

No. 695,494.

Patented Mar. 18, 1902.

A. J. ROSENTERER.

SPRING HINGE.

(Application filed July 17, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

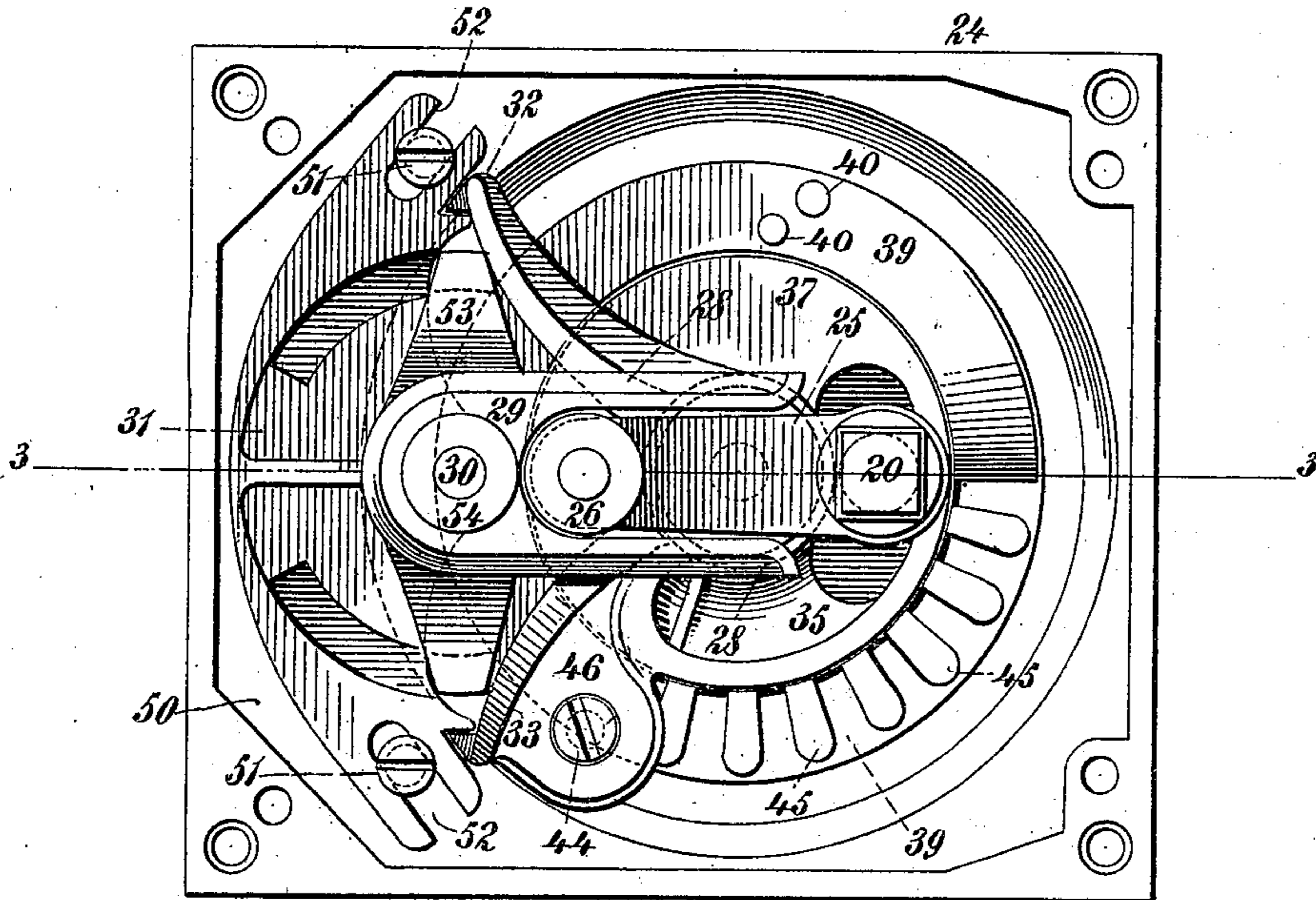
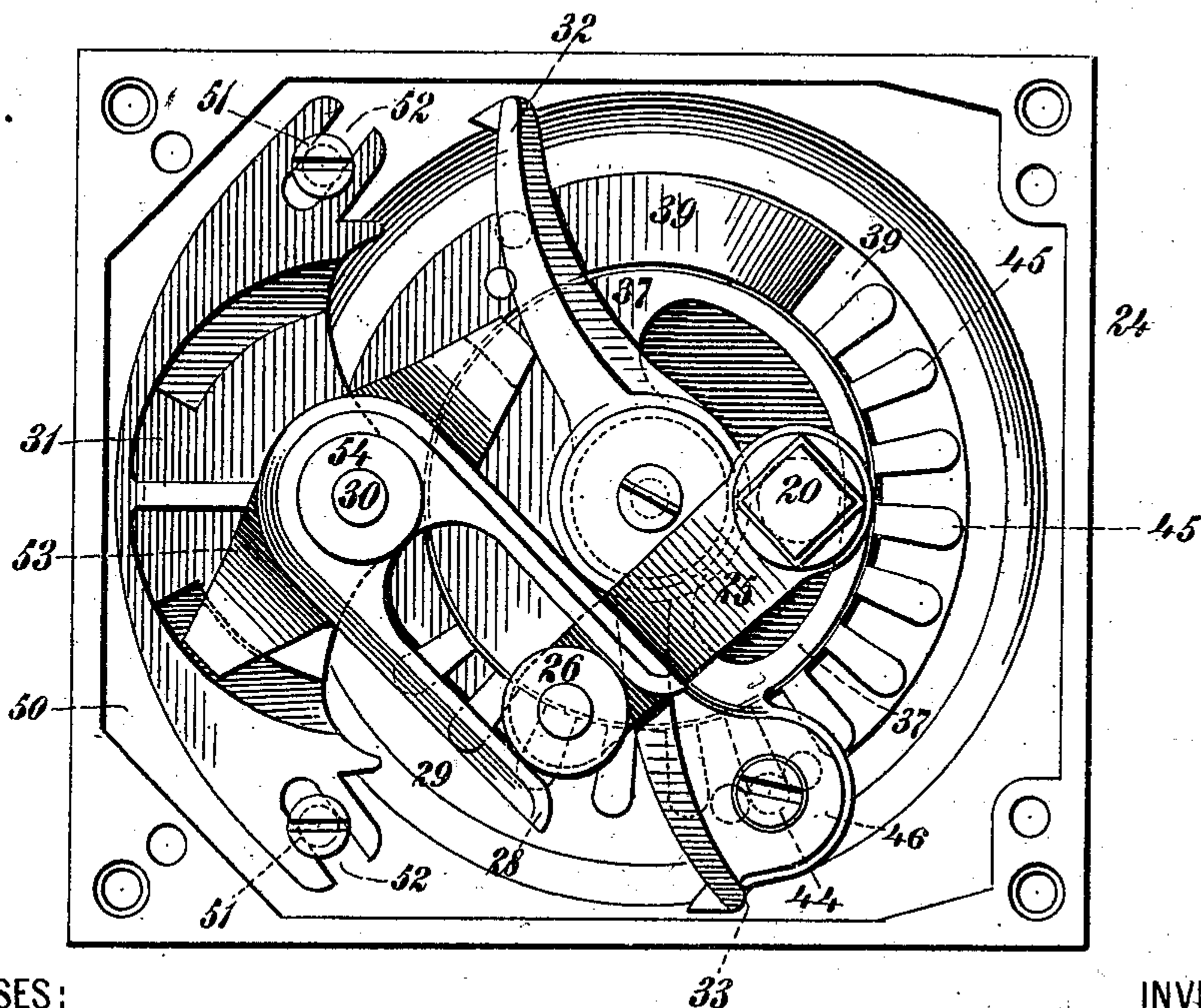


