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PATENTED MAY 17, 1904.

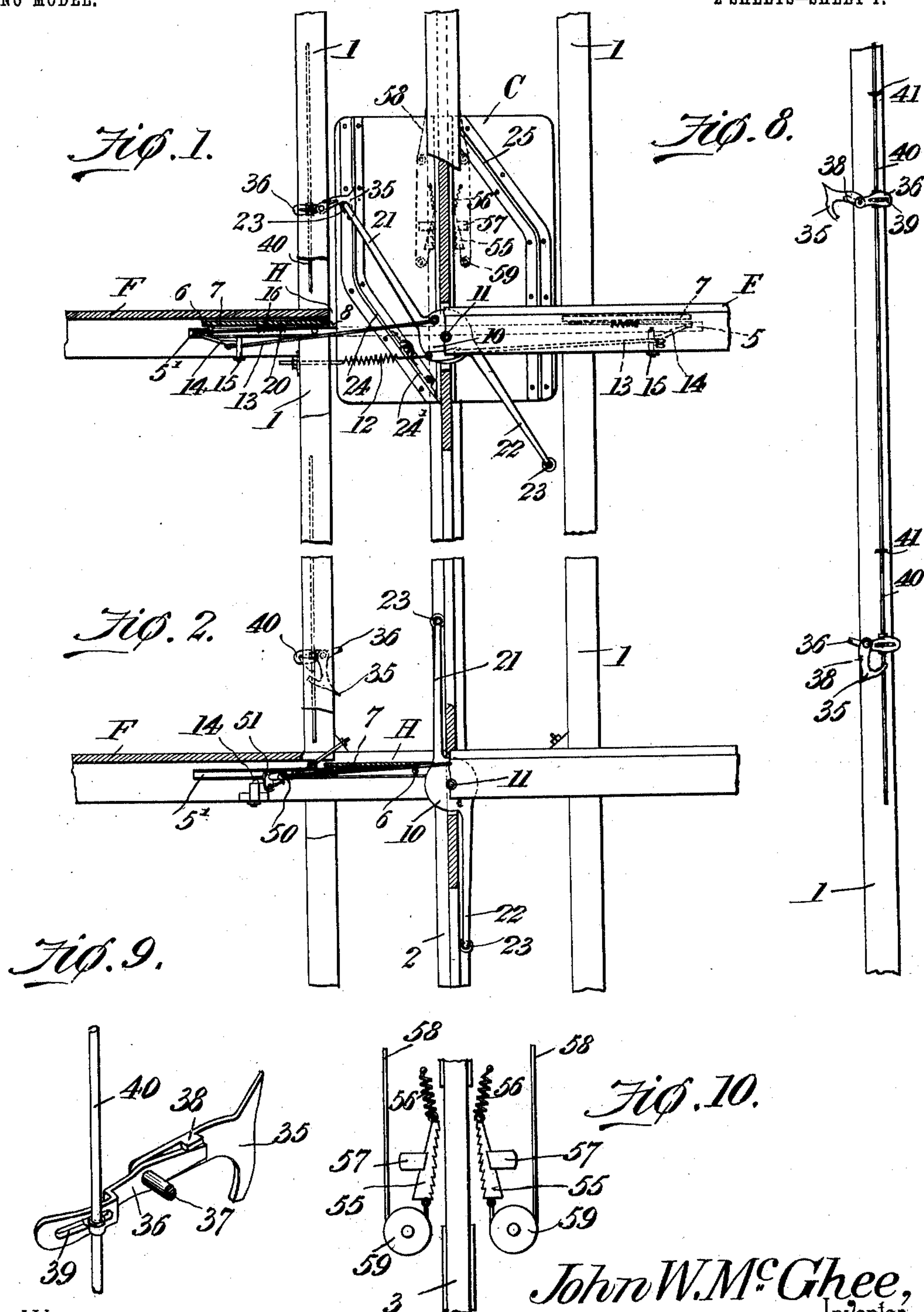
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AUTOMATIC CLOSURE FOR ELEVATOR HATCHWAYS.

