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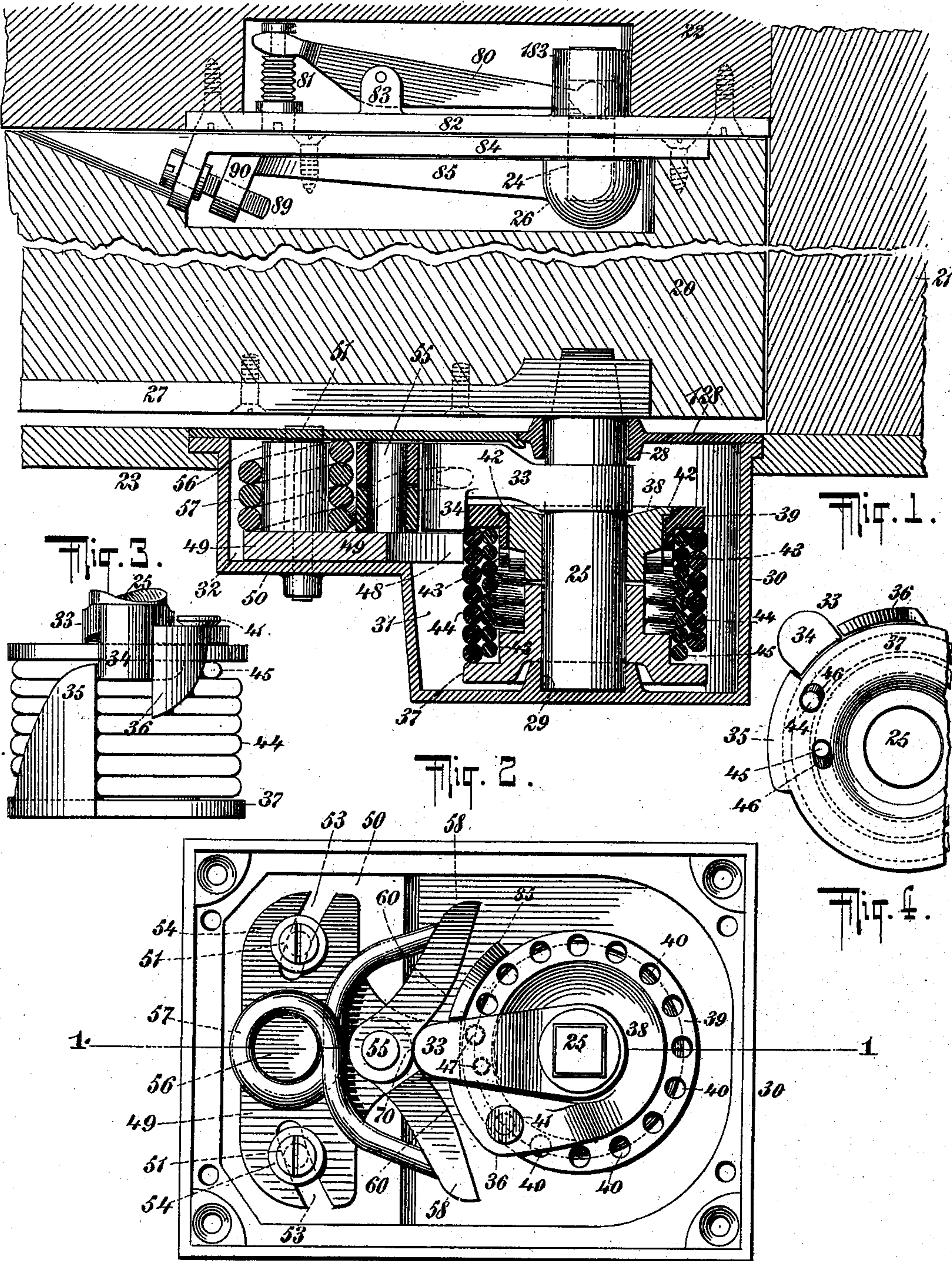
Patented Mar. 18, 1902.

J. BARDSLEY.
SPRING HINGE.

(Application filed July 6, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:
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No. 695,526.