Fig. 2.



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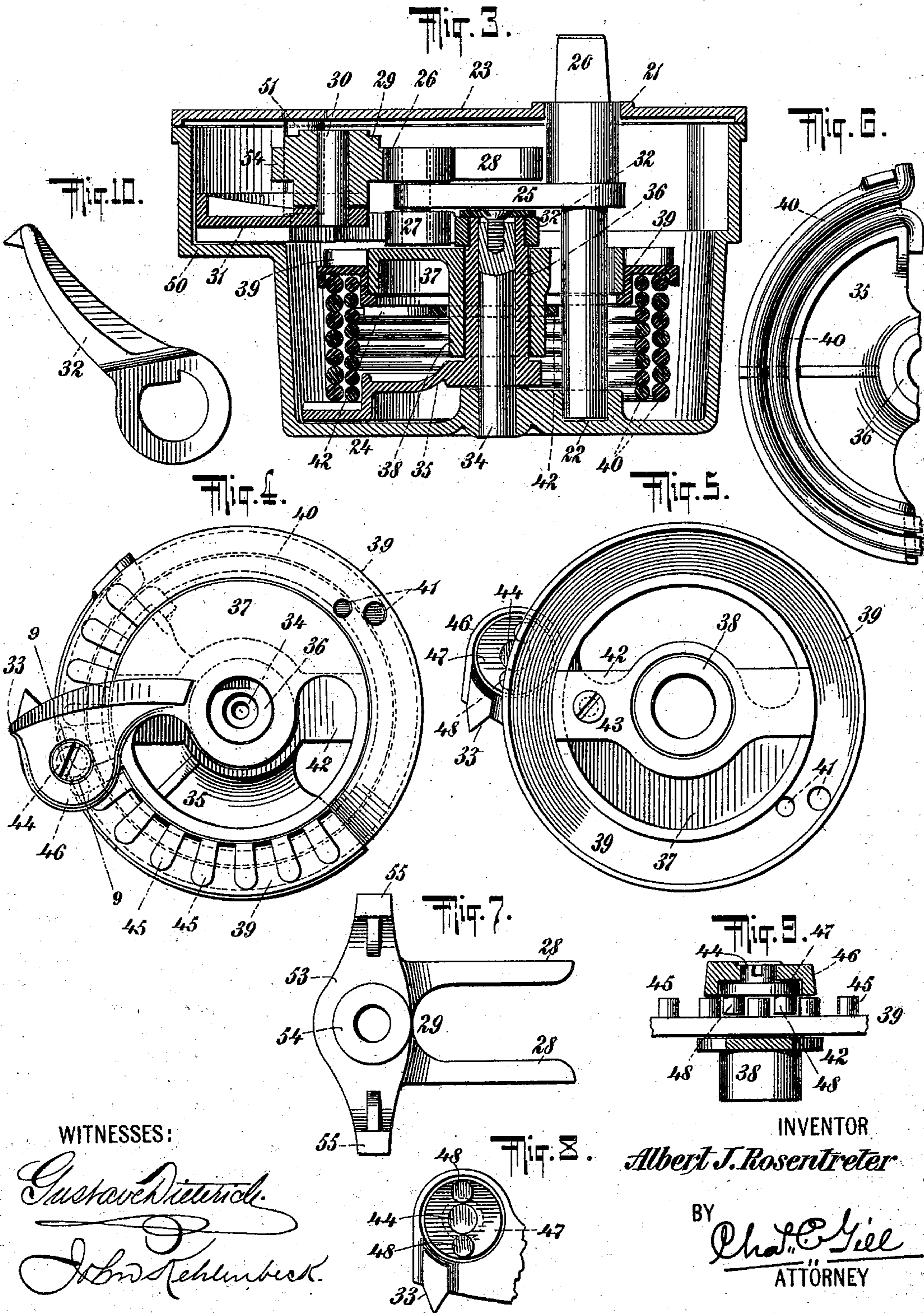
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UNITED STATES PATENT OFFICE.

ALBERT J. ROSENTER, OF BOONTON, NEW JERSEY, ASSIGNOR TO
JOSEPH BARDSLEY, OF MONTCLAIR, NEW JERSEY.

SPRING-HINGE.

SPECIFICATION forming part of Letters Patent No. 695,494, dated March 18, 1902.

Application filed July 17, 1901. Serial No. 68,590. (No model.)

