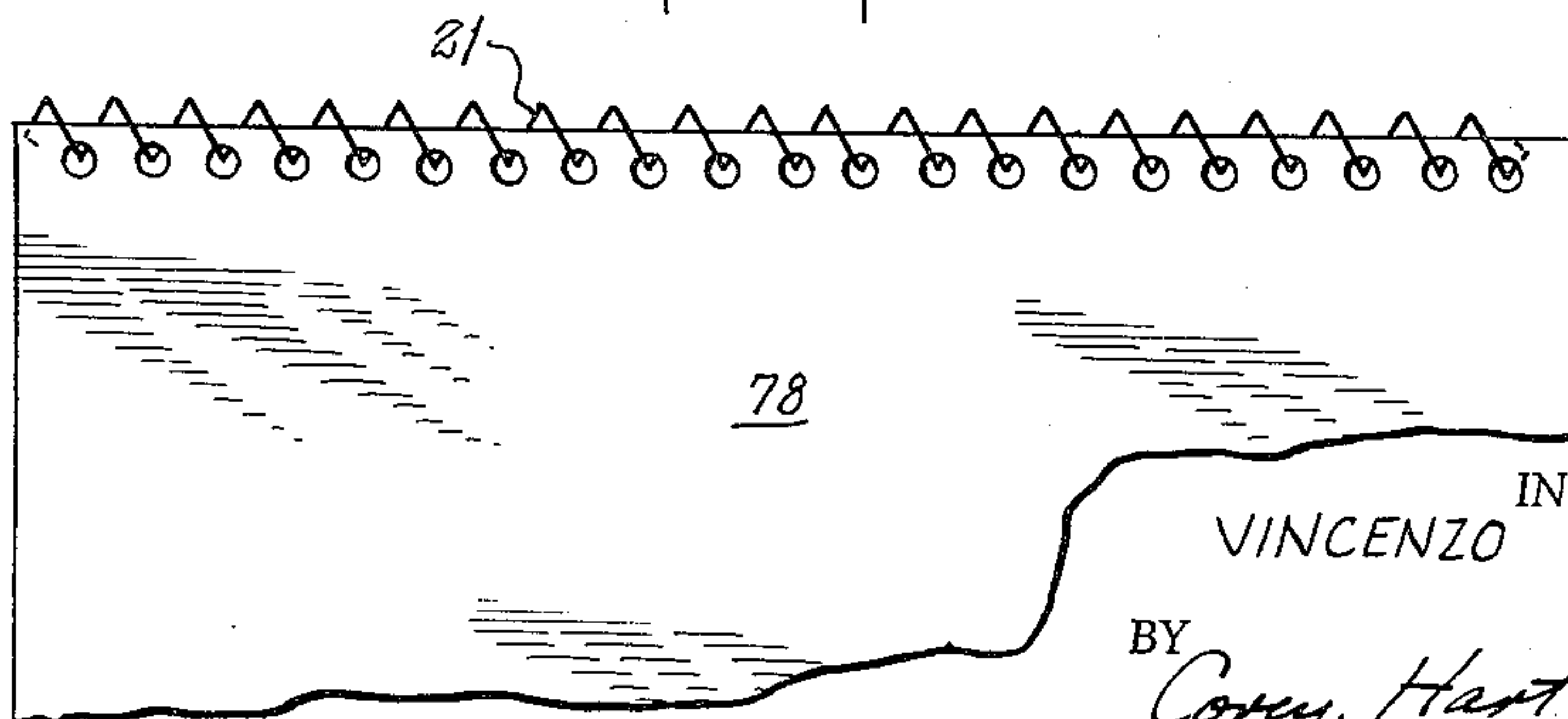


Fig. 11.



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MACHINE FOR HELICALLY BINDING BOOKS
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Filed Mar. 14, 1957, Ser. No. 646,103

10 Claims. (Cl. 140—92.7)

This invention relates to machines for making loose leaf books composed of a plurality of sheets loosely bound together by means of a helically shaped binder.

The art has developed machines capable of binding a book of loose sheets having a plurality of holes arranged in row along the binding edge thereof with a helical wire which is formed, threaded through the said row of holes, cut to proper length and locked in position on the book. While such prior machines may satisfactorily perform these binding steps, they have certain inherent defects which restrict their field of use. For instance, all prior machines capable of performing the indicated binding steps, so far as I am aware, are exceedingly complicated. Because of this complexity, such machines are costly to make and require considerable attention in operation. Should anything go wrong, it is necessary to send for special parts and/or to employ the services of trained mechanics to restore the machine to proper operating condition. These factors tend to burden with a high overhead, a product which is ordinarily of a low priced type and is maintained so by severe competitive conditions.

The principal purpose of the present invention is to provide a simple, compact, rugged machine capable of satisfactorily performing the aforesaid binding operations.