APPLICATION FILED JAN. 23, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



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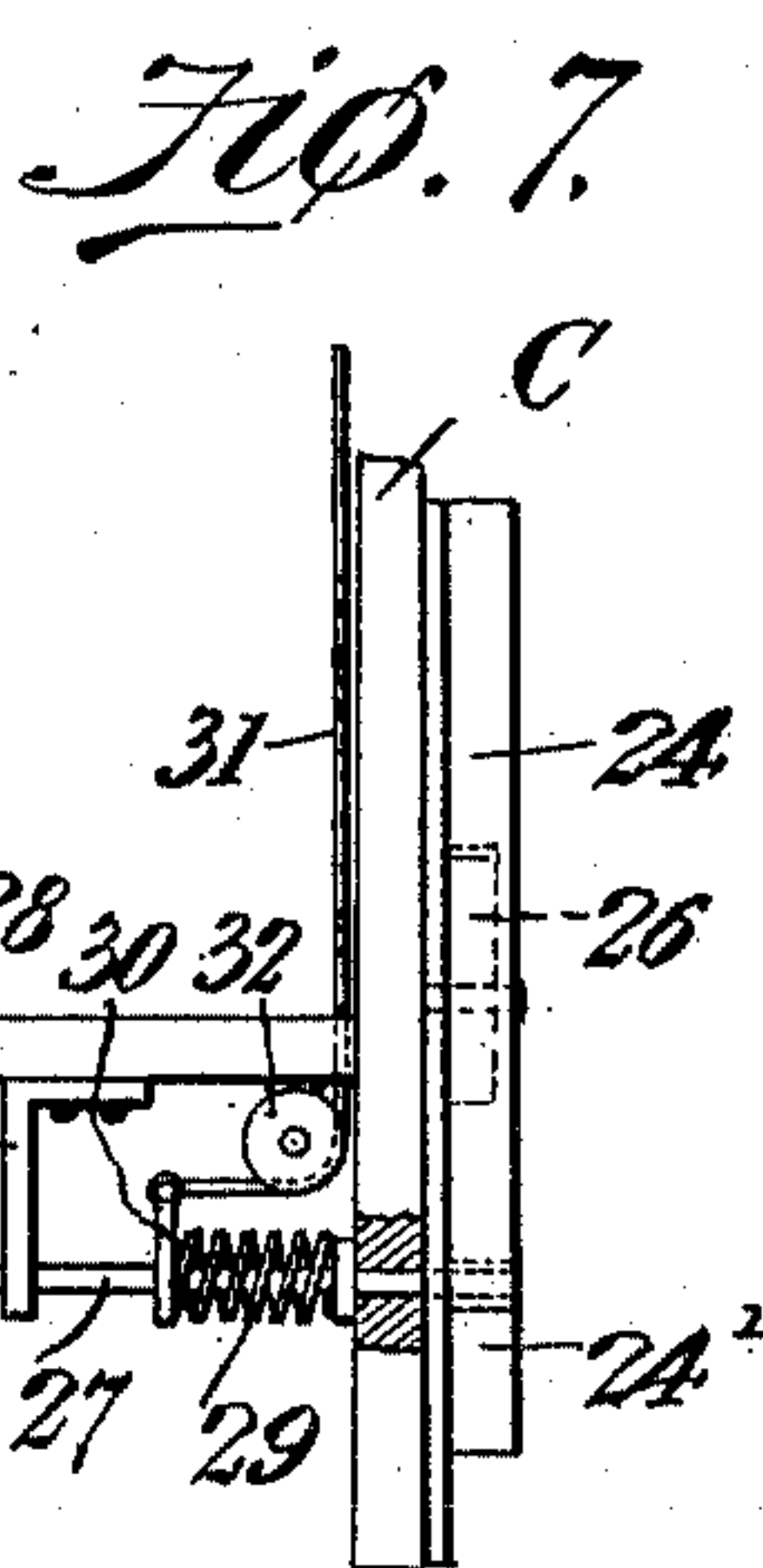
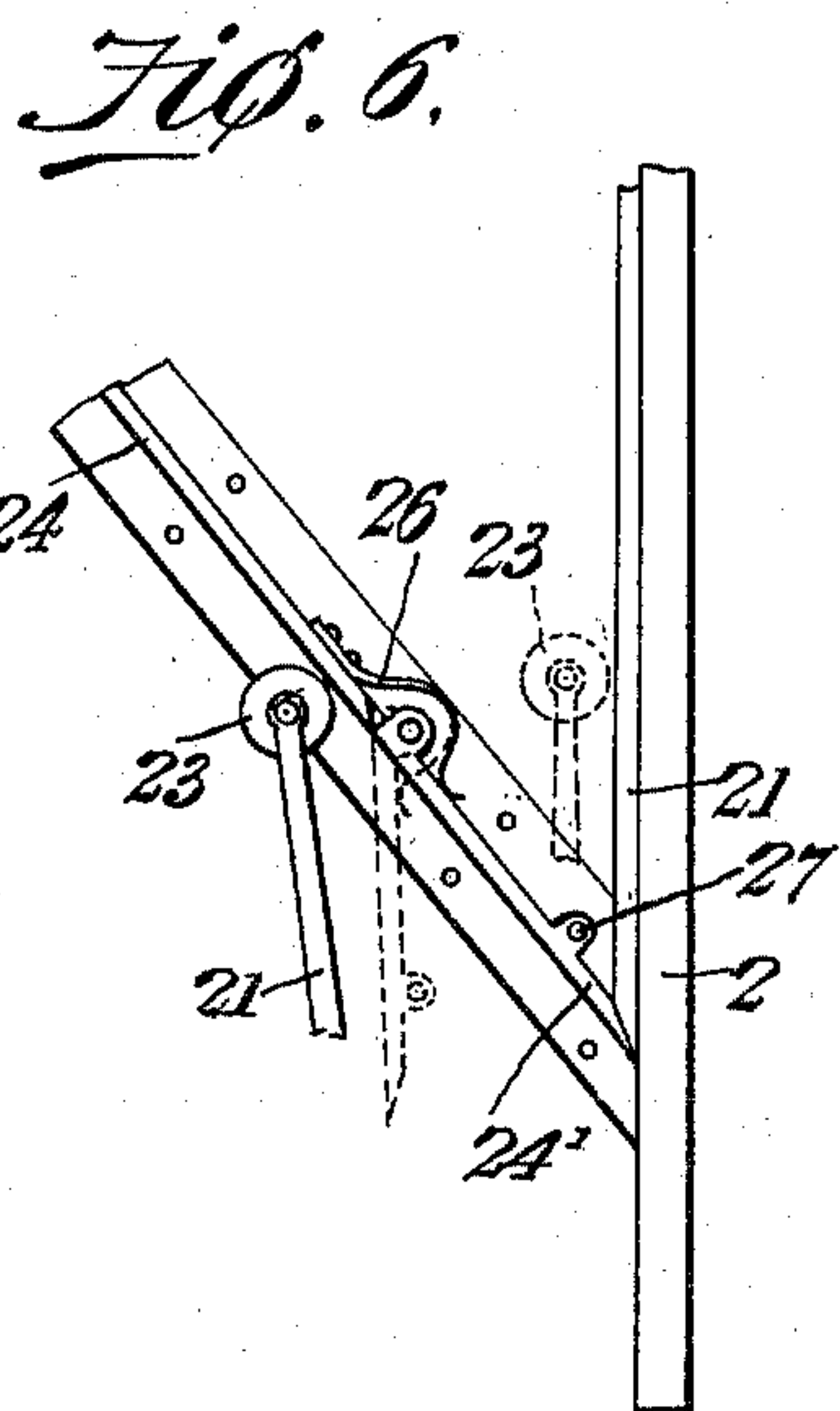
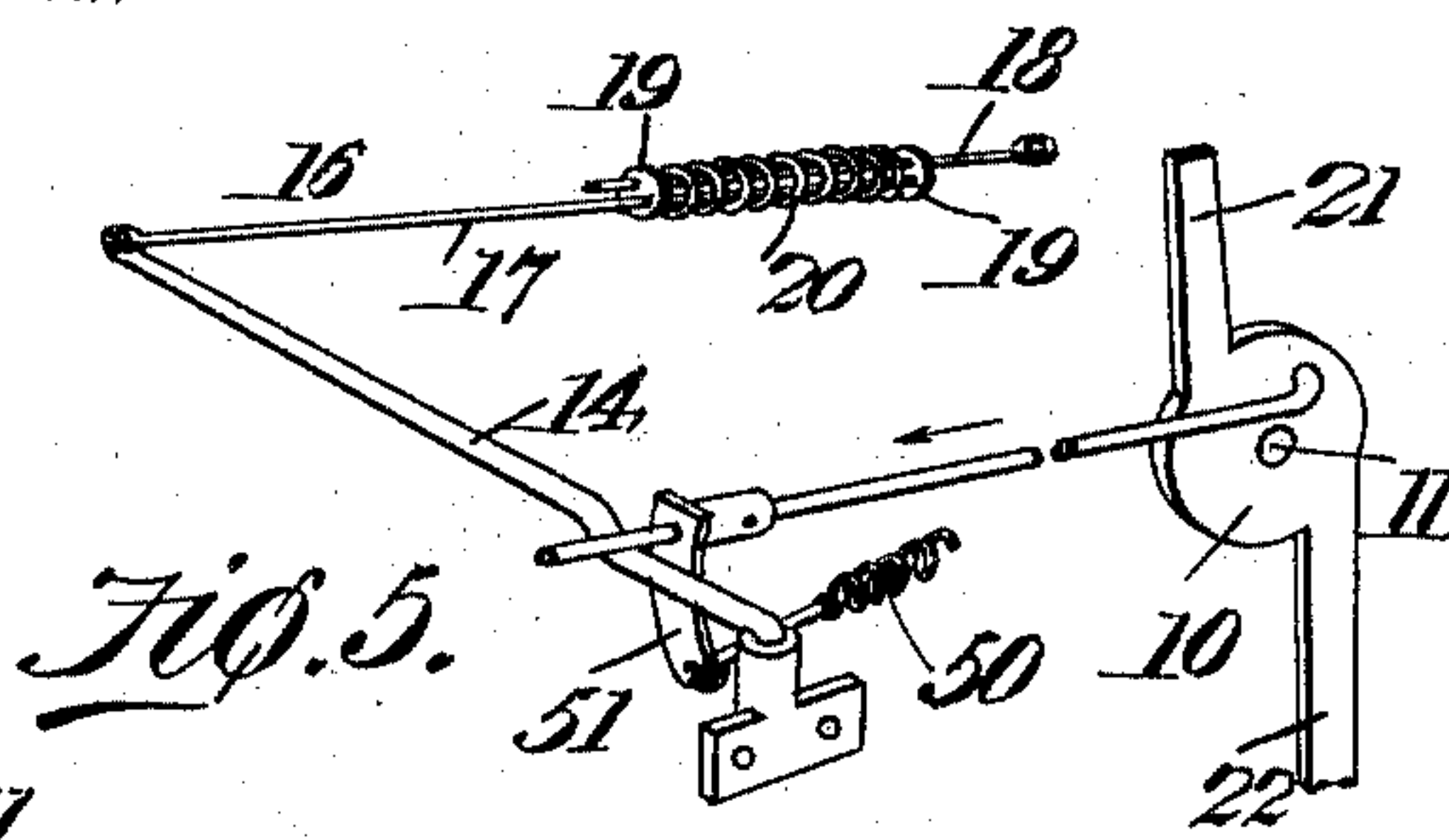
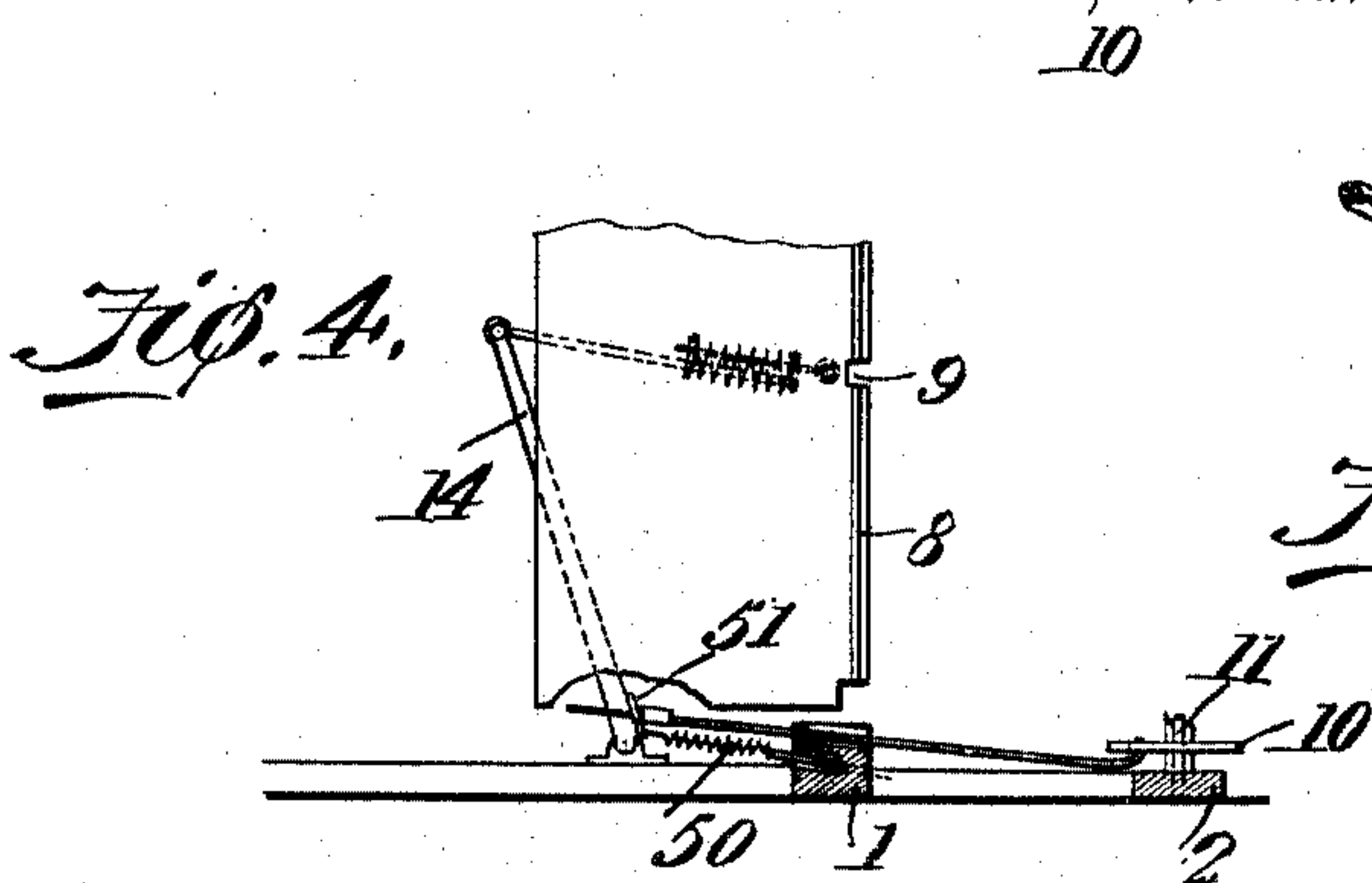