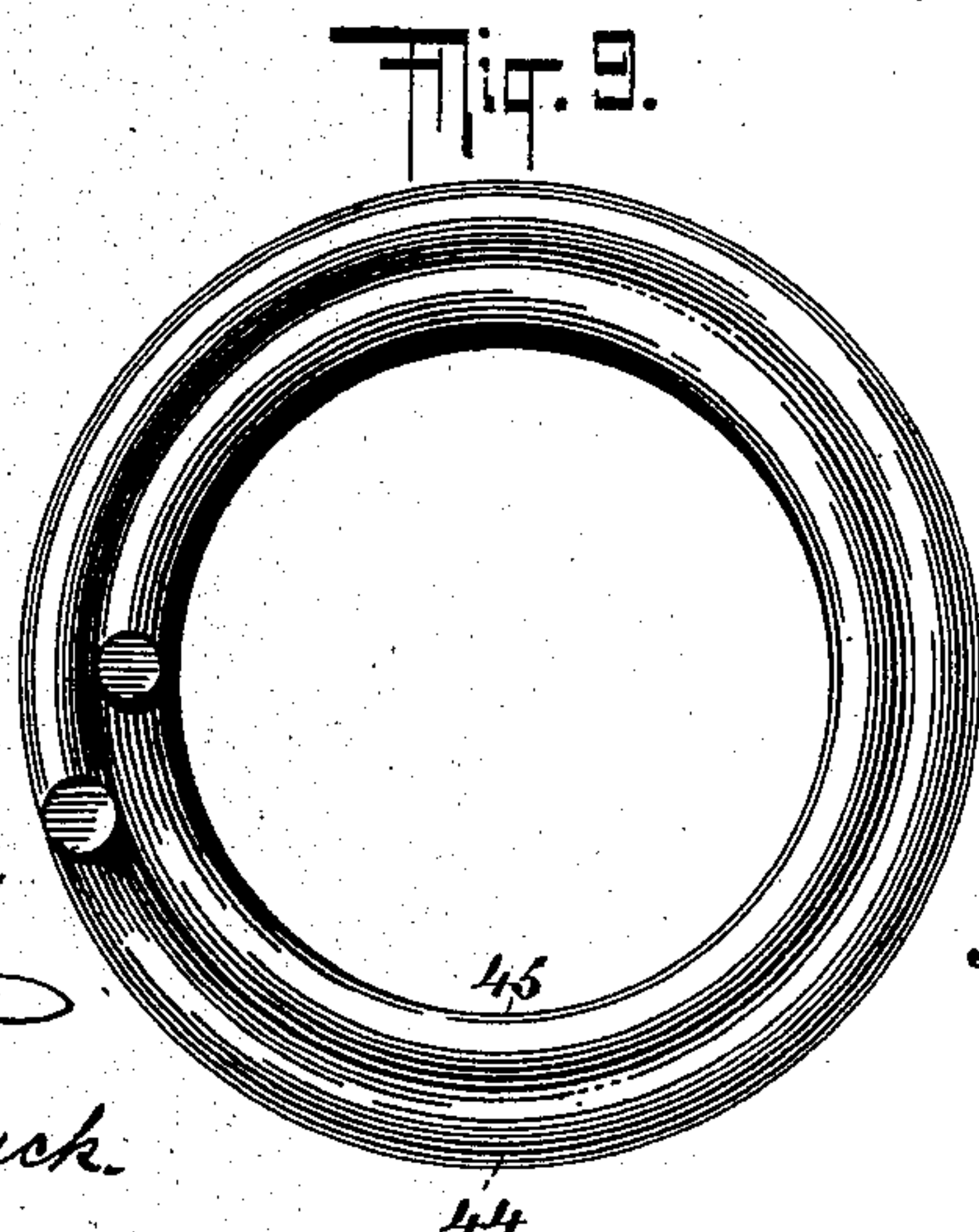
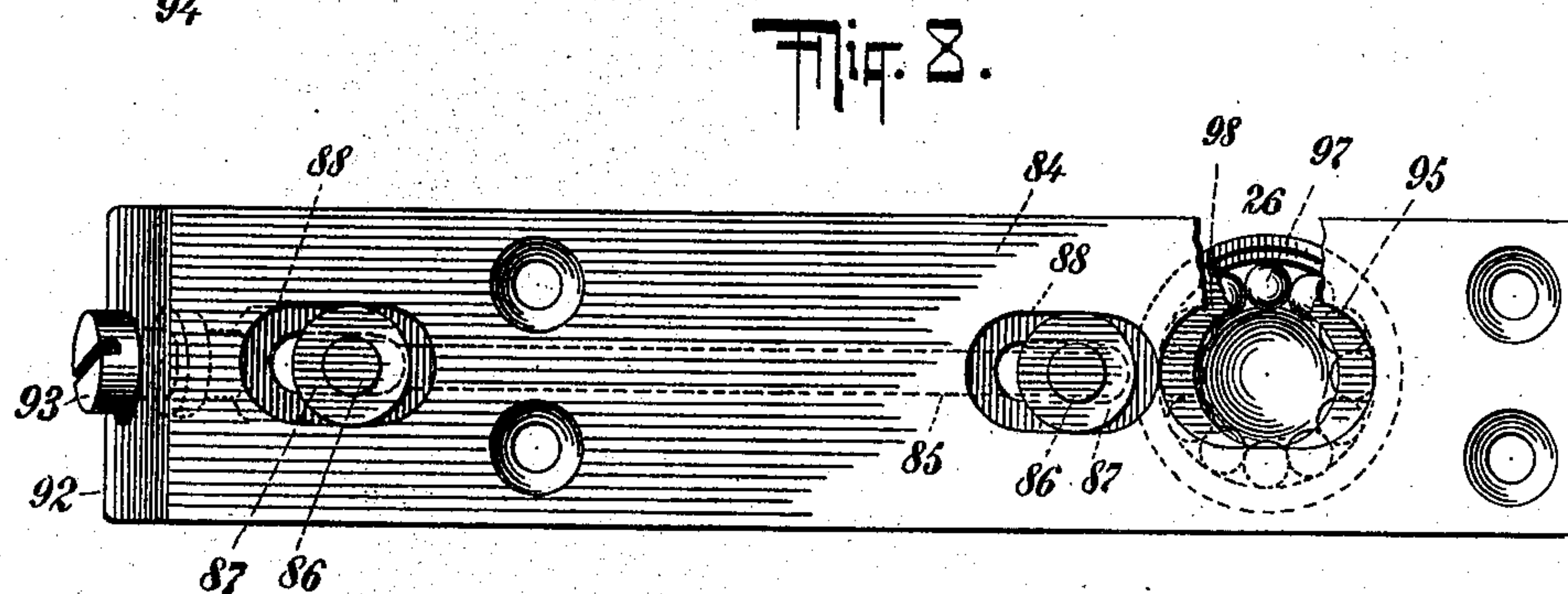
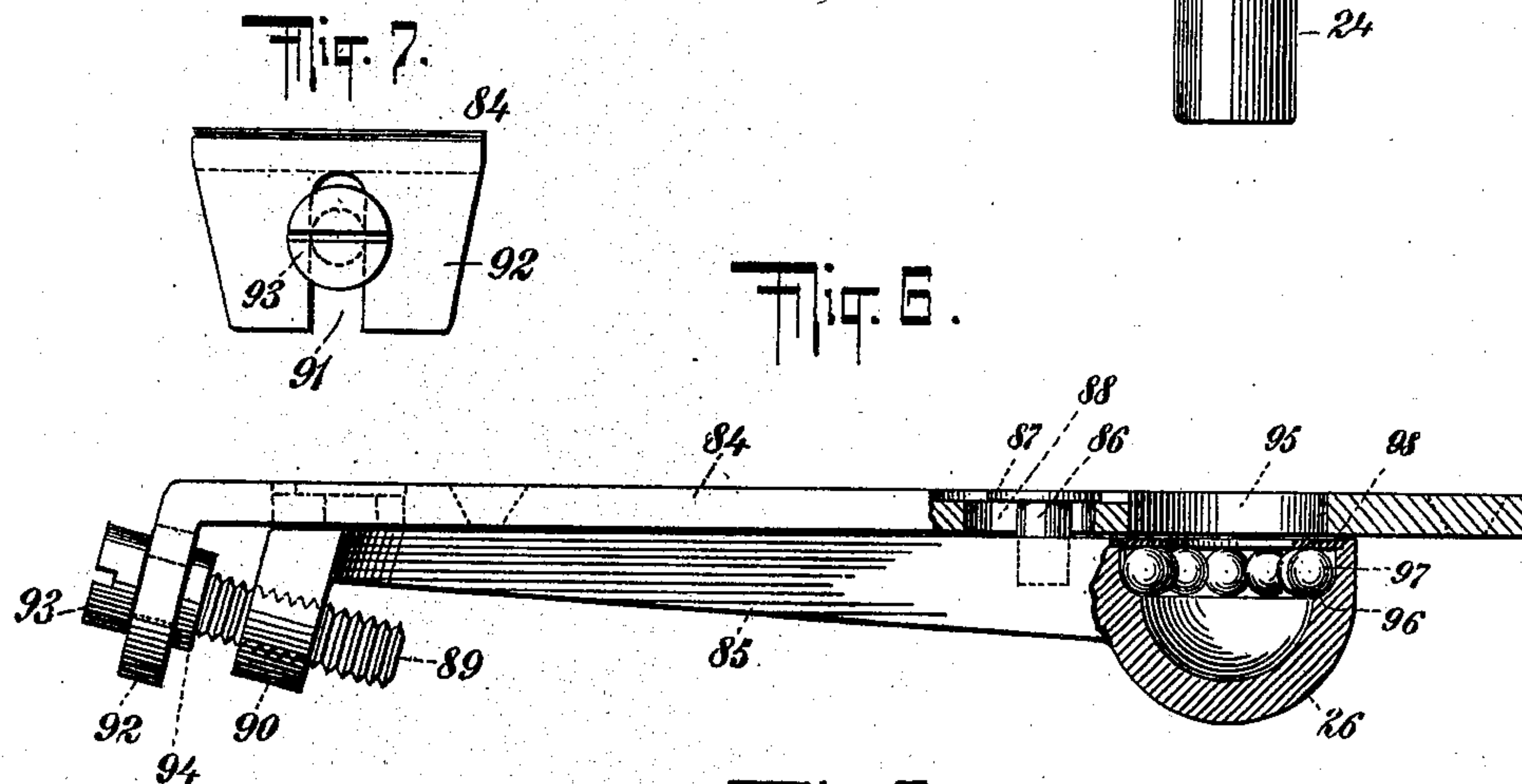
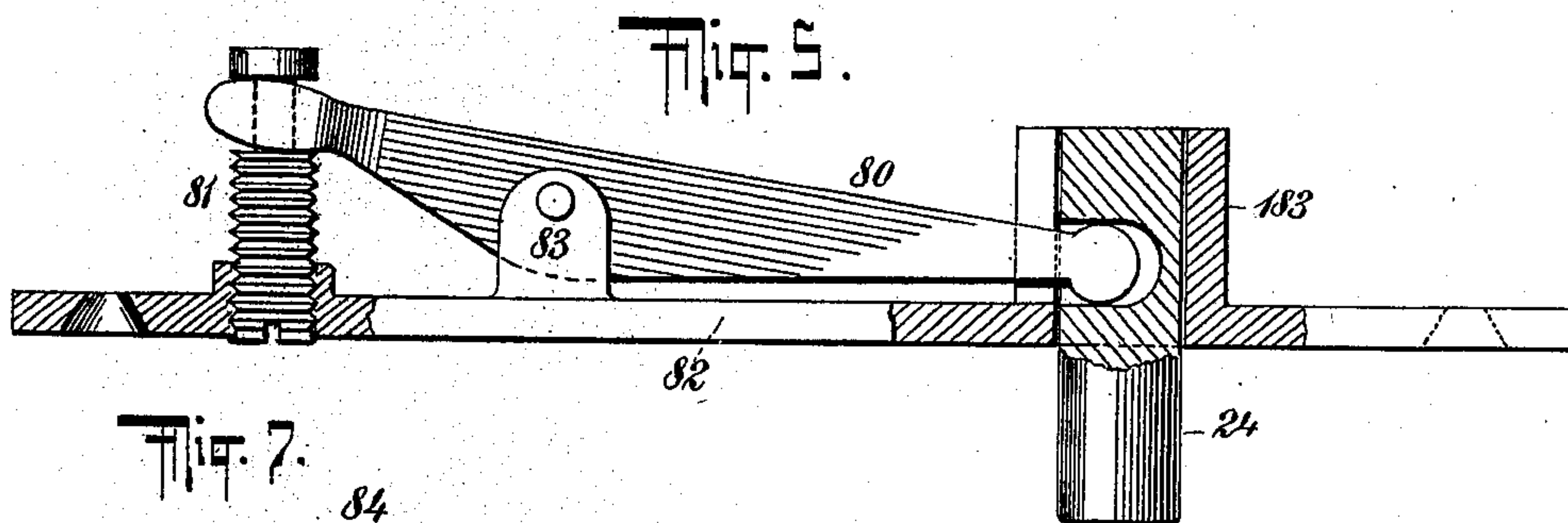
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J. BARDSLEY.
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(Application filed July 6, 1900.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