Another object of the invention is to provide a machine of the indicated type which is relatively inexpensive to construct, can be worked by relatively unskilled operators, will not readily become inoperative in usage, and can be readily restored to operative condition by mechanics of ordinary skill.

Other objects and advantages of the invention will appear from the following detailed description when read in connection with the accompanying drawings which show a machine of the indicated type constructed in accordance with the invention and in which

FIG. 1 is a front elevational view of a machine constructed in accordance with the invention, the figure showing the front wall of the housing broken away to enable the working parts of the machine to be seen;

FIG. 2 is a sectional view taken along the line 2—2 of FIG. 1;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2 and showing in enlarged detail the construction of the wire forming die;

FIG. 4 is an enlarged view of the wire feeding rollers shown at the upper left hand corner of FIG. 2;

FIG. 5 is an enlarged partial view of the book supporting plate and associated mechanism shown in FIG. 1;

FIG. 6 is a vertical sectional view taken along the line 6—6 of FIG. 5 and showing more clearly the arrangement of the parts when a book has been placed in binding position on the machine, but has not as yet been changed in such position;

FIG. 7 is a view similar to FIG. 6 and shows the arrangement of the parts when the book is clamped in binding position;

FIG. 8 is an enlarged detailed sectional view showing more clearly the construction and arrangement of the book holding and wire guides;

FIG. 9 is a top plan view of the wire guide plate, the view looking along the line 9—9 of FIG. 5 and showing wire cutting and bending mechanism mounted in the

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guide groove of such plate prior to the cutting and bending operations thereof;

FIG. 10 is a view similar to FIG. 9 illustrating the manner in which the wire is cut and bent; and

FIG. 11 is a plan view of a book bound by a binder produced by the machine of this invention.

As above indicated, the machine of this invention is designed to form from a straight piece of wire a helix of proper diameter and pitch, and to insert such helix through the line or row of prepunched holes provided along one edge of the book of loose sheets. When a predetermined length of the wire has been so formed and threaded through the book, it is severed from the remainder of the wire and the cut ends thereof are bent to prevent its removal from the book of sheets bound thereby. In the use of the machine, the operator first actuates a switch 10 (note FIG. 1) which controls the operation of a motor 11 and readies a circuit containing two solenoids and two micro switches for controlling such solenoids. On actuation of the switch 10 to closed position, the motor 11 and such circuit are connected to a suitable source of electrical energy, the motor rotating continuously until it is disconnected from such source by actuating switch 10 to open position. The circuit however shall be maintained inoperative until the two micro switches are closed in the manner hereinafter described.

As shown more clearly in FIGS. 1 and 2 of the drawings, the motor 11 has provided on the main shaft thereof, a pulley 12 which is connected by a belt 13 to a pulley 14 forming part of a clutch mechanism. The pulley 14 is arranged to drive a pulley 15 which is connected by a belt 16 to a pulley 17. The pulley 17 is secured to a shaft 18 that is rotatably supported by a pair of bearing blocks mounted on the frame of the machine in any suitable manner. The shaft 18 has also connected thereto a wire feed roll 19 which is continuously driven through the aforesaid mechanism during a period of operation of the machine. The clutch mechanism of which pulleys 14 and 15 form part may be any suitable type of friction clutch capable of controlling and varying the speed at which the motor 11 shall drive the feed roll 19 through the aforesaid mechanism.

Associated with feed roll 19 is a feed roll 20 which is controlled by one of the aforesaid micro switches and which is actuated during each cycle of operation of the machine to feed a length of wire 21 from a source of supply to a die 35 for forming the wire into helical shape. As shown in FIGS. 2 and 4 of the drawings, the feed roll 20 is rotatably mounted on an arm 25 which is secured at one end to a pin 26 that is pivotably mounted in a bearing block 27 supported by a bracket secured to the frame of the machine. Connected at one end to the free end of arm 25 is a bar 28 that extends at right angles to pin 26 and is provided at its other end with a depending contact block 29. The block 29 overlies the vertically movable plunger of a solenoid 30 which is operated independently of the motor through a micro switch 31 (note FIG. 1). When the micro switch 31 is open, the solenoid 30 is deenergized so that the solenoid plunger is in its lower or retracted position. In this condition of the solenoid the weight of bar 28 and block 29 is sufficient to maintain the arm 25 in a retracted position with the roll 20 thereon in an inoperative position relative to feed roll 19. When the micro switch 31 is closed the solenoid 30 is energized and its plunger is raised vertically to engage and lift the contact block 29, thereby pivoting arm 25 about pin 26 to bring the feed roll 20 into pressing engagement with that portion of wire 21 located between it and the continuously rotating feed roll 19. The two rolls will then coact to feed the wire 21 upwardly from a wire reel 32 which is located in the lower part of the housing and which supplies the wire from which the

helical binders are made. The reel 32 is adapted to hold a considerable length of the wire, so as to provide a supply sufficient for the formation of a large number of binders. In its travel from the reel 32, the wire passes through a guide tube 33, past the feed rolls 19 and 20, and through a guide tube 34 into the die 35 for forming the helical binder.