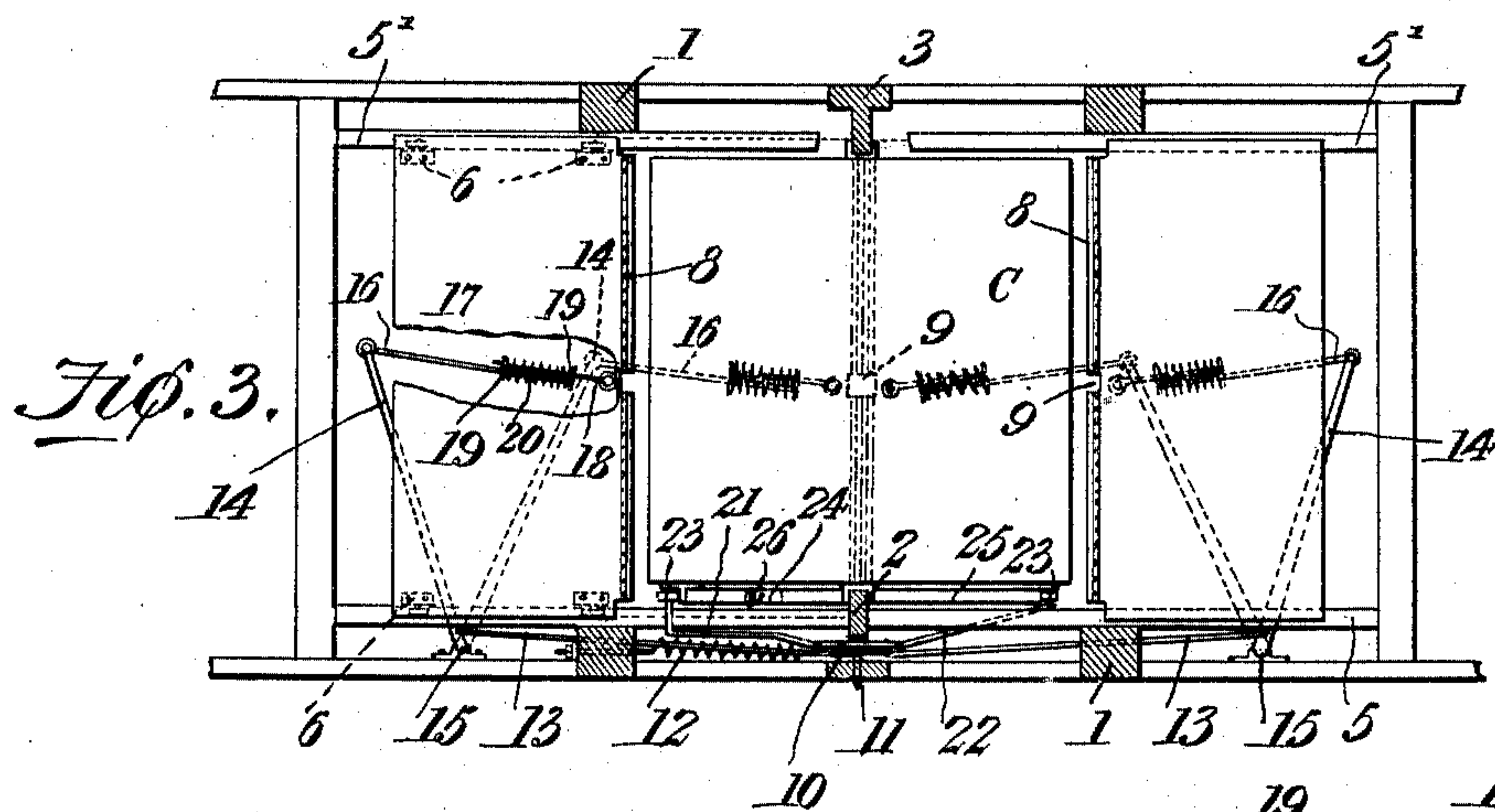
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UNITED STATES PATENT OFFICE.