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No. 695,526.

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SPRING HINGE.

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3 Sheets—Sheet 3.

Fig. 10.

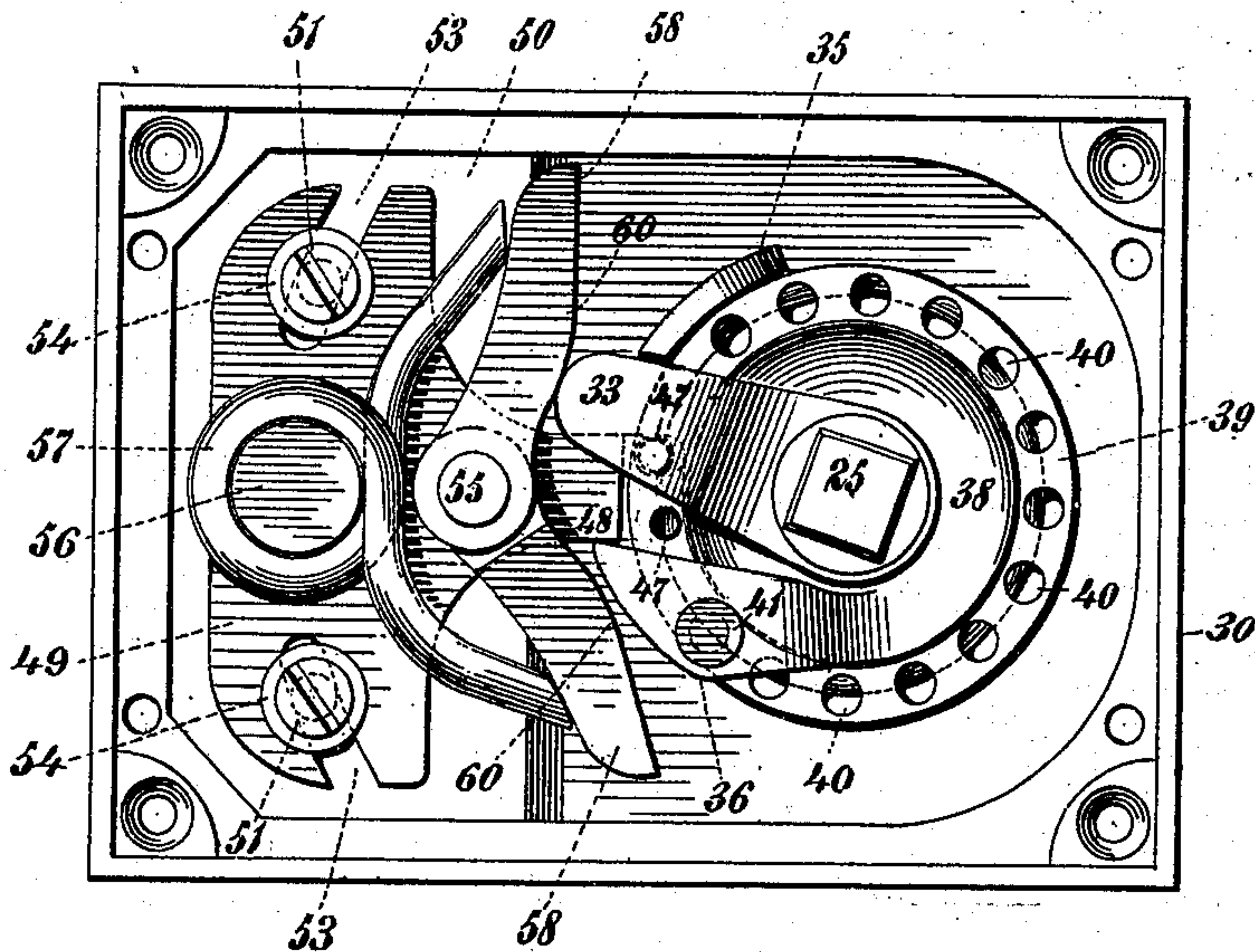
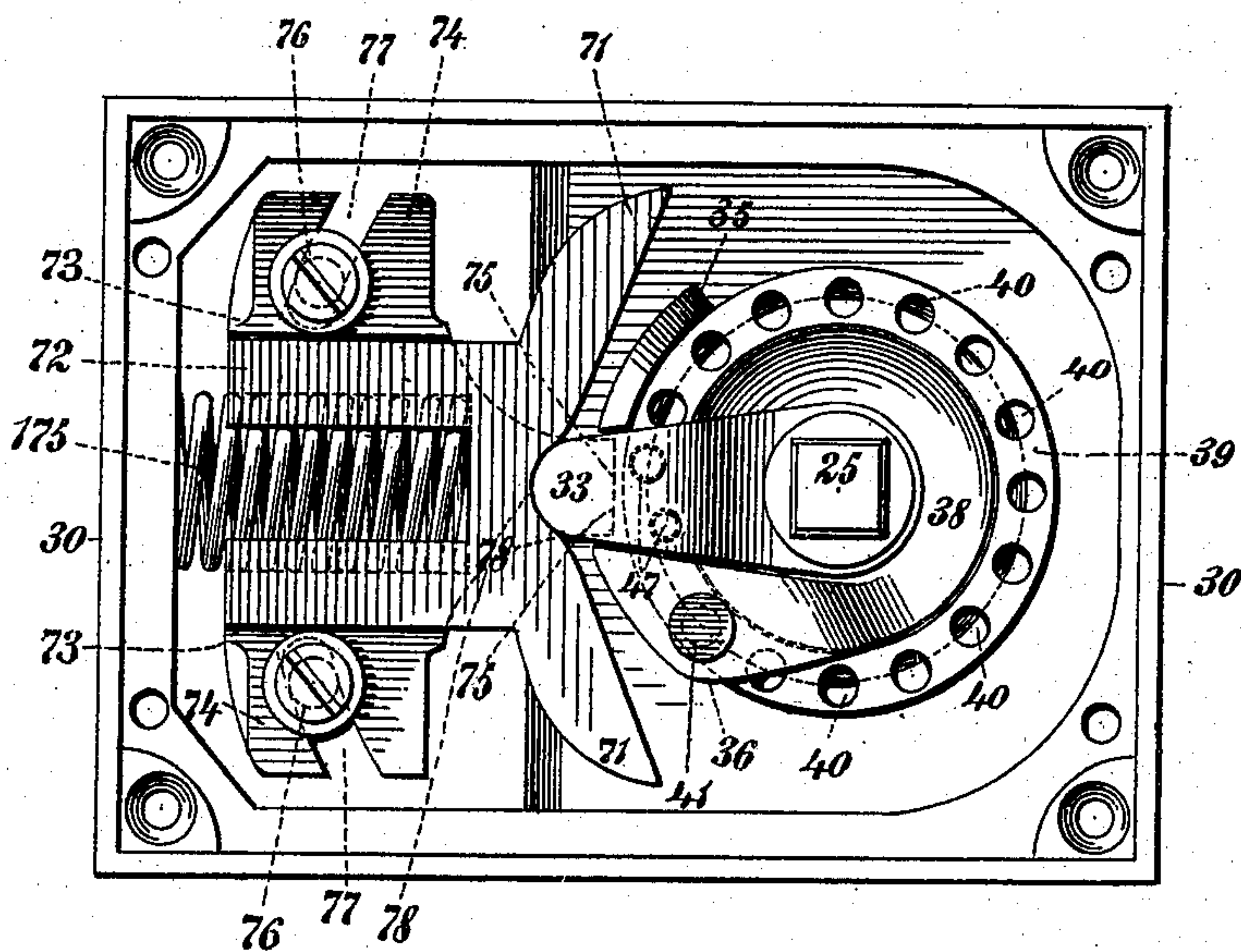


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOSEPH BARDSLEY, OF MONTCLAIR, NEW JERSEY.

SPRING-HINGE.

SPECIFICATION forming part of Letters Patent No. 695,526, dated March 18, 1902.

Application filed July 6, 1900. Serial No. 22,660. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BARDSLEY, a citizen of the United States, and a resident of Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Spring-Hinges, of which the following is a specification.

The invention relates to improvements in spring-hinges; and it consists in the novel features, combinations, and arrangements of parts hereinafter described, and particularly pointed out in the claims.

The invention pertains more particularly to hinges for doors which are mounted at their lower end upon a spring spindle or pivot and held at their upper end by means of a stud projecting into a socket.

In accordance with my present invention I provide a novel construction of spring-hinge for the lower edge of the door and a novel socket to receive the stud at the upper edge of the door; and the said invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section, partly broken away, through a door and its casing equipped with hinges constructed in accordance with and embodying the invention. Fig. 2 is a detached top view of the spring-hinge, the top or cap plate of same being omitted. Fig. 3 is an elevation of a portion of the spring-hinge removed from its casing. Fig. 4 is a bottom view, partly broken away, of same. Fig. 5 is an enlarged detached side elevation, partly in section, of the means for supporting and adjusting the top hinge-stud, on which the door turns. Fig. 6 is a like view of the socket at the upper edge of the door to receive the stud which projects into said socket. Fig. 7 is an end view of same. Fig. 8 is a top view, partly broken away, of same. Fig. 9 is an enlarged detached top view of the springs which form a part of the lower or spring hinge. Fig. 10 is a top view, corresponding with Fig. 2, of the lower or spring hinge and illustrates the position the parts will assume when the door has been moved to a partly-open position; and Fig. 11 is a top view, partly in section, of a modified form of the lower or spring hinge.

In the drawings, 20 designates a usual form of double-acting door; 21, the door frame or casing; 22, the lintel over the door, and 23 the sill below the door and within which the spring-hinge is embedded.

The door 20 has its swinging movement upon the upper stud 24 and with the lower spindle 25, the said stud 24 being free within its socket 26 and the upper end of the spindle 25 being polygonal and inclosed within a corresponding aperture formed in the bar 27, seated within the lower edges of the door. The door 20 thus turns upon the stud 24 and with the spindle 25, and the movement of the door in either direction sets in motion the said spindle 25 and the parts connected therewith.