The micro switch 31 is closed manually by the machine operator at the beginning of each cycle of operation of the machine. As is shown in FIGS. 1 and 2 of the drawings, the micro switch 31 is mounted on a bracket 40 carried by the shelf which supports the motor 11. The actuating pin of the micro switch is located in the path of movement of a finger 41 adjustably secured to a substantially vertically disposed actuating rod 42. The lower end of rod 42 is connected by an arm 43 to a bar 44 rotatably supported in bearings provided at the base of the machine. A foot treadle 45 is secured at the rear end thereof to the bar 44 intermediate the supporting bearings therefor. The arrangement of these parts is such that when the foot treadle is depressed by the operator, arm 43 will be pivoted downwardly about the axis of rod 44, thereby lowering rod 42 and causing the finger 41 to engage and actuate micro switch 31. Normally the rod 42 is maintained in a raised position by a coil spring 46 which is connected at its lower end to rod 42 at a point above the finger 41 and which is connected at its upper end to a fixed part of the machine housing. It will be noted that when the treadle 45 is depressed at the beginning of a cycle, it is maintained depressed by the operator throughout the binding of a book and until the cycle is completed. Thus the solenoid 30 will remain energized to cause a feeding of the wire to the die until the advancing end of the formed wire trips or closes the second micro switch 50 which is located in the path of feed of the formed wire through the book, as will hereinafter become more clear. The closing of micro switch 50 causes the deenergizing of solenoid 30 thereby permitting feed roll 20 to retract in the manner previously explained and thus render the feed rolls 19 and 20 inoperative to continue the feed of wire to the binder forming die.

The binder forming die 35 which is mounted on a bracket 54 secured to the frame of the machine, is constituted of three essential parts. One of these parts is a horizontally disposed, annularly-shaped body member which is adjustably supported by the said bracket and which includes an enlarged forward portion 55 and a reduced rear portion 56 (note FIG. 3). Secured to the portion 55 of the body member, as by means of a set screw 57, is the reduced end 58 of an annularly-shaped die member. The enlarged portion 59 of the die member projects forwardly from said body member portion 55. Located within and extending through the portions 58, 59 of the die member is a mandrel 60 provided with a helical groove 61 having a pitch substantially equal to that of the helical binder to be formed from the wire 21. The shank or cylindrically-shaped end portion 62 of the mandrel is located in the reduced portion 56 of the body member. The mandrel 60 is secured in proper position within die member portions 58, 59 by such shank portion 62 and a set screw 65 which is in threaded engagement with portion 55 of the body member and which extends through die portion 58 into engagement with the mandrel. The enlarged portion 55 of the body member is provided also with a passageway 63 into which extends the upper end of the wire guide tube 34. The upper or discharge end of passageway 63 is aligned with a passageway 64 through the reduced portion 58 of the die member. The discharge end of passageway 64 is in alignment with one side portion of the helical groove 61 of the mandrel. When the wire 21 is driven by feed rolls 19 and 20 up through guide tube 34 and passageways 63, 64, and into such portion of groove 61 under compression, the mandrel 60 and the portion 58 of the die member co-

operate to form the wire into helical shape; the groove 61 feeding the thus formed helical wire toward the discharge or forward ends of die member portion 59 and mandrel 60.

After passing beyond the discharge ends of the mandrel 60 and die part 59, the helically shaped wire passes through an aperture 53 in the bracket 54, the wall of such aperture serving as a guide for the helical wire. As is shown more clearly in FIG. 5 of the drawings, the helical wire then passes between the first two of a series of teeth 70 provided on the forward edge of a plate 71 adjustably secured to the lower end of a supporting plate 72 mounted on the frame of the machine (note FIG. 6). During the binding operation the helix will feed through the spaces between the teeth 70, while being supported by and traveling along a guide groove 73 provided in the forward upper surface of a guide bar 74. It will be noted in FIGS. 6 and 7 of the drawings, that the bar 74 is hingedly connected at its upper rear longitudinal edge to the under surface of plate 71 by a pair of spaced hinges 75, 75 so that the guide groove 73 may be pivoted upwardly into operative relation with the teeth 70 of plate 71. Secured to the rear surface of guide bar 74 is the forward end of a rearwardly extending arm 76 which is connected at its other end to the upper end of rod 42. It will thus be noted that on downward movements of the rod 42, arm 76 will be depressed to pivot the forward grooved end of guide 74 upwardly about the common axis of hinges 75 and thereby bring groove 73 into proper position to guide the helical binder as it is fed through a book. The forward upper end surface portion of guide 74 is beveled and secured to such beveled surface portion by suitable screws is a book clamp 77. The length of book clamp 77 depends upon the width of the book that is to be bound; longer clamps being used for wider books. During the upward pivotal movement of guide 74, the clamp 77 comes into engagement with the front cover of the book 78 to be bound to fix it in position on the machine during the binding operation (compare FIGS. 6 and 7). The book 78 is seated on a pair of spaced arcuately shaped guides 79 which are threaded through two of the apertures in the row thereof provided along the binding edge of the book for receiving the helical binder. Each of the arcuate guides 79 are provided on its inner or underside with a channel 84 to guide the helical wire through the aperture of the book through which the guide extends (note FIG. 8). The back of the book rests against a back rest 80 adjustably connected to the supporting plate 72. It will be noted in FIGS. 5 to 8 of the drawings, that the bottom edge of back rest 80 is provided with a series of teeth 81 which are aligned in overlying relation with the teeth 70 on plate 71. Each of the guides 79 is formed on the forward end of a small plate 82 which is seated on plate 71 to the rear of and against the teeth 81 of back rest 80 so that the root portion of the associated guide 79 extends outwardly in arcuate fashion through the space between a pair of adjacent teeth 81 of such back rest. The clamp 77 is provided with spaced slots 83 through which the guides 79 pass during the upward pivotal movement of guide plate 74 to enable the clamp 77 to come into engagement with the book.