To all whom it may concern:

Be it known that I, ALBERT J. ROSENTER, a citizen of the United States, and a resident of Boonton, in the county of Morris 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 the present invention a novel construction of spring-hinge is provided for the lower 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 top view of a spring-hinge constructed in accordance with and embodying the invention, the cap for the inclosing casing being omitted and the parts of the hinge being shown in the normal position they assume when the door is stationary and closed. Fig. 2 is a like view of same, but illustrating the position the parts will take when the door is in a partly open position. Fig. 3 is a central vertical longitudinal section of same on the dotted line 3 3 of Fig. 1. Fig. 4 is a detached top view of the upper interior hub to which the springs are connected and is presented to more clearly illustrate the means for adjusting the tension of the springs. Fig. 5 is a bottom view of same. Fig. 6 is a top view, partly broken away, of the lower hub to which the actuating-springs are connected. Fig. 7 is a detached bottom view of a lever to be set in motion by the door and the form of the top of which is illustrated in Figs. 1 and 2. Fig. 8 is a detached bottom view of one of the lever-arms and is presented to illustrate more particularly the lower end of the rotary device for adjusting the tension of the springs. Fig. 9 is a sectional view of the de-

vice for adjusting the tension of the springs, the section being taken on the dotted line 9 9 of Fig. 4; and Fig. 10 is a detached view of one of the lever-arms.

In the drawings, 20 designates a customary form of actuating-spindle to receive the lower end of the door in the usual manner. The spindle 20 when in use has an axial motion imparted to it, and said spindle is journaled in the bearings 21 and 22, the bearing 21 being in the form of a sleeve which is integral with the top plate or cap 23 for the casing 24 and the bearing 22 being in the nature of a socket formed in the base of the said casing 24 and in line with the said bearing 21, as shown in Fig. 3.

The spindle 20 is simply a plain shaft, and the only element of the structure positively united with the shaft is the actuating-arm 25, which projects horizontally from the upper portion of the spindle 20 and is provided at the upper and lower sides of its outer end with the rollers numbered 26 27, respectively.

The roller 26 is disposed between the arms 28 of the bifurcated frame 29, the latter being mounted upon the vertical pivot 30, carried by the plate 31, and the roller 27 is disposed between the lever-arms 32 33, the rollers 26 27 constituting parts of the arm 25 and the roller 26 being intended to turn the bifurcated frame 29 to one side or the other during the operation of the door, as denoted in Fig. 2; while the roller 27 during the operation of the door is intended to act upon one or the other of the lever-arms 32 33.

The construction and operation of the bifurcated frame 29 and lever-arms 32 33 will be described in full hereinafter.

In a substantially central position within the casing 24 is rigidly mounted a vertical stud or shaft 34, upon which is mounted the lower hub 35, which has a vertical sleeve 36 to pass upon said shaft 34, as shown in Fig. 3, said sleeve 36 affording a bearing for the hub 35 and being adapted to turn axially on said shaft 34. The upper hub 37 is formed with a depending sleeve 38, which passes downward upon the sleeve 36 of the hub 35, and the sleeve 38, together with the sleeve 36, affords a bearing which admits of the proper axial rotation of the hub 37.

The hub 37 has connected with it an encircling ring 39, which is at all times in firm connection with the hub 37, but may be rotated around the said hub to a limited extent for the purpose of effecting the adjustment of the door-closing springs 40, which are coiled springs set one within the other and having their upper ends projected upward through openings 41, formed in said ring 39. The ring 39 is supported at its inner edges upon the cross-bar 42, connected with the hub 37 by means of a screw 43, Figs. 4 and 5, and above the ring 39, at one side of the hub 37, is disposed the rigid lever-arm 33, which is integral with the upper surface of the hub 37 and which in addition to performing other functions, as hereinafter explained, prevents any upward movement of the ring 39 from its position around the hub 37. The ring 39 is first slipped upon the hub 37 from the lower side of the latter, and then the cross-bar 42 is passed upward from the lower end of the sleeve 38 of the hub 37 until its ends contact with the inner edges of said ring 39, and thereupon the said cross-bar 42 is fastened to the hub 37 by means of the screw 43.

