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 DEVICE FOR THE AUTOMATIC RETURN OF DOORS  
 AND THE LIKE PIVOTING MEMBERS  
 Filed April 13, 1949

2,626,420

Fig. 1

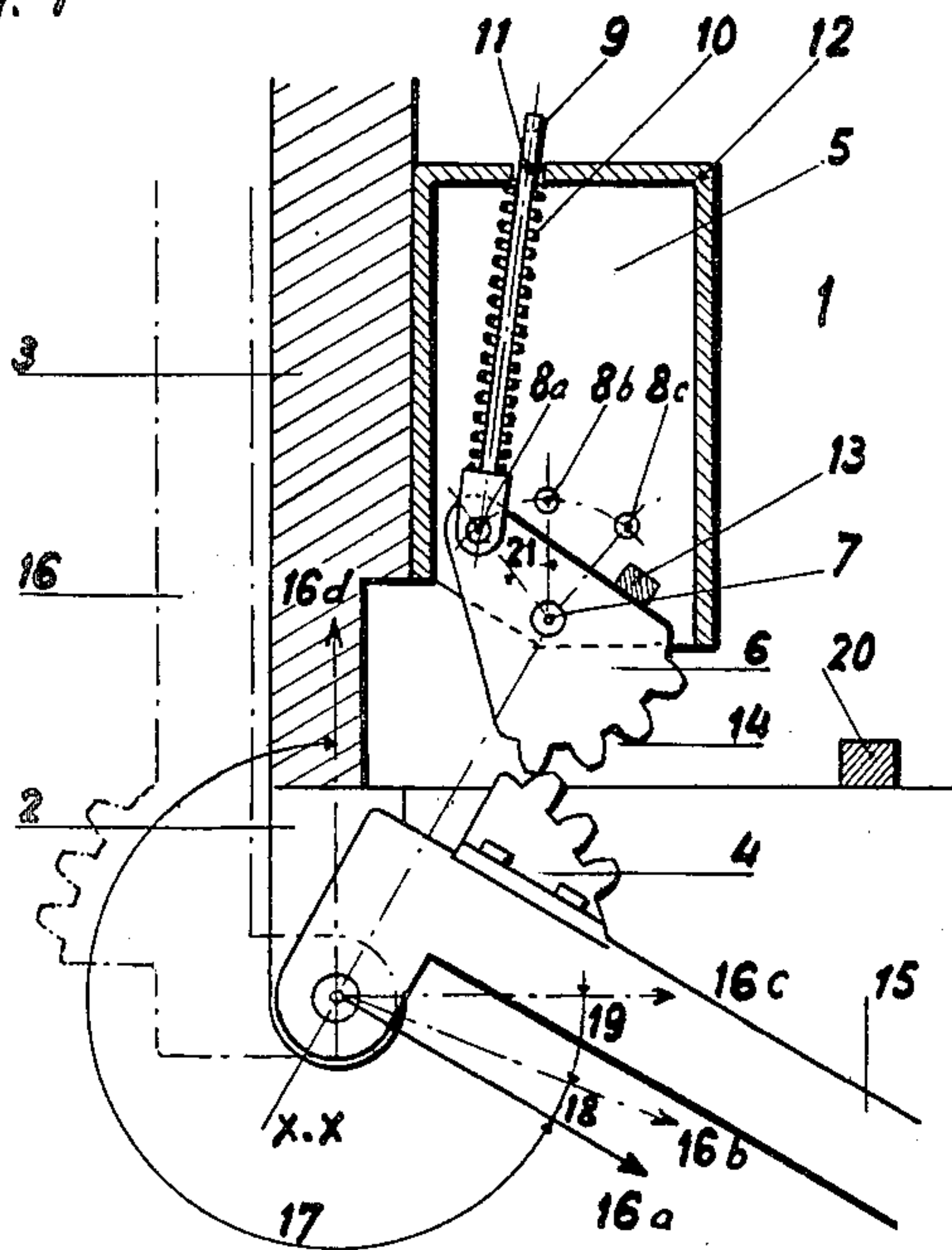


Fig. 2