It will be understood from the foregoing that in the operation of the machine, the guide bar 74 is normally in a lowered or retracted position to enable the book of sheets to be bound to be threaded upon the arcuate guides 79 as shown in FIG. 5 and 6. In carrying out this step, the book 78 is held in an inverted position with the apertured end thereof at the bottom so that when the guides 79 have been inserted therethrough the row of apertures in the book of sheets will be aligned with the spaces between the teeth 81 of the back rest 80. As the book of sheets 78 is placed upon the guides 79, the latter are so shaped that the sheets of the book are rearranged to cause each set of successive perforations in the book pages to define a passageway which conforms in curva-

ture to the coils of the helical binder to be threaded there-through. In other words, each guide 79 has an arc of curvature conforming to the radius of the helix and is also offset to approximately the same degree as the pitch of the helix used to bind the book. The guides 79 are inserted through the book 78 until the latter is resting against the back rest 80 with the full weight of the book being carried by such guides. The operator then depresses the foot treadle 45, causing rod 42 and arm 76 to pivot guide 74 upwardly to provide a guide path for the helix and to cause the clamp 77 to securely clamp the book in position against the back rest 80. Immediately thereafter, the finger 41 will actuate micro switch 31 to feed wire to the die 35 to form the helical binder in the manner previously explained. As the formed wire is fed from the die 35, it moves upwardly and inwardly first through the spaces between the teeth 70 of plate 71, then through the spaces between the teeth 81 of back rest 80, and then through the apertures of the book, being guided in its advancing movement by the guide groove 73. At the sets of successive perforations in the book pages through which the guides 79 extend, the wire feeds through such sets along the channels 84 provided on the underside of such guides. After the advancing end of the helical binder has moved beyond the end of the book it comes into contact with and raises the activating lever of the second microswitch 50 which is in the same circuit as the first microswitch 31, but is still open. As shown in FIGS. 1 and 5 of the drawings, microswitch 50 is enclosed in a housing 51 mounted on the supporting plate 72 adjacent to the advanced side edge of the back rest 80, and intermediate the ends of the guide 74. Preferably the microswitch 50 is so located that its activating lever will be engaged by the advanced end of the helical approximately one inch beyond the associated edge of the book. When the activating lever of the microswitch 50 is so actuated, the microswitch closes and causes the de-energization of solenoid 30, thereby causing feed roll 20 to be retracted from feed roll 19 and thus stopping the feed of the wire 21 to the die 35. The closing of microswitch 30 also simultaneously energizes a second solenoid 90 which controls cutting and bending means to cut the ends of the portion of the helical binder in the book and to bend such ends so that the binder is secured to the book.

As shown in FIG. 1 of the drawings, solenoid 90 is mounted on a bracket secured to the frame of the machine and is located so that its plunger is in spaced, substantially aligned relation to the right hand end of guide bar 74, as viewed in such figure. When solenoid 90 is energized the plunger thereof advances to engage the right hand end of a rack bar 91 slidably mounted in a slot 92 provided in the front edge of an elongated bar 89 secured to the rear under side of guide bar 74 (note FIGS. 6 and 7). The rack 91 is normally biased towards the solenoid 90 by a spring 93 which is connected at one end to a post 94 on the rack 91 and which is connected at its other end to the guide bar 74. The rack post 94 engages with a stop 95 on guide 74 to limit the retracting movement of the rack to a position at which the solenoid engaging end of the rack is spaced from the solenoid plunger in the inoperative condition of the solenoid, but is engaged by such plunger and advanced by the latter when the solenoid is energized by the closing of microswitch 50. The teeth of rack 91 are engaged by a pair of spaced cutter gears 96, 96' which are provided on the projecting ends of pins 97, 97', respectively. The pins 97, 97' extend upwardly through bearing bushings 98, 98', respectively, mounted in the guide bar 74 and comprise the cutting and bending units of the machine. The pins and bushings of such units are located in passageways or holes provided in the guide bar 74 transversely to and in front of the rack 91 and extend to the guide groove 73 in such bar (compare FIGS. 6, 7, 9 and 10). The inner ends of the pin and bushing in each unit are located substantially