The connection between the ring 39 and upper hub 37, which substantially unites said ring and hub so that both are compelled to rotate together during the opening and closing of the door, comprises the rotary chuck 44 and series of teeth 45, said teeth being formed upon the upper surface of said ring 39 and said chuck 44 being carried in an extension 46, formed on the lever-arm 33. The rotary chuck 44 has upon its upper end a grooved head adapted to receive the edge of a screw-driver, as shown in Fig. 4, and upon its lower end is formed a head 47, (shown in Figs. 8 and 9,) containing studs 48. The studs 48 are adapted to enter between the teeth 45, formed on the ring 39, and bind the hub 37 and ring 39 together. The rotary chuck 44 and teeth 45 are provided in order to adjust the springs 40, whose upper ends are, as above described, connected with said ring, while their lower ends are, as shown in Fig. 6, hooked upon the lower hub 35. By rotating the rotary chuck 44 the studs 48 thereof (the lever-arm 33 then being stationary) will by engaging the teeth 45 effect the rotation of the ring 39 upon the hub 37, said studs 48 alternately passing around the outer ends of and engaging said teeth 45 and compelling the ring 39 to turn around the hub 37. When the chuck 44 has been turned to a sufficient extent either in one direction or the other to secure the proper tension in the springs 40, said chuck will be arrested with its studs 48 straddling one of the teeth 45, as indicated by the dotted lines in Fig. 4, and when in this position the chuck 44 will remain at rest, and the tension of the springs 40 binding one of the teeth 45 against one of the studs 48 will thereby effect the locking of the hub 37 and ring 39 together, so that said hub and said

ring will during the opening and closing of the door rotate together.

During the opening of the door in one direction the lower roller 27, connected with the actuating-arm 25, operates against the lever-arm 33 to rotate the hub 37 and ring 39 against the stress of the springs 40, and during the opening of the door in the opposite direction the said roller 27 acts against the lever-arm 32 to rotate the lower hub 35 against the stress of the springs 40, said lever-arm 33, as above described, being integral with the hub 37, while the lever-arm 32 (shown in Fig. 10) is keyed upon the upper end of the sleeve 36, connected with the lower hub 35. The normal at-rest position of the lever-arms 32 and 33 is illustrated in Fig. 1, in which it will be observed that the said lever-arms have their pointed outer ends in engagement with the plate 31, said plate constituting stops for checking the lever-arms 32 33 in their normal position against the stress of the springs 40, which exert a constant tension against the hubs 35 37 to drive said lever-arms 32 33 to their normal position and against the plate 31.

The plate 31 is segmental in outline and is held upon a platform 50, formed in the casing 24, by means of screws 51, which pass downward through slots 52, formed at the ends of said plate 31, which permit of the adjustment of said plate in a lateral direction, whereby to compel the adjustment of the actuating lever-arm 25 and the parts affected thereby into proper alinement for compelling the door when warped or somewhat unevenly hung to reach a proper closed position. The lateral adjustment of the plate 31 effects the movement of the lever-arms 32 33 with it and carries the bifurcated frame 29, since the pin 30, upon which said frame is mounted, is secured to the said plate 31.

The bifurcated frame 29 is shown in top elevation in Figs. 1 and 2 and in bottom elevation in Fig. 7, and said frame comprises arms 28 28, straddling the upper roller 26, the transverse bar 53, the hub 54, which passes upon the vertical pin 30, and the downwardly-depending arms or lugs 55 55, disposed at the ends of the transverse bar 53 and adapted to engage the lever-arms 32 33, one of said arms 55 being intended for engagement with the lever-arm 32 and the other arm 55 being intended for engagement with the lever-arm 33.

When the bifurcated frame 29 is in its normal at-rest position, with the door closed, the depending arms or lugs 55 55 are against the levers 32 33 and the ends of the said levers 32 33 are against the stops furnished by the plate 31, as shown in Fig. 1, and at such time the actuating-arm 25 is in line with the bifurcated frame 29, with its upper roller 26 between the arms 28 of said frame and its lower roller 27 between the inner ends of the lever-arms 32 33, the parts being held in this position, with the door closed, by the force of the springs 40.