The spindle 25 when in use has an axial motion imparted to it, and it is journaled in bearings 28 and 29, the bearing 28 being in the form of a sleeve, which is integral with the top plate or cap 128 for the casing 30, and the bearing 29 being in the nature of a socket or sleeve formed at the base of said casing 30 and in line with said bearing 28, as shown in Fig. 1.

The casing 30 is formed with the two compartments 31 and 32, the former being deeper than the latter and receiving the spindle 25 and the parts more directly connected therewith.

The spindle 25 is simply a plain shaft, and the only element of the structure positively united with this shaft is the actuating-arm 33, which projects horizontally from the upper portion of the spindle 25 and is formed with the downwardly-extending portion 34, the latter in the normal condition of the structure being disposed between the stop-arms numbered 35 and 36, respectively, the stop-arm 35 being connected with the lower hub 37, which encompasses said spindle 25, and the upper arm 36 being connected with the upper hub 38, which encompasses the upper portion of the said spindle 25 directly below the arm 33. The lower and upper hubs 37 and 38 snugly receive the spindle 25, but are free of said spindle, and the lower hub 37 at its inner edges finds a bearing upon the upper edges of the socket or sleeve 29, which receives the lower end of said spindle. The lower hub 37 is in one integral piece and the

stop-arm 35 is always in rigid connection therewith. The upper hub 38 is likewise in one integral piece and the stop-arm 36 is always in rigid connection therewith, and the upper portions of said hub 38 are encompassed by the ring 39, having the series of apertures 40 and adapted to be connected with the hub 38 by means of a pin 41, which passes downward through the stop-arm 36 and enters one of said apertures in said ring 39. When the ring 39 is operatively connected with the hub 38 by means of the pin 41, it then becomes a part of the hub 38 and is adapted to turn therewith. The ring 39 is held in position upon the said hub 38 by means of the annular flange 42, which engages the upper edges of said ring 39, and the pins 43, which engage the lower edges of the ring 39. The ring 39 is slipped upon the hub 38 until it reaches the flange 42 and then the pins 43 are inserted in position, as shown in Fig. 1, and thereby the ring 39 is locked in position, but is free to turn axially upon the hub 38, except when said ring is rigidly connected with said hub through the instrumentality of the aforesaid pin 41. The ring 39 may be considered as a part of the hub 38, since said hub and ring are rigidly connected with one another at all times except when in the manner hereinafter described the pin 41 is withdrawn and the ring 39 is given an axial motion to wind up or unwind the main closing-springs 44 45 to increase or decrease the tension of the latter. In the further description of the structure the ring 39 may therefore be treated as a part of the upper hub 38. The main closing-springs 44 45 are coiled springs held upon the hubs 37 and 38, the lower ends of the said springs being secured to the lower hub 37 by having their ends inserted into apertures 46, Fig. 4, formed in said hub 37. The upper ends of the springs 44 45 are passed into apertures 47 in the ring 39, and thus the springs 44 and 45, which are independent coils, are secured at their lower end to the hub 37 and at their upper end to the ring 39. The securing of the upper ends of the spring 44 and 45 to the ring 39 is for all practical purposes equivalent to securing the springs to the upper hub 38, since when the pin 41 is in position the ring 39 is in rigid connection with the hub 38, as above explained.

The depending portion 34 of the arm 33 is disposed between the stop-arms 35 and 36, as before explained, and below said portion 34 of the arm 33 is provided an additional stop-arm 48, which is also disposed between the stop-arms 35 and 36 and is integral with a plate 49, which is preferably adjustable, as hereinafter explained.

When the spindle 25 and arm 33 are moved in one direction by the opening of the door, the portion or section 34 of said arm 33 will engage the stop-arm 35 and pressing against said stop-arm 35 will cause the latter to travel in the direction of the door, with the result of turning the lower hub 37 and winding the

springs 44 45 from the lower end of the latter. During such movement of the stop-arm 35 and hub 37 (the door opening in the direction of the arm 35) the stop-arm 36 will engage the edge of the stop 48, and thus create a resistance which will prevent the turning of the hub 38 with the hub 37. When the door is being opened in an opposite direction, the portion or section 34 of the arm 33 will meet the stop-arm 36 and through the latter effect the rotation of the hub 38 and ring 39 and the consequent winding up of the springs 44 and 45 from the upper end of the latter, and at such time the stop-arm 35 will engage the stop 48, and thus prevent the lower hub 37 from rotating with the upper hub 38. During the opening of the door in one direction the springs 44 and 45 will thus be wound from their lower end, and during the opening of the door in an opposite direction the springs 44 and 45 will be wound from their upper ends. The winding of the springs 44 and 45 during the opening of the door serves to create a force, which when the door is released will effect its closing.

The plate 49, carrying the stop 48, is secured upon the floor 50 at one end of the casing 30 by means of the screws 51 51, whose reduced lower ends pass downward through slots 53, formed in the plate 49, and thence enter threaded apertures in the floor 50 of the casing. At the lower end of the body of the screws 51 are washers 54, which press upon the upper surfaces of the plate 49 and permit the convenient clamping, by means of the screws 51, of said plate against the floor 50. The screws 51 have their heads exposed through the top or closing plate of the casing 30, so that they may be easily reached by means of a screw-driver. The slots 53 in the plate 49 are on the arc of a circle whose center is the main spindle 25, and they admit of the lateral adjustment of the plate 49, so as to bring the stop 48, carried by said plate, and the arm 33 into such accurate adjustment with relation to the door as may be found necessary under the varying conditions to be met, as hereinafter explained.

The plate 49 carries the studs 55 and 56, which studs extend upward in close relation to the top plate or closing-cap of the casing 30 and one of which, 56, receives the spring 57, while the other, 55, receives the shank ends of the pivoted arms 58, which arms, as shown in Fig. 2, extend outward laterally from the stud 55 and are engaged at their outer side by the ends of the spring 57, which is a stout coiled-wire spring and serves normally to keep the arms 58 at their rest position. (Shown in Fig. 2.) The stud 55 is in line with the stop 48, carried by the plate 49, and the lever-arms 58 correspond with one another and in the normal at-rest condition of the structure receive centrally between themselves in the socket 70 the end of the actuating lever-arm 33. The lever-arms 58 at their sides facing the actuating-spindle 25

are preferably provided with the convex surfaces 60 for coaction with the end of the actuating-arm 33, secured upon the upper end of the spindle 25.