centrally of and are substantially flush with the surface of such groove 73. Provided on the inner ends of the pins 97, 97' and projecting into the groove 73, are semi-disc like members 101, 101', respectively, having their semi-circular sides concentric with the annular surface of the pin and their straight sides located to one side of and less in length than a parallel diameter of the pins. Normally the straight sides of the members 101, 101' are located so that the helical in its feed through the book passes between the same and members 102, 102' provided on the inner ends of pins 97, 97', respectively, and also projecting into the groove 73. The members 102, 102' have a cross-sectional area less than half that of the members 101, 101' and are somewhat triangularly shaped with the apices thereof located in the central portions of the pins and one side thereof disposed in opposed relation to one half of the straight side of the members 101, 101'. Provided on substantially diametrically opposed portions of each of the bushings 98, 98' so as to be aligned with members 101, 101', respectively, in the retracted position of the rack 91, are members 103, 104 and 103', 104' respectively, which project into groove 73. Members 103, 104 have inner side edges which align with the straight edge of member 101 in the retracted position of rack 91, and members 103', 104' have inner side edges which align with the straight edge of member 101' in the said position of rack 91. Also provided on the bushings 98, 98' in adjacently spaced relation to the members 103, 103', respectively, are projecting members 105, 105', respectively. The inner sides of the members 105, 105' are opposed to and spaced a distance slightly greater than the thickness of the helical wire from the inner sides of the members 103, 103', respectively. In the retracted position of rack 91, the inner sides of members 102, 105 form one side wall of a passageway for the helical wire and the inner sides of members 103, 101 and 104 form the other side wall of such passageway. The members 101'—105' on the other unit form a similar arrangement, but it will be noted in FIGS. 9 and 10 that the positions of the latter are reversed with respect to those of the members 101—105. Thus, while the pins 97, 97' of such units are rotated in the same directions during the movements of the rack bar 91 and the gears 96, 96', respectively, the member of one unit will operate in a fashion opposite to that of the members of the other unit. As a result, the bent ends of the helical binder will be turned inwardly towards each other.

Consider now the operation of the unit composed of gear 96, pin 97, bushing 98 and members 101—105 and located on the left hand side of the guide bar 74, as viewed in FIGS. 9 and 10 of the drawings. In the feed of the helix from the die 35 and through the apertures of the book 78, the rack 91 is in a retracted position with the post 94 in engagement with the stop 95. The members 101—105 in this condition of such parts are arranged in the manner above mentioned to provide a passageway through which the helical wire feeds. When the second solenoid 90 is energized in the manner previously described, the plunger thereof advances to the left, as viewed in FIG. 10, forcing the rack bar 91 to the left against the tension of spring 93 and causing the gear 96 and consequently pin 97 to rotate in a counter clockwise direction when looking into the guide groove 73, as shown in FIGS. 9 and 10 of the drawings. During such advancing movement of the rack bar 91, the pin 97 rotates 90° moving the members 101 and 102 relative to members 103, 104 and 105 to the positions shown in FIG. 10 of the drawings. During such relative movement, the cutting edge 106 of member 101 will coact with the cutting edge 107 of member 105 to sever the wire of the helical as shown in FIG. 10. During such severing action and thereafter during the completing of the cutting and bending operations, the members 103, 105 hold the portion 108 of the wire which now becomes the leading end of the formed helical binder extending from the die 35 and in position

to be fed toward and through the apertures of the next book of pages to be bound. The members 101 and 102 coact with members 104 to bend the other cut end portion 109 of the wire through an angle of ninety degrees as shown in FIG. 10 of the drawings. Bent end portion 109 forms the left hand end of the book binder, as viewed in FIG. 11, and by reason of its bent configuration prevents the binder from being displaced to the right on such book. In a similar fashion, the cutting edges 106' and 107' of members 101' and 105', respectively, cooperate to cut the binder at the right hand side of the book, as viewed in FIGS. 9 and 10, leaving the leading end portion 108' of the wire which is discarded as waste, between the members 103' and 105'. The members 101', 102' and 104' then cooperate to bend the cut end 109', which forms the right hand end of the binder, through an angle of ninety degrees to prevent the binder from being displaced to the left on the book.