When the door is opened in one direction, the

lower roller 27, carried by the arm 25, will act against one of the lever-arms 32 33 and the upper roller 26 will act against the bifurcated frame 29, with the result of turning the latter to a limited extent and causing one of its depending arms 55 to engage that one of the lever-arms 32 33 which is not engaged by the roller 27, as indicated in Fig. 2. When the door is opened in one direction, the lower roller 27, carried by the lever-arm 25, will move against the lever-arm 32 and effect, through the lower hub 35, the winding up of the springs 40, and when the door is opened in the opposite direction the lower roller 27 will move against the lever-arm 33 and effect, through the movement of the hub 37, the winding up of the springs 40 from the upper end of the latter. When the door is opened and then released, the lever-arm (32 or 33) then in engagement with the lower roller 27 will be acted upon by the springs 40 to force the door into a closed position.

When the door is in its closed position, the roller 27 of the actuating-arm 25 is intermediate the shank ends of said levers, and during the opening of the door the said roller 27 will ride outward in a direction toward the outer ends of said levers, the effect of this arrangement being that when the door is in its closed position it will be very securely held by the springs 40, whose apparent force against the door will lessen as the door is opened, owing to the fact that the roller 27 rides outward toward the outer end of said levers 32 33; this being permitted by the fact that the actuating-spindle 20 is eccentric to the hubs 35 37, carrying said levers.

Apart, therefore, from the employment of the bifurcated frame 29 the devices below said frame constitute an operative structure; but by preference the bifurcated frame 29 is employed, and these features may be understood upon reference to Fig. 2, in which it will be seen that upon the opening of the door the roller 27 has moved against the lever-arm 33 and the upper roller 26 has turned the frame 29 and caused one of its arms 55 to move against the lever-arm 32, whereby said lever-arm 32 simultaneously with the operation of the lever-arm 33 has been caused to turn the lower hub 35 and effect the winding of the spring from the lower end of the latter, the movement of the lever 33 having turned the hub 37 in an opposite direction and wound the springs 40 from the upper end of the hub. Thus upon the opening of the door the springs 40 will be wound from both their ends until such time as the roller 26, carried by the lever-arm 25, has turned the frame 29 to the limit of its movement indicated in Fig. 2, after which the roller 26 may pass directly from between the arms 28 of the frame 29, leaving the latter standing in the position in which it is shown in Fig. 2, with one of its arms 55 acting as a stop for the lever-arm 32, holding the latter away from the plate 31. During the closing motion of the

door and looking at Fig. 2 the roller 26 will return to its position between the arms 28 of the frame 29 and engaging said arms will impart a reverse rotation to said frame 29 and allow the lever-arm 32 to act against its contacting arm 55 to aid in restoring the frame 29 to its normal position. When the door is opened in a reverse direction, the lower roller 27 of the actuating-arm 25 will engage the lever-arm 32 and the upper roller 26 will turn the bifurcated frame 29 in a direction toward said lever-arm 32, and thereby cause one of the arms 55 of said frame to engage and move the lever-arm 33 for the purpose of winding up the springs 40 from the upper end of the latter, while the motion of the lever-arm 32 results in the winding of said springs from their lower ends.

The presence of the frame 29, operating as described, results in the door being firmly held in its closed position and remaining unaffected by drafts and the like, since, as will be observed, the door during the first part of its opening movement is compelled to wind up both ends of the springs 40, said springs thus exerting a maximum force at the closing point of the door to retain the door in its closed position. After the door has been opened to a given extent the frame 29 will reach the position represented in Fig. 2, and then during the continued motion of the door the frame 29 remains at rest and the springs 40 are only wound from one end of the latter. Thus during the continued opening of the door a less amount of force is required than at the starting of the opening movement of the door. The frame 29 coöperates with the springs 40 in preventing any vibration of the door when at its closed position or the opening of the door by drafts or the standing of the door ajar.