5 In the employment of the invention the springs 44 and 45 will be given the tension requisite for the work to be done, and in this preliminary feature of the adjustment the pin 41 will be withdrawn from the arm 36
10 and ring 39, thus leaving the ring 39 free to be rotated upon the upper hub 38 for the purpose of winding up the springs 44 and 45. Any suitable instrument may be employed for turning the ring 39 to wind the springs
15 44 and 45, since the series of apertures 40 afford convenient means for receiving the bifurcated end of a forked tool, whereby said ring may be turned in one direction to wind up the springs 44 and 45 or in a reverse di-
20 rection to allow the unwinding of the springs 44 and 45. When the ring 39 shall have been turned in one direction or the other to a proper extent to effect the requisite tensioning of the springs 44 and 45, the pin 41 will be restored
25 to place and will lock the ring 39 and hub 38 together, as before. The series of apertures 40 in the ring 39 admit of a wide range of adjustment of the springs 44 and 45, since under all conditions some one of the apertures 40 will
30 present itself in line with the aperture in the arm 36 to receive the pin 41. After the proper tension has been given to the springs 44 and 45 and the door 20 has been placed in position the parts of the structure when the door is in its
35 closed position will be in their normal at-rest condition, (illustrated in Figs. 1 and 2,) and said door will be held in its closed position by reason of the stop 48 and the fact that the outer end of the lever-arm 33 is held in the
40 socket 70, provided for it intermediate the inner portions of the lever-arms 58, said lever-arms being then held in their position by the spring 57. During the opening of the door in either direction the outer end of the arm
45 33 will move against and over the convex portion 60 of one lever-arm 58, said arm 33 first moving from the concavity or socket intermediate the shank ends of the said arms 58 and thence outward along the convex portion
50 60 of the arm 58, with which it may be in engagement. The convex portions 60, provided on the lever-arms 58, are useful in that thereby the door is somewhat resisted during the early part of its opening movement and then facilitated in its further opening movement
55 or after the outer end of the arm 33 has passed beyond the apex of the convexity 60. During the closing of the door the arm 33, connected with the spindle 25, is obliged to ride over the convex portion 60, and said arm 33 becomes
60 thereby somewhat checked or resisted while approaching and moving to the apex of said convex portion. When during the closing of the door the arm 33 passes inward beyond the
65 apex of the convexity 60, its further movement is facilitated by the pressure of the arm 58 against it. The apex of the convexity 60

will be reached by the arm 33 when said arm is about at a right angle to the arm 58. The convex portions 60 of the arms 58 merely ac-
70 centuate the main purposes of said arms, which are to control the action of the springs 44 and 45 and arm 33 and during the opening of the door to resist the arm 33 until the latter reaches a position at about right angles
75 to the arm 58 and then to direct the force of the spring 57 against said arm 33 and facilitate the movement of the latter during the further opening of the door, and it is also the purpose of the arms 58 to resist the closing
80 of the door until the arm 33 reaches a position at about right angles to the arm 58 and then to facilitate the further movement of the arm 33 by directing the force of the spring
85 57 against it. Thus the arms 58 and spring 57 perform important duties, and while their work is rendered more pronounced when the convex portions 60 are provided on the arms
90 58 the invention is not confined to the use of such convex portions. It is to be noted that the arms 58, under the pressure of the spring
95 57, facilitate the opening and resist the closing of the door at the period when the springs 44 and 45 are under their greatest tension, the said spring 57 then also being under its great-
100 est tension, and that said arms 58 and spring 57 resist the opening and aid the closing of the door during the period when the springs 44 and 45 are at their normal or are approaching their normal tension. Thus an amount
105 of exertion which would otherwise be required from the person opening the door is supplied by the spring 57 after the arm 33 passes beyond its right-angular position with respect to the arm 58, and during the early closing
110 movement of the door, when the springs 44 and 45 are strongest, the door is resisted and prevented from attaining undue momentum.

When the door is at its closed position, the spring 57, acting against both arms 58, serves
115 to aid in preventing the vibration of the door or the opening of the door by drafts or the standing of the door ajar.

The plate 49, carrying the stop-arm 48, arms 58, and spring 57, is adjustable on the arc of
120 a circle whose center is the spindle 25, and when the plate 49 is thus adjusted it effects, through the stop-arm 48 and arms 33 35 36, a corresponding turning of the hubs 37 and 38 and spindle 25, so that the entire structure
125 within the casing 30 is kept in true alinement no matter what the adjustment of the plate 49 may be. The adjustment of the plate 49 is effected by loosening the screws 51 and moving the plate 49 a slight distance laterally
130 in one direction or the other, as required, and then retightening the screws 51. The purpose of adjusting the plate 49 or, as results, the adjustment of the operative structure within the casing 30, is to overcome any de-
fects in the hanging of the door and to compel the door, notwithstanding such defects, to normally stand in true closed position within its frame. At times, due to irregularities in

the door or the door-casing or the securing of the bar 27 to the lower edge of the door or the embedding of the casing in the floor below the door or the trueness of the polygonal upper end of the spindle 25, as well as from other causes, the door may not close entirely and with proper satisfaction, and on any such occasion in order to compel the door when closed to firmly stand in a proper position the plate 49 will be adjusted laterally to effect such result, the adjustment of said plate being to, through the spindle 25, hold the door in its proper closed position. The screws 51 are separated from one another a slightly-greater distance than the thickness of a door, and hence after the door is hung the screws 51 may be loosened and the plate 49 moved in its adjustment by the movement of the door (through the spindle 25 and arms 33, 35, 36, and 48) without removing the top plate 128 of the casing 30, whereupon the screws 51 will be retightened, and in this regard it will be evident that there is a great convenience in exposing the tops of the screws 51 through closely-fitting holes in said top plate 128.

I do not desire to confine the invention to the special form of plate 49 and lever-arms 58 shown in Figs. 2 and 10, since said parts may be modified in their form and construction without departing from the scope of the invention, and hence in Fig. 11 I illustrate a modification of this part of the structure, said modification consisting in providing arms 71, rigidly connected with a slide 72, mounted between guides 73, formed in the adjustable plate 74, carrying the intermediate stop 75, the latter corresponding with the stop 48 of Fig. 1. The slide 72 is hollow and receives the coiled spring 175, which has a bearing against the end of the casing 30. The plate 74 is capable of adjustment by means of screws 76 and slots 77. Intermediate the inner ends of the arms 71 is formed a socket 78 to correspond with the socket 70, provided intermediate the inner portions of the lever-arms 58 of Fig. 2. In the employment of the modification shown in Fig. 11 the slide 72 is during the opening of the door pushed outward against the stress of the spring 175, and the arms 71 have no pivotal movement, because they are integral with the slide 72. I prefer the pivoted arms 58 (shown in Fig. 2) to the rigid arms 71, (shown in Fig. 11;) but in many cases the construction shown in Fig. 11 may be employed with entirely satisfactory results.

The stud 24, upon which the upper edge of the door turns, is carried upon one end of the pivoted lever-arm 80, as shown in Figs. 1 and 5, and is vertically movable by means of the screw 81, whose head is exposed through an aperture in the plate 82, which carries the bearings 83 for the lever-arm 80, and also a sleeve 183, within which the stud 24 is held. The plate 82 is set within a recess in the lintel over the door, and said lintel is properly recessed, as shown in Fig. 1, to receive the lever-arm 80, screw 81, and sleeve 183.

The upper edge of the door below the said plate 82 contains a recess in which is placed the socket 26 (for the stud 24) and plates 84 and 85, the plate 84 being fastened by screws to the upper edge of the door and the plate 85 being held to the lower side of the plate 84 and rendered adjustable thereon by means of the pins 86 and heads 87 therefor. The pins 86 pass upward through slots 88, formed in the plate 84, and are held in said slots by means of the heads 87. The plate or arm 85 carries the socket 26 and is adjustable longitudinally on the plate 84 by means of the screw 89, which engages a threaded aperture in the inclined arm 90 of the plate 85 and is freely held within a slot 91, formed in the inclined arm 92 of the plate 84. The screw 89 has at its outer end a head 93 and collar 94, and between this head and collar the slotted arm 92 passes, (as clearly indicated in Figs. 6 and 7.) The turning of the screw 89 in one direction will move the plate 85 and socket 26 in one direction, and the reverse movement of said screw 89 will move the socket 26 and plate 85 in an opposite direction. The object of the adjustment of the plate 85 and socket 26 is to bring said socket into true central alinement with the stud 24, so as to insure the proper easy action of the door. The socket 26 is below an opening 95 in the plate 84, and said opening 95 is elongated, so as to be of greater length than the diameter of the entrance-aperture to the socket 26, whereby the adjustment of the socket 26 is prevented from interfering with the passage of the said stud 24 through the said opening 95. The socket 26 and its carrying arm or plate 85 are in one integral piece, and said socket 26 adjacent to its upper end is formed with the annular shoulder 96, upon which is arranged the circle of balls 97, the latter at their upper outer portions being partly covered by a washer or plate 98, seated within the edges of the socket 26. The balls 97 furnish a bearing for the sides of the stud 24, and said balls are prevented from losing their position, since they are of an aggregate diameter equaling the circumference of the space within the cap above the shoulder 96 and are held at their upper portions by means of the washer or plate 98. The inclined arms 90 92 of the plates 85 84, together with the screw 89, afford very convenient means for adjusting the socket 26 without removing the plate 84 from the door. The slot 91 is provided in the arm 92 for the purpose of conveniently receiving the screw 89 and also to permit of the limited vertical sliding movement or play which said screw will have when turned to adjust the socket 26.

The springs 44 and 45 are two independent wire coils, one being within the other, as illustrated in Fig. 1, and the wire of the inner coil 45 is preferably of smaller diameter than the wire of the outer coil 44, and the purpose of thus proportioning the diameter of the wires of the springs 44 and 45 is to effect an equal division in the force said springs shall

respectively exert when in use. The wire of the coil 45 is sufficiently less in diameter than the wire of the coil 44 to prevent the coil 45 from exceeding the strength of the coil 44. If the wire of the coil 45 were of the same diameter as the wire of the coil 44, the coil 45 would, owing to being coiled on a smaller circle than the spring 44, exceed the strength of said spring, and under such condition the two springs 44 and 45 would not always act in unison or with the same degree of force, but would be under different degrees of tension and not be capable of uniformly performing the same degrees of duty. When, however, the diameter of the wire of the inner coil 45 is less than the diameter of the wire of the outer coil 44 to a degree which will prevent said coil 35 from, due to its smaller circumference, having an excess of force over the coil 44, the two springs or coils 44 and 45, although being one within the other, will have a substantially uniform tension, so that the force of one will equal that of the other, and they will be capable of uniformly exerting their tension during the movement of the door. The relative diameters of the wire of the coils 44 and 45, above described, also renders it entirely possible and convenient to adjust the tension of both of said coils at the one time by the turning of the ring 39, whereas in the absence of the wire of the coils 44 and 45, having the relative diameters above specified, the turning of the ring 39 to wind up both of the springs would result in the inner coil 45 having a greater proportionate degree of tension imparted to it than to the outer coil 44. Thus in accordance with a portion of my invention the springs 44 and 45 are placed one within the other, and the wire of the inner coil 45 has a diameter sufficiently less than the diameter of the wire of the outer coil 44 to secure a uniform force in the two springs—that is to say, to secure the same or substantially the same force in the outer coil 44 as that possessed by the inner coil 45. It is also of importance that two springs 44 and 45, one within the other, be employed, since thereby I am enabled to get the requisite degree of spring-power within a shallow space, whereas when only one coiled spring is made use of it is necessarily of such length that it prohibits the use of the hinge in many cases, and especially in all instances in which the floor structures are of a character to prevent the cutting of deep recesses to receive the spring-hinge.

The operation of the devices embodying my invention will probably be sufficiently understood from the detailed description hereinbefore presented. When the door is opened in one direction, it will turn the spindle 25 and the arm 33 will move against the arm 35, connected with the lower hub 37, and also against one of the arms 58, with the result that the springs 44 and 45 will be wound up by the movement of the hub 37, and thereby given a tension which will be exerted at the proper

time to close the door. The movement of the arm 33 against the arm 58 will be to resist the door during the early part of its opening movement and then under the force of the spring 57 to aid the door in its further opening movement. When the door is released to close, the springs 44 and 45 will move the arm 33 back to its normal or central position, said springs at such time acting through the arm 35 in contact with the said arm 33. During the early part of the closing movement of the door the contact of the arm 58 with the end of the arm 33 will serve to resist the closing action of the springs 44 and 45; but later and during the final closing movement of the door the springs 44 and 45 will be assisted in their action by the pressure of the arm 58 against the arm 33. When the door is opened in the opposite direction, or toward the arm 36, the operation above explained will be repeated, except that the arm 33 will contact with the arm 36 and also with the other arm 58, and the springs 44 and 45 will be wound from their upper ends instead of, as above, from their lower ends. The manner of adjusting the tension of the springs 44 and 45 has been hereinbefore explained, and it has also been hereinbefore explained how the mechanism within the casing 30 may be conveniently adjusted to pull the door into proper alinement within its casing or frame.

The invention is not limited to all of the details of form and construction hereinbefore described, since many of the parts may be modified as to form and construction without departing from the scope of the invention. In some instances it will not be necessary to use both of the arms 58 (shown in Fig. 2) or both of the arms 71, (shown in Fig. 11,) since if the hinge is to be applied to a single-acting door always opening in one direction the spring-actuated arm 33 will move against only one of said arms. I prefer the employment of the arms 58 or the arms 71; but if it is simply desired to produce a spring-hinge without affording any means for controlling the action of the spring both of the arms 58 may be omitted. The arms 58 or 71 may also be varied in outline in accordance with conditions—as, for instance, if the door is in an open hallway and subjected to strong drafts the arm 58 adjacent to the street side of the door should be of a form not to appreciably resist the opening of the door, since under such condition the door must be opened against the force of the draft and it is unnecessary to add further material resistance to the opening of the door; but even under such circumstances the preliminary movement of the spindle-arm 33 should be somewhat resisted, so as to insure the firm holding of the door in its closed position.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a spring-hinge, the rotary spindle 25 to be engaged and operated by the door, the lower hub 37 loosely mounted on the lower

part of said spindle and having the arm 35 which extends upwardly from the lower edge of said hub, the upper hub encompassing said spindle and having the arm 36 which extends downwardly from the upper edge of said upper hub, and the stop 48 intermediate said arms 35, 36, and serving to receive the contact of the vertical facing side edges of said arms, combined with a coiled spring encompassing and connected at its ends to said hubs and confined intermediate said arms 35, 36, and said hubs, and the spindle-arm 33 extending over the upper end of the said upper hub and having the portion 34 extending intermediate said arms 35, 36, and above said stop 48; substantially as set forth.

2. In a spring-hinge, the rotatory spindle adapted to be operated by the door carrying the arm, and a door-closing spring encompassing said spindle for coöperation with said arm, and means operatively engaging said spring with said arm combined with a yielding arm to be engaged by said lever-arm during the opening and closing of the door, the said yielding arm resisting the opening of the door during the early portion of the movement of the latter and then aiding the further opening of the door; substantially as set forth.

3. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring encompassing said spindle for coöperation with said arm, and means operatively engaging said spring with said arm combined with a pair of yielding arms extending laterally from a point in line with said spindle-arm when the latter is in its normal at-rest position, and being in the path of said spindle-arm, the said spindle-arm being compelled to move against one of said yielding arms when the door is being opened in one direction, and against the other of said yielding arms when the door is being opened in the opposite direction; substantially as set forth.

4. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring encompassing said spindle for coöperation with said arm, and means operatively engaging said spring with said arm combined with the yielding arm for engagement with said spindle-arm during the opening and closing of the door, the said yielding arm being formed with the convex surface for contact with said spindle-arm; substantially as set forth.

5. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring encompassing said spindle for coöperation with said arm, and means operatively engaging said spring with said arm combined with the pivotally-mounted spring-pressed lever-arm to be engaged by said spindle-arm during the opening and closing of the door; substantially as set forth.

6. In a spring-hinge, the rotatory spindle

adapted to be operated by the door, the arm carried by said spindle, the door-closing spring encompassing said spindle for coöperation with said arm, and means operatively engaging said spring with said arm combined with the pair of spring-pressed arms in the path of said spindle-arm and adapted for coöperation therewith during the opening and closing of the door; substantially as set forth.

7. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring encompassing said spindle for coöperation with said arm, and means operatively engaging said spring with said arm combined with the pair of spring-pressed arms in the path of said spindle-arm for coöperation with said spindle-arm, said pair of arms having, intermediate their inner or shank portions, the socket to receive the end of the said spindle-arm when the latter is in its normal at-rest position; substantially as set forth.

8. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring encompassing said spindle for coöperation with said spindle-arm, and means operatively engaging said spring with said arm combined with the pair of yielding arms in the path of said spindle-arm, and means for adjusting said yielding arms, spindle and spindle-arm to effect the proper closed position of the door; substantially as set forth.

9. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring for coöperation with said arm, means operatively engaging said spring with said arm and the pair of yielding arms in the path of and for coöperation with said spindle-arm for controlling said spring, combined with the plate carrying said yielding arms, means for adjusting said plate, yielding arms, spindle and spindle-arm into proper alinement to effect the proper closed position of the door; substantially as set forth.

10. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the door-closing spring for coöperation with said arm, means operatively engaging said spring with said arm and the pair of yielding or spring-pressed arms in the path of and for coöperation with said spindle-arm, the plate carrying said yielding arms, and the screws engaging said plate, said plate being adjustable with respect to the door, and said screws having their heads exposed through the top plate of the casing of the spring-hinge; substantially as set forth.

11. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm carried by said spindle, the stop-arms at opposite sides of said spindle-arm, and the spring connected with said stop-arms, combined with the stop to engage one of said stop-arms while the other is in action, and the pair of yielding or spring-pressed arms

in the path of said spindle-arm for controlling the said spring during the opening and closing of the door; substantially as set forth.

12. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm connected with said spindle, the stop-arms at opposite sides of said arm, and the door-closing spring connected at its opposite ends with said stop-arms, combined with the plate carrying the stop-arm intermediate the above-mentioned stop-arms, the pair of yielding or spring-pressed arms in the path of said spindle-arm and carried by said plate, and means for adjusting said plate so as to give to said plate, said arms and said spindle the proper adjustment with respect to the normal closed position of the door; substantially as set forth.

13. In a spring-hinge, the rotatory spindle adapted to be operated by the door, the arm connected with said spindle, the stop-arms at the opposite sides of said spindle-arm, and the door-closing spring connected to said stop-arms, combined with the plate having the stop-arm intermediate the above-mentioned stop-arms, the studs 55 and 56 carried by said plate, the arms 58 mounted upon said stud 55 and being in the path of said lever-arm, and the spring 57 upon said stud 56 and having its ends in engagement with the said arms 58; substantially as set forth.

14. The door, and a pivot for the lower end thereof, combined with the stud or pivot for the upper end of the door, the plate 84, and the socket 26 supported by said plate and adapted to receive the said stud, said socket 26 having the annular shoulder 96, the series of balls 97 thereon, and the plate or washer 98 for said balls; substantially as set forth.

15. The door, the pivot for the lower end of the door, and the stud or pivot 24 for the upper end of the door, combined with the plate 84 having the arm 92, the socket 26 supported by said plate 84 to receive said stud or pivot 24, the plate or arm 85 connected with said socket and having the arm 90, and the

screw 89 engaging the said arms 92 and 90 for adjusting the position of the said socket 24 without removing the plate 84; substantially as set forth.

16. The door, the pivot receiving the lower end of the door, and the stud or pivot 24 for the upper end of the door, combined with the plate 84 having the opening 95 and slots 88, the socket 26 supported by said plate 84 in line with said opening 95, the arm or plate 85 connected with said socket and having the pins 86 within said slots 88, and means for adjusting said socket and plate or arm 85 and maintaining said socket in its adjusted position; substantially as set forth.

17. The door, and the pivot for the lower end thereof, combined with the stud or pivot for the upper end of the door, the plate 84, and the socket 26 supported by said plate and adapted to receive the said stud, said socket 26 having adjacent to its entrance the annular shoulder 96 and the series of balls 97; substantially as set forth.

18. In a spring-hinge for doors, the rotatory spindle adapted to be operated by the door, the arm connected with said spindle, the stop-arms at the opposite sides of the said spindle-arm, and the door-closing spring connected with said stop-arms, combined with the adjustable plate 49 having the stop 48 intermediate the said stop-arms, and the vertical screws 51 for binding against and securing said plate 49 in its adjusted positions, said screws being separated from each other a distance somewhat greater than the thickness of the door; substantially as and for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 5th day of July, A. D. 1900.

JOSEPH BARDSLEY.

Witnesses:

CHAS. C. GILL,

GUNDER GUNDERSON.