The members 102, 102' of the cutting and bending units are given the configuration shown to permit the return rotation of the pins 97, 97', respectively, without spoiling the bend made on the advancing stroke of the rack. The rack 91 makes its return stroke as soon as the operator permits the foot pedal 45 to rise under the pressure of spring 46. The release of the foot pedal 45 enables the spring 46 to lift the rod 42, thereby permitting the guide bar 74 to drop. As the cut leading end portion 108' on the guide groove 73 drops with the guide bar, the activating arm of microswitch 50 is released thereby deenergizing such switch. As a result solenoid 90 is deenergized and permits the rack 91 to be retracted by the force of spring 93. It will be noted that the guide bar 74 is provided with a plurality of passageways or openings into which the cutting and bending units may be inserted. These openings permit the adjustment of the portions of the units for different widths of books and preferably are utilized when large adjustments (of the order of one inch) of such mechanisms are necessary. To place the units more accurately and for small adjustments in the width of the books, the guide bar 74 is adjusted lengthwise on the supporting plate 72.

When the guide bar 74 has returned to its lowered position, the parts of the machine are restored to their original conditions and a cycle of the operation of the machine has been completed. The bound book may then be removed from the machine and a new book of loose pages mounted on the arcuate guides 79 for the next binding operation.

While I have hereinabove described and illustrated in the drawings a preferred embodiment of my invention, it will be understood by those of the art that such embodiment may be modified and changed without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A machine for binding books comprising, means supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book, a unitary device including a binder guide and a book clamp fixed in side-by-side relation, and positioned beyond the area defined by the supported book transversely to the plane of the latter so that said guide is disposed in opposed relation to the ends of the book sheets forming said binding edge, means pivotally supporting said unitary device on said supporting means for movement generally in the direction of the plane of the supported book toward and away from the binding edge of such book while maintaining said guide in opposed relation to said ends of the book sheets, wire feeding means including a feed roll for feeding wire to said binder forming means, means operable to pivotally move said feed roll to an advanced operative position and to

retract the same therefrom, manually operable means actuatable to an advanced position at the beginning of a binding cycle and maintained in such advanced position until the cycle is completed, said manual means being connected to and when actuated advancing said unitary device to an advanced position to simultaneously bring said clamp into engagement with the supported book and said guide into operative position relative to the binding edge of such book, means carried by said manually operable means to actuate said operable means to advance said feed roll when said manual means is moved to advanced position, and control means including a displaceable member located beyond the book in the path of movement of the binder and operatively connected to said operable means to independently cause the latter to retract said roll to an inoperative position when said displaceable member thereof is actuated by the leading end of the binder fed through the book by said binder forming means and without affecting said unitary device held in advanced position by said manually operable means.

2. A machine for binding books comprising, means for supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book, a unitary device including a binder guide and a book clamp fixed in side-by-side relation, and positioned beyond the area defined by the supported book transversely to the plane of the latter so that said guide is disposed in opposed relation to the ends of the book sheets forming said binding edge, means pivotally supporting said unitary device on said supporting means for movement generally in the direction of the plane of the supported book toward and away from the binding edge of such book while maintaining said guide in opposed relation to said ends of the book sheets, wire feeding means including a feed roll for feeding wire to said binder forming means, means operable to pivotally move said feed roll to an advanced operative position and to retract the same therefrom, a reciprocable rod, means operable to move said rod, to an advanced position at the beginning of a binding cycle and to maintain such rod in such advanced position until the cycle is completed, said rod being connected to and when actuated advancing said unitary device to an advanced position to simultaneously bring said clamp into engagement with the supported book and said guide into operative position relative to the binding edge of such book, means carried by said rod to actuate said operable means to advance said feed roll as the rod is moved to advanced position, and control means including a displaceable member located beyond the book in the path of movement of the binder and operatively connected to said operable means to independently cause the latter to retract said roll to an inoperative position when said displaceable member thereof is actuated by the leading end of the binder fed through the book by said binder forming means and without affecting said unitary device held in advanced position by said rod.

3. A machine for binding books comprising, means for supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book, said binder forming means consisting essentially of three cylindrical parts including two telescoped parts each being composed of an enlarged annular portion extending from a reduced annular portion and the reduced annular portion of one of said parts being seated in the enlarged annular portion of the other part so that the passageway of the inserted part is aligned with the passageway in the reduced portion of the other part, said inserted part passageway being substantially larger in diameter than said aligned reduced portion passageway, said third cylindrical part being constituted of a form-