JOHN WICKLIFF MCGHEE, OF ARKANSAS CITY, KANSAS, ASSIGNOR OF
ONE-HALF TO JAMES GUY, OF ARKANSAS CITY, KANSAS.

AUTOMATIC CLOSURE FOR ELEVATOR-HATCHWAYS.

SPECIFICATION forming part of Letters Patent No. 760,139, dated May 17, 1904.

Application filed January 23, 1904. Serial No. 190,379. (No model.)

To all whom it may concern:

Be it known that I, JOHN WICKLIFF MCGHEE, a citizen of the United States, residing at Arkansas City, in the county of Cowley and State of Kansas, have invented a new and useful, Automatic Closure for Elevator-Hatchways, of which the following is a specification.

This invention relates to automatic closures for elevator-hatchways, mining-shafts, and the like, and has for its principal object the provision of an automatic hatchway-closure that may be applied to an ordinary elevator shaft and car without material alteration of the shaft framing or car and which will open and close automatically to permit the passage of the car either up or down when the suspension-cables are intact, but will be prevented from opening if the suspension-cables break, so limiting the descent of the car in case of breakage of the cables to the distance between car and hatchway.

A further object of the invention is to provide in connection with each automatic hatchway-closure a catch by means of which the closing devices may be held in inoperative position and which may be released from engagement by the elevator conductor at any point in the elevator-shaft.

In attaining the objects above mentioned and others which will appear as the invention is more fully disclosed I prefer to make use of the novel construction and combination of parts of an automatic hatchway-closure for elevator-shafts and the like, as hereinafter fully described and claimed, and illustrated in the preferred form in the accompanying drawings, forming part of this specification.

In the drawings, Figure 1 is a view, partly in side elevation and partly in section, of a portion of one floor of a building and the adjacent portions of the framing of the elevator-shaft with one form of the automatic closure applied thereto, the parts being shown in the position occupied when the elevator-car is passing through the hatchway. Fig. 2 is a view, partly in side elevation and partly in section, of a portion of a floor and the adjacent portions of the framing of the elevator-

shaft and having a slightly-different form of embodiment of the invention applied thereto, the parts being shown in the position taken when the hatchway is closed. Fig. 3 is a plan view of the structures shown in Fig. 1, parts being broken away to show the working of the hatchway-closing mechanism. Fig. 4 is a detail plan view showing a portion of the mechanism illustrated in Fig. 2. Fig. 5 is detail view in perspective of the hatchway-closure mechanism shown in Fig. 4. Fig. 6 is a detail view showing the operation of a pivoted section of the cam-track on the elevator-car when the car-suspension cables break. Fig. 7 is a detail view of the mechanism by which the pivoted section of the cam-track on the elevator-car is held in operative position while the car-suspension cables are unbroken. Fig. 8 is a detail view showing the mode of connecting the catches at the several floors of the building, by means of which the hatchway-closing mechanism is held in inoperative position. Fig. 9 is a perspective view of one of the catches shown in Fig. 8 and its mode of connection with the operating-rod. Fig. 10 is a detail view of an automatic clutch by means of which the descent of the elevator-car is arrested if the suspension-cables break.

In the drawings corresponding parts are designated by similar characters of reference throughout the several views.

Referring to the drawings, and more particularly to Figs. 1 and 3, F designates a floor in a building through which the elevator-shaft passes, and the corner timbers of the elevator-shaft are designated 1. At the sides of the elevator-shaft T-shaped guide-rails 2 and 3 are provided, as usual. The hatchway, which is shown at H, is, as usual, sufficiently large to permit the passage of the elevator-car C without danger of contact with the edges of the hatchway.

Extending to both right and left of the guide-rails 2 and 3 of the elevator-shaft are tracks 5 and 5', arranged slightly below the floor F and of suitable character to receive the supporting-rollers 6 of two similar hatchway-closure sections 7. The tracks 5 extend

entirely to the guide-rail 2 on that side of the elevator-shaft; but the tracks 5' are cut away at their ends to afford space for the passage of a clutch mounted on the elevator-car 5 and adapted for engagement with the guide-rail 3 at that side of the elevator-shaft.

The hatchway-closure sections 7 are precisely similar in structure and are provided at their meeting edges with cushions 8, of felt, 10 rubber, leather, cork, or other suitable material, to deaden the sound when the closure-sections are brought together by the action of the closing mechanism. The closure-sections are of course both recessed at the middle of their meeting edges, as shown at 9, to 15 permit the passage of the car-suspension cables and are also cut away at the ends of their meeting edges to provide space between them for the guide-rails 2 and 3. Each of the 20 hatchway-closure sections is held normally in position to prevent the passage of the elevator-car through the hatchway, being held in such position by means of the mechanism which will now be described. In Figs. 1 and 25 3 the mechanism illustrated consists of a disk 10, mounted for oscillatory movement upon a pivot-pin 11 at one side of the elevator-shaft, a spring 12, having one end connected with the disk 10, near its periphery, and hav- 30 its other end adjustably secured to one of the shaft-timbers 1, and a system of levers for each of the closure-sections so connected with the disk 10 that when the disk occupies the position shown in Fig. 1 the closure-sections 35 will be open; but when the disk turns under the action of the spring 12 the systems of levers operate to force the closure-sections into the position shown in dotted lines in Fig. 3.

In Figs. 1 and 3 the mechanism employed in 40 connection with each of the closure-sections to impart movement thereto from the disk 10 consists of a connecting-rod 13, extending laterally from the disk, a lever 14, to which the connecting-rod 13 is pivotally connected near 45 its fulcrum 15, and a connection 16 between the free end of the lever 14 and the adjacent hatchway-closure section. Each of the connections 16 is preferably composed of parallel rods 17 and 18, each having a disk 19 rigidly 50 attached thereto at one end and provided with a passage for the other rod, and a spring 20, arranged between said disks and firmly secured thereto at its ends, so that the movement imparted to the closure-sections from the 55 levers 14 may be imparted somewhat gradually and without too great a shock.

Extending from the disk 10 at substantially opposite points are two rigid arms 21 and 22, the former projecting above the floor F and 60 the latter below it. The action of the spring 12 tends to throw the arms into vertical position, and that is the position normally occupied by the arms. Each of the arms is bent at its free end, as shown in Fig. 3, and bears at its 65 end a roller 23. The rollers 23 are provided

for engagement with cam-tracks 24 and 25, mounted upon one side of the elevator-car C, which may be of any suitable or preferred construction. The track 24 consists of an upper vertical portion and a lower oblique 70 portion, the latter having at its lower end a pivoted section 24', whose utility will presently be explained. The track 25 includes a lower vertical portion and an upper oblique 75 portion, the entire track being fixed in position and ordinarily formed integral. The pivoted section 24' at the lower end of track 24 is engaged by a spring 26, provided on the upper side of said track and adapted to depress the pivoted section 24' unless supported by 80 some suitable means. When the car-suspension cables are intact, the pivoted track-section 24' is held in the position indicated in solid lines in Fig. 6 by a latch consisting of a bar 27, arranged for sliding movement through 85 an opening in the side wall of the car and through a bracket 28, attached to the under side of the car-floor. The bar 27 is surrounded by a spring 29, which tends to retract the bar by pressing against a transverse member 90 30, fixed upon the bar. As long as the car-suspension cables are intact the spring 29 is compressed and the bar 27 is kept in advanced position, so as to hold the pivoted track-section 24' in operative position by means of a 95 cord or cable 31, attached to the transverse member 30, passing around a guide-pulley 32 beneath the floor of the elevator-car and extending upward to the suspension-cables, to which it is attached. Upon the breakage of the 100 suspension-cables the tension of the cord 31 will be relaxed and the elasticity of the spring 29 will cause it to expand suddenly, retracting the bar 27 from the opening in a lug on the upper surface of the pivoted track-section 24', 105 with which it had been engaged. When the car-suspension cables are unbroken and the hatchway-closure sections, with the mechanism described, are free to operate, the downward movement of the elevator-car will cause the 110 end of track-section 24 to engage with the roller upon the end of the arm 21, projecting upward from the disk 10, and as the elevator-car continues to descend the roller at the end of the arm 21 will travel outward along the 115 track 24, as shown in Figs. 1 and 6. This movement of the arm will of course cause the disk 10 to turn against the tension of the spring 12 and will impart movement to the mechanism connected with the said disk, 120 whereby the closure-sections are retracted to the position shown in solid lines in Figs. 1 and 3. The proportions of the arms 21 and 22 and of the tracks 24 and 25 are such that 125 when the roller at the end of the arm 21 passes from the oblique portion of track 24 to the vertical portion the lower part of the elevator-car will be immediately above the floor F and the hatchway-closure sections will be spread open to the necessary extent to 130

permit the passage of the car through the hatchway. When the car has passed part way through the hatchway and the roller at the end of the arm 23 is about to pass off the upper end of the straight portion of track 24, the lower end of track 25 will have come into engagement with the roller on the end of the downwardly-projecting lever 22 and the sudden closure of the hatchway will be prevented, the closure-sections being held open until the car has passed downward entirely through the hatchway and the roller at the end of arm 22 has passed from the vertical portion of track 25 to the oblique portion. As soon as the roller at the end of arm 22 passes from the vertical portion of track 25 to the oblique portion the tension of the spring 12 will cause the disk 10 to turn upon its pivot to resume its original position as fast as the downward movement of the car and the movement of the roller at the end of arm 22 along the oblique portion of track 25 will permit. As long as the suspension-cables of the elevator-car are unbroken and the mechanism of the hatchways is not held in inoperative position by means of catches presently to be described the operation of the automatic hatchway opening and closing mechanism at each floor will be substantially as above described; but in case the cables supporting the car should break the spring 29 would at once expand and withdraw the latch-bar 27 from its position of engagement with the pivoted portion 24' of the track 24. The spring 26 would then operate to depress the said pivoted portion 24' of track 24, and as the car approached a hatchway in its descent the roller 23 at the end of arm 21 would not engage the end of track 24 and be caused to travel outward along it, but would instead remain in contact with the guide-rail of the shaft, as shown in dotted lines in Fig. 6, and the elevator-car would descend upon the closure-sections and be stopped thereby, as the mechanism for opening the said closure would not be operated at all.

As under some circumstance it may be desirable to keep the hatchway-closures in open position, I provide above each of the hatchways a catch of the form shown in Fig. 9, consisting, preferably, of two independent members 35 and 36, both pivotally mounted upon a pin 37. The member 35 is in the form of a hook adapted for engagement with the bent terminal portion of the arm 21, and it is also provided with a laterally-projecting lug 38, which rests normally on the member 36 at one end. The member 36 is a lever the outer arm of which is slotted at 39 for the passage of a stud carried by an operating-rod 40, arranged for vertical sliding movement in guides 41, secured to the adjacent corner timber of the elevator-shaft. The object of making each of the catches of two independent members, as described and shown, is to enable

the elevator conductor to release any one of the members 36 from engagement with the arm 21 of the mechanism connected with the adjacent hatchway without disturbing the other catches and also to provide means whereby in case of need all of the catches may be simultaneously released by the elevator conductor when the car is at any point in the shaft. As will be readily seen from an inspection of the drawings, the member 35 of any catch can be turned on its pivot without imparting movement to the member 36, and hence when one of the members 35 is released by the elevator conductor without imparting movement to the member 36 no movement will be imparted to the rod 40, connecting the several catches; but, on the other hand, if the closures of several hatchways are held open by means of the catches and it becomes desirable to release all the catches to permit the closing mechanism to operate the elevator conductor has only to grasp the rod 40 and pull sharply downward thereon. The downward movement of the rod 40 in its guides will impart movement to the levers 36, and they in turn will lift the members 35 out of engagement with the arms 21 and permit the closing mechanism of each hatchway to come into operation. As the rod 40 is connected with the levers 36 by means of studs attached to the rod and slots formed in the said levers, the vertical movement of the rod can impart swinging movement to said levers and the hooks 35 associated therewith.

In Figs. 2, 4, and 5 a slightly-modified arrangement of parts is shown for imparting movement from the disk 10 at each hatchway to the closure-sections. Instead of arranging a spring 12 between the disk and one of the corner-timbers of the elevator-shaft a spring 50 is connected to a bracket 51, attached to the lever 14, and the other end of the spring is connected with an eyebolt extending obliquely downward through the floor and the adjacent corner-post of the elevator-shaft. The other parts of the structure are substantially the same as those already described, and detailed description thereof appears unnecessary.

In the modified form of structure described in the immediately preceding paragraph the operation is substantially the same as that in the form first described. The spring 50 tends to pull the lever 14 toward the elevator-shaft, and so to force the arms on the disk 10 into vertical position in substantially the same way that the spring 12 does by its pull directly upon the disk 10. Consequently the parts of the hatchway-closing mechanism are held normally in the position shown in Fig. 2, and when the car descends in the shaft the lower end of the track 24 will engage the roller at the end of the arm 21 and swing said arm outward in just the same manner that it does when the form of closing mechanism first described is employed. Similarly when the car-

suspension cables break the release of the latch-bar 27 from engagement with the pivoted track-section 24' will cause said track-section to be thrown out of its normal position and prevent the operation of the hatchway opening and closing mechanism as the car approaches the hatchway.

In order to check the descent of the car as much as possible in case the cable breaks, and so lessen the violence of the shock when the car strikes the hatchway-closure sections at the floor immediately below it, I prefer to provide each car with an automatic clutch which will become operative as soon as the car-suspension cables break. A simple form of clutch for this purpose is that illustrated in Fig. 10, which consists of two wedge-shaped clutch members 55, supported by springs 56, attached to the side of the elevator-car opposite that upon which the tracks 24 and 25 are mounted. The clutch members 55 are arranged for sliding movement, being guided by members 57, rigidly mounted on the side of the car adjacent to the guide-rail with which the clutch members are intended to engage. In order to hold the clutch members in inoperative position, a small cord or cable 58 is attached to the lower end of each and passes around a guide-pulley 59, mounted on the car at a point slightly below the lower end of the clutch member. The cords or cables 58 extend upward and are attached in any suitable manner to the car-suspension cables. When, therefore, the car-suspension cables break and allow the car to descend under the influence of gravity, the tension of the cords 58 is suddenly relaxed, and the contraction of the springs 56 will cause the clutch members 55 to be drawn suddenly upward and to engage with the sides of the rib of the T-shaped guide-rail between them. If the clutch members are forced hard against the guide-rail and the load in the car is tolerably light, the descent of the car may be completely stopped by the action of said clutch members; but ordinarily the clutch members will merely retard the descent of the car, which will be finally brought to rest by coming into contact with the closure members of the hatchway immediately below it.

From the foregoing description it will be clearly seen that by means of the automatic closure for elevator-hatchways, mining-shafts, and the like the hatchways will be kept normally closed, and the formation of strong drafts up the elevator-shaft will ordinarily be prevented. It will also be clearly seen that in the event of a fire starting in a building in which the elevator-shaft is equipped with the automatic closing mechanism described the spread of the fire from floor to floor by passage up the elevator-shaft will be effectively prevented. It will also be seen that if the car be suitably constructed to afford protection to the passengers therein in the event of a fire being started in a building having an eleva-

tor provided with such closures the inmates of the building may be carried by the elevator even through the fire itself, as the automatic hatchway-closures will be effective to prevent the spread of the fire from one floor to another, and consequently in passing downward the passengers would be exposed to its heat for a moment only.

A special feature of the invention is in the mechanism whereby the hatchway-closure may be kept open, if desired, and released singly or all at once, according to the circumstances. For purposes of ventilation it is frequently desirable to leave the hatchways of the elevator-shaft open to permit free passage of air. When that is to be done, the catches provided in connection with the mechanism are to be brought into play. When for any reason it is desirable to close any one of the hatchways independently of the others, the catch associated with that hatchway may be released from engagement with the arm 21 of the hatchway-closing mechanism without disturbing the other catches. Also in the event of a fire or the occurrence of any other cause for the instant closure of all the hatchways the rod 40, associated with all of said catches, affords means whereby they may be instantly and simultaneously released.

The mechanism whereby the operation of the hatchway-opening devices is prevented in the case of the breakage of the car-suspension cables is also worthy of special mention. I am well aware that it is by no means new to provide means in connection with the automatic hatchway-closure to prevent the opening of the closure when the car-suspension cables break. Such devices are, however, usually designed for operation by the elevator conductor and are not automatic. The great disadvantage which is always found in devices of that character lies in the fact that in case of the breakage of the car-suspension cables the elevator conductor is very apt to lose his presence of mind, and so neglect to throw the lever or take any other step necessary to prevent the operation of the hatchway-opening mechanism. In the present case the arrangement by which the hatchway-opening mechanism is prevented from operation when the cable breaks is absolutely automatic in its working and does away with the dependence upon the elevator conductor's presence of mind for the safety of the passengers in the elevator. No matter how absent-minded the elevator conductor may be, the diminution in the tension of the car-cables which inevitably occurs when a break is produced in the cables will cause the relaxation of tension on the cord 31 and permit the retraction of the latch-bar 27, so releasing the track-section 24' and allowing it to swing into inoperative position.

While I have described the preferred forms of embodiment of my invention, and springs will be ordinarily employed as the means for

imparting movement to the hatchway-closure sections, I do not wish to be understood as limiting myself to the use of springs for that purpose. Instead of springs suitably - arranged counterweights may be employed to furnish the necessary energy to move the closure-sections into closed position after the passage of the elevator-car. As counterweights and springs are generally regarded as mechanical equivalents in the production of such movement, I deem it unnecessary to illustrate a form of the invention in which counterweights are used in lieu of the springs above described.

In constructing the several parts of the invention as described any suitable materials may be employed; but metal will ordinarily be used for the greater portion of the structure because it is so much stronger than the same, volume of any other available material and is more reliable where it is apt to be subjected to excessive strain.

Having thus described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In apparatus of the character specified, a hatchway-closure member held normally in operative position, a car suspended for movement through the hatchway, and devices carried by the car for automatically opening said closure member when the car approaches said member from above, said opening devices being held in operative position as long as the car-suspension means remains unbroken but being automatically thrown into inoperative position when the car-suspension means is broken.

2. In apparatus of the character specified, a hatchway-closure member held normally in closed position, an elevator-car suspended for movement through said hatchway, devices carried by said car for automatically opening said closure member when the car approaches said member from above, a latch by means of which said opening devices are held normally in operative position, and latch-releasing means arranged to operate automatically when the car-suspension means is broken.

3. In apparatus of the character specified, a hatchway-closure member, means for holding said member normally in closed position, mechanism associated with said member for throwing it into open position, and a member carried by the car and held normally in position to engage the mechanism for opening the hatchway-closure when the car approaches said closure from above, said member being held in operative position as long as the car-suspension devices remain unbroken and being automatically thrown into inoperative po-

sition when said car-suspension devices are broken.

4. In apparatus of the character specified, a hatchway-closure member held normally in closed position, mechanism for opening said closure member, said mechanism comprising an oscillatory member held normally in vertical position, a stationary cam carried by said car and adapted for engagement with said oscillatory member when the car descends toward the hatchway-closure, the portion of said cam with which said oscillatory member first engages being held normally in position for engagement by said oscillatory member, but being automatically thrown out of such position when the car-suspension devices are broken.

5. In apparatus of the character specified, a hatchway-closure member held normally in closed position, mechanism for throwing said closure member into open position, an elevator-car suspended for movement through the hatchway, a cam-track mounted on the elevator-car and adapted for engagement by said mechanism for throwing the closure member into open position, the lowermost portion of said track being susceptible of movement out of position for engagement with the mechanism for opening said closure member, a spring engaging the movable portion of said cam-track and tending to throw it out of operative position, and means released by the breakage of the car-suspension devices for holding said movable portion of the track in operative position.

6. In apparatus of the character specified, a hatchway-closure member disposed across a shaft and held normally closed, and means for opening said closure member on the descent of a car toward the member, said means being automatically rendered inoperative when the car-suspension devices are broken.

7. In apparatus of the character specified, a hatchway-closure member held normally in closed position, mechanism normally operative upon the descent of a car toward the hatchway to throw said closure member into open position but rendered inoperative when the car-suspension devices are broken, and means also operative upon the breakage of the car-suspension devices for retarding the descent of the car upon the hatchway-closure member.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN WICKLIFF MCGHEE.

Witnesses:

W. E. WILCOS,
F. L. WOODDELL.