The plate 31 is adjustable laterally on the arc of a circle whose center is the actuating-spindle 20, and when the plate 31 is adjusted laterally it effects, through the lever-arms 32 33, the corresponding turning of the hubs 35 and 37 and spindle 20, so that the entire structure within the casing 24 is kept in true alinement no matter what the adjustment of the plate 31 may be. The adjustment of the plate 31 is effected by loosening the screws 51 and moving the plate 31 a slight distance laterally in one direction or the other, as required, and then retightening the screws 51. The purpose of adjusting the plate 31 or, as results, the adjustment of the operative structure within the casing 24 is to overcome any defects in the hanging of the door and to compel the door, notwithstanding such defects, to normally stand in a true closed position within its frame. At times, due to the irregularities in the door or the door-casing or the embedding of the casing 24 in the floor below the door or the trueness of the polygonal upper end of the spindle 20, 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 31 will be adjusted laterally to effect such result, the adjustment of the
 5 said plate 31 being to compel the spindle 20 to hold the door in its proper closed position.

The springs 40 are two separate independent wire coils, the wire of the inner coil being of smaller diameter than the wire of the
 10 outer coil, and the upper ends of said coils enter the apertures 41 in the ring 39, while the lower ends of said coils are bent at an angle, as shown in Fig. 9, to hook upon convenient shoulders provided on the lower hub
 15 35. The present invention is not, however, limited to the employment of both of the springs 40; but it is recommended that both of said springs be used, since better results may be attained thereby.

20 It will be understood from the foregoing description that the present invention is not limited to the employment in every instance of the bifurcated frame 29; but it is recommended that said frame be made use of, since
 25 by means of its employment efficiency in the hinge is enhanced.

The lever-arms 32 33 are by reason of their connection with the hubs 35 37 pivotally mounted, and said lever-arms have by preference
 30 convexly-curved operating-surfaces to coact with the roller 27, so that said lever-arms may during the starting of the opening of the door resist the outward passage of said roller 27 and during the further opening of
 35 the door (or after the roller 27 has passed the apex of said convex surfaces) retard as little as practicable the movement of said roller, the object being to insure the firm holding of the door in its closed position and
 40 relieve a part of the resistance after the door has been partly opened and is being pressed to a further open position.

The adjustment of the plate 31 may be effected without removing the cap-plate 23
 45 from the casing 24, since the heads of the screws 51 are exposed through said plate. The screws 51 are separated from each other a distance somewhat greater than the thickness of a door, and hence after the door is hung
 50 the screws 51 may be loosened, the door moved to its proper closed position, and the screws 51 then retightened, thus through the door and the parts in operative connection with the spindle 20 moving the stop-plate 31 to
 55 the desired position, where it is held by the retightening of the screws 51.

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

1. In a spring-hinge, the actuating-spindle
 60 to receive the door, the vertical shaft 34 at one side of said spindle, the hub 35 having a sleeve 36 mounted on said shaft, the hub 37 having the sleeve 38 mounted upon the said sleeve 36, and the coiled spring connected at its
 65 ends with said hubs, combined with the lever-arms respectively connected with said hubs for turning the same and winding said spring

during the opening of the door, stops for arresting said lever-arms at their initial position, and the actuating-arm connected with
 70 said spindle and adapted to engage either of said lever-arms for turning the same and winding the spring during the opening of the door; substantially as set forth.

2. In a spring-hinge, the actuating-spindle
 75 to receive the door, the upper and lower rotary hubs, and the coiled spring connected at its ends with said hubs, said upper hub comprising as a member thereof the rotary ring 39 having the series of teeth 45, combined
 80 with the rotary chuck 44 connected with said upper hub and having on its lower end the studs 48 to engage said teeth and effect the rotation of said ring for adjusting the tension of the said spring, the lever-arms respectively
 85 connected with said hubs for turning the same and winding the spring during the opening of the door, stops for arresting said lever-arms at their initial position, and the actuating-arm connected with said spindle and
 90 adapted to engage either of said lever-arms for turning the same and winding the spring during the opening of the door; substantially as set forth.

3. In a spring-hinge, the actuating-spindle
 95 to receive the door, combined with the coiled door-closing spring, the pivotally-mounted lever-arms respectively connected with the ends of said spring for winding said spring during the opening of the door, stops for arresting
 100 said lever-arms at their initial position, the actuating-arm connected with said spindle and adapted at its outer end to engage either of said lever-arms for turning the same and winding the spring during the opening of the
 105 door, and means operable from said spindle for, during the opening of the door, acting against the other of said lever-arms while said actuating-arm is moving its lever-arm and then arresting said other lever-arm, whereby
 110 during the starting portion of the opening of the door, said spring will be wound from both its ends and then, during the continued opening of the door, said other lever-arm having been arrested, said spring will be wound from
 115 one of its ends only; substantially as set forth.

4. In a spring-hinge, the actuating-spindle
 120 to receive the door, combined with the coiled door-closing spring, the pivotally-mounted lever-arms respectively connected with the ends of said spring for winding said spring during the opening of the door, stops for arresting
 125 said lever-arms at their initial position, the actuating-arm connected with said spindle and adapted at its outer end to engage either of said lever-arms for turning the same and winding the spring during the opening of the door, and the pivoted bifurcated frame 29 in engagement with said actuating-arm and having
 130 arms 55, for engagement with said lever-arms, one of said arms 55 being for coöperation with one of said lever-arms, and the other of said arms 55 being for coöperation with the other of said lever-arms, and said

frame 29 being so disposed with respect to said lever-arms that while said actuating-arm is moving one of said lever-arms, said frame 29 through one of its arms 55 will actuate the other of said lever-arms; substantially as set forth.

5. In a spring-hinge, the actuating-spindle to receive the door, combined with the coiled door-closing spring, the pivotally-mounted lever-arms respectively connected with the ends of said spring for winding said spring during the opening of the door, the plate 31 affording stops for arresting said lever-arms at their initial position, means for adjusting the position of said plate 31 so as to regulate the initial position of said lever-arms in accordance with the condition of the door, the actuating-arm connected with said spindle and having the rollers 26, 27, and adapted, through said roller 27, to engage either of said lever-arms for turning the same and winding the spring during the opening of the door, and the pivotally-mounted frame 29 carried by said plate 31 and in engagement with said roller 26 for actuating the other of said lever-arms to wind its end of the spring while said actuating-arm is moving its lever-arm, whereby during the starting portion of the opening of the door, said spring will be wound from both its ends; substantially as set forth.

6. In a spring-hinge, the inclosing casing having a cap-plate, and the actuating-spindle to receive the door, combined with a door-closing spring, the pivotally-mounted lever-arms respectively, connected with the ends of said spring for winding said spring during the opening of the door, stops for arresting said lever-arms at their initial position, the vertical screws 51 separated from one another a distance somewhat greater than the thickness of a door for binding said stops and having their heads exposed through the said cap-plate to admit of their operation without removing said cap-plate for adjusting the parts of the hinge from the door, and the actuat-

ing-arm connected with said spindle and adapted at its outer end to engage either of said lever-arms for turning the same and winding the spring during the opening of the door, said spindle being mounted eccentrically to said lever-arms; substantially as set forth.

7. In a spring-hinge, the actuating-spindle to receive the door, combined with a door-closing spring, the pivotally-mounted lever-arms respectively connected with the ends of said spring for winding said spring during the opening of the door, the adjustable plate 31 affording stops for arresting said lever-arms at their initial position, the vertical screws 51 separated from one another a distance somewhat greater than the thickness of a door for binding said plate and when loosened to admit of the adjustment of the same from the door, and the actuating-arm connected with said spindle and adapted at its outer end to engage either of said lever-arms for turning the same and winding the spring during the opening of the door, said spindle being mounted eccentrically to said lever-arms; substantially as set forth.

8. A door-closing spring, combined with means for the adjustment of said spring, said means comprising a plate 39 to which one end of the spring is connected and which is adapted to move in the direction the spring is wound during its adjustment, the teeth on said plate, and the axially-rotatable chuck 44 having the studs 48 to engage and move around the ends of said teeth for moving said plate and adjusting said spring; substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 16th day of July, A. D. 1901.

ALBERT J. ROSENTER.

Witnesses:

CHAS. C. GILL,
GUNDER GUNDERSON.