ing mandrel extending through both of said passageways and having a spiral channel formed in the surface of the portion thereof contained in said inserted part passageway, said inserted part constituting a die part co-operating with said channeled portion of the mandrel to form the helical binder and said other part constituting a holder for both the die part and the mandrel, and means for feeding a wire to be formed through the enlarged portion of said holder part and the concentric reduced portion of said die part and into the inner end of said die part passageway, and means supporting said binder forming means so that the outer discharge end of said die part passageway is directed in substantial alignment toward the binding edge of the supported book, a unitary device including a binder guide and a book clamp fixed in side-by-side relation, and positioned beyond the area defined by the supported book transversely to the plane of the latter so that said guide is disposed in opposed relation to the ends of the book sheets forming said binding edge, means pivotally supporting said unitary device on said supporting means for movement generally in the direction of the plane of the supported book toward and away from the binding edge of such book while maintaining said guide in opposed relation to said ends of the book sheets, wire feeding means including a feed roll for feeding wire to said binder forming means, means operable to pivotally move said feed roll to an advanced operative position and to retract the same therefrom, a reciprocable rod, means operable to move said rod, to an advanced position at the beginning of a binding cycle and to maintain such rod in such advanced position until the cycle is completed, said rod being connected to and when actuated advancing said unitary device to an advanced position to simultaneously bring said clamp into engagement with the supported book and said guide into operative position relative to the binding edge of such book, means carried by said rod to actuate said operable means to advance said feed roll as the rod is moved to advanced position, and control means including a displaceable member located beyond the book in the path of movement of the binder and operatively connected to said operable means to cause the latter to retract said roll to an inoperative position when said displaceable member thereof is actuated by the leading end of the binder fed through the book by said binder forming means and without affecting said unitary device held in advanced position by said rod.

4. A machine for binding books comprising, means for supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book, a unitary device including a binder guide and a book clamp fixed in side-by-side relation, and positioned beyond the area defined by the supported book transversely to the plane of the latter so that said guide is disposed in opposed relation to the ends of the book sheets forming said binding edge, means pivotally supporting said unitary device on said supporting means for movement generally in the direction of the plane of the supported book toward and away from the binding edge of such book while maintaining said guide in opposed relation to said ends of the book sheets, wire feeding means including a feed roll for feeding wire to said binder forming means, a lever pivotally supporting said feed roll, a solenoid operable to pivotally move said lever to advance said feed roll to an operative position, a reciprocable rod, means operable to move said rod, to an advanced position at the beginning of a binding cycle and to maintain such rod in such advanced position until the cycle is completed, said rod being connected to and when actuated advancing said unitary device to an advanced position to simultaneously bring said clamp into engagement with the supported book and said guide into

operative position relative to the binding edge of such book, a switch controlling the operativeness of said solenoid, a finger carried by said rod to actuate said switch to operate said solenoid as the rod is moved to advanced position, and a second switch having an activated lever located beyond the book in the path of movement of the binder and operatively connected to said solenoid to cause the latter to be rendered inoperative when said activating lever thereof is actuated by the leading end of the binder fed through the book by said binder forming means, thereby causing said lever to pivot said feed roll to an inoperative position without affecting said unitary device held in advanced position by said rod.

5. A machine for binding books comprising, means for supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book, a unitary device including a binder guide and a book clamp fixed in side-by-side relation, and positioned beyond the area defined by the supported book transversely to the plane of the latter so that said guide is disposed in opposed relation to the ends of the book sheets forming said binding edge, means pivotally supporting said unitary device on said supporting means for movement generally in the direction of the plane of the supported book toward and away from the binding edge of such book while maintaining said guide in opposed relation to said ends of the book sheets, wire feeding means including a feed roll for feeding wire to said binder forming means, means operable to pivotally move said feed roll to an advanced position and to retract the same therefrom, manually operable means, means carried by said manually operable means to actuate said operable means to advance said feed roll when said manual means is moved to advanced position, control means including a displaceable member located beyond the book in the path of movement of the binder for independently causing said operable means to retract said roll to an inoperative position when said displaceable member thereof is actuated by the leading end of the binder fed through the book by said binder feeding means and without affecting said unitary device held in advanced position by said manually operable means, a pair of wire cutting and bending units operatively associated with said book supporting means, means operable to actuate said units, said control means controlling said unit operable means and causing the latter to operate said units to cut and bend the binder fed through the book by said binder feeding means when said control means is so actuated by the leading end of the fed binder and while said unitary device is held in advanced position by said manually operable means.

6. A machine for binding books comprising, means for supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book, a unitary device including a binder guide and a book clamp, means pivotally supporting said unitary device on said supporting means for movement from a retracted inoperative position toward said operative edge to bring said guide and clamp into operative relation with the binding edge of a book on said supporting means, wire feeding means including a feed roll for feeding wire to said binder forming means, means operable to pivotally move said feed roll to an advanced operative position and to retract the same therefrom, manually operable means actuatable to an advanced position at the beginning of a binding cycle and maintained in such advanced position until the cycle is completed, said manual means being connected to and advancing said unitary device into operative position when actuated to an advanced position, means carried by said manually operable means to actuate said operable means to ad-

vance said feed roll when said manual means is moved to advanced position, control means including a displaceable member located beyond the book in the path of movement of the binder for independently causing said operable means to retract said roll to an inoperative position when said displaceable member thereof is actuated by the leading end of the binder fed through the book by said binder forming means and without affecting said unitary device held in advanced position by said manually operable means, a pair of wire cutting and bending units operatively associated with said book supporting means, each of said units including a bearing bushing, a pin mounted in said bushing for rotatable movement about its longitudinal axis, wire cutting and bending means provided on one end of said pin, wire cutting and bending means on the associated ends of said bearing bushings and arranged concentric to and being coactive with said pin wire cutting and bending means to cut and bend the ends of a binder fed over such ends on a book when said pins are rotated, a rack gear secured to each of said pins, means including a rack bar engageable with said gears to actuate said units, said control means controlling said actuating means and causing the latter to operate said units to cut and bend the binder fed through the book by said binder feeding means when said control means is so actuated by the leading end of the fed binder and while said unitary device is held in advanced position by said manually operable means.

7. A machine for binding books comprising means for supporting a book to be bound with the binding edge thereof arranged along an operative edge of said means, a movable binder guide having a longitudinal guide groove and positioned beyond the area defined by the supported book transversely to the plane of the latter so that said groove is disposed in opposed relation to the ends of the book sheets forming said binding edge, means pivotally supporting said guide on said supporting means for movement generally in the direction of the plane of the supported book toward and away from the binding edge of such book while maintaining said groove in opposed relation to said ends of the book sheets, means including cyclically operable means for advancing said guide into operative position relative to said supporting means and to retract the same therefrom, said cyclically operable means being actuatable to an advanced position to advance said guide at the beginning of a binding cycle and being maintained in such advanced position until the cycle is completed, binder forming means arranged to direct a helically-shaped binder through apertures along the binding edge of the book and along the groove of said guide, means controlled by said cyclically operable means to actuate said binder forming means to feed a binder at a predetermined point in a cycle of said cyclically operable means, control means including a displaceable member located on said guide beyond the book in the path of movement of the binder for independently interrupting the feed of said binder forming means when said displaceable member thereof is actuated by the leading end of the fed binder without affecting said guide held in advanced position by said operable means, a pair of wire cutting and bending units mounted on said guide and having the wire cutting and bending means thereof located in the groove of said guide, and means controlled by said control means for actuating said units to cut and bend portions of the fed binder located in said guide groove when said displaceable member is actuated by the leading end of the binder while said guide is held in advanced position by said operable means.

8. A machine such as defined in claim 7, in which said book supporting means supports a book in substantially vertical position with the binding edge thereof lowermost, and in which said guide is located below said operative edge of said supporting means, said pivotable means being connected to said supporting means to raise said guide upwardly towards said operative edge when said cyclically operable means is advanced, and a book clamp carried by said guide and movable into clamping position on the binding edge of a supported book in the advancing movement of said guide.

9. A machine such as defined in claim 7, in which said supporting means supports a book in substantially vertical position with the binding edge thereof lowermost and is provided with fixed sheet rearranging means at the operative edge thereof and insertable through apertures in the binding edge of the book to rearrange the pages of the books as the latter are being mounted thereon and to support the rearranged pages of the book in inverted position on said supporting means, and in which said binder guide is supported in depending relation on said supporting means, said advancing means being operable to pivotally raise said guide to a position in which the guide groove thereof supports a binder fed through the book apertures, and a book clamp carried on the free longitudinal edge of said guide and movable into clamping position on the binding edge of a supported book in the advancing movement of said guide.

10. A machine such as defined in claim 9, in which said sheet arranging means is composed of a plurality of spaced, arcuately-shaped members, each provided with a binder receiving guideway through which the binder progresses in its passage through the book.

References Cited in the file of this patent

UNITED STATES PATENTS

2,161,689	Strandberg	June 6, 1939
2,166,519	Catini	July 18, 1939
2,168,865	Fischer	Aug. 8, 1939
2,262,994	Dickey	Nov. 18, 1941
2,300,544	Freundlich	Nov. 3, 1942
2,361,983	Veley	Nov. 7, 1944
2,730,142	Berberich	Aug. 15, 1951
2,649,120	November	Aug. 18, 1953
2,694,418	Bergstrom	Nov. 16, 1954

UNITED STATES PATENT OFFICE
CERTIFICATION OF CORRECTION

Patent No. 2,995,157

August 8, 1961

Vincenzo Catini

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 57, after "means" insert -- for --; line 59, for "therefof" read -- thereof --; column 10, line 33, before ", means" insert -- actuatable to an advanced position at the beginning of a binding cycle and maintained in such advanced position until the cycle is completed, said manual means being connected to and when actuated advancing said unitary device to an advanced position to simultaneously bring said clamp into engagement with the supported book and said guide into operative position relative to the binding edge of such book; --.

Signed and sealed this 17th day of April 1962.

(SEAL)

Attest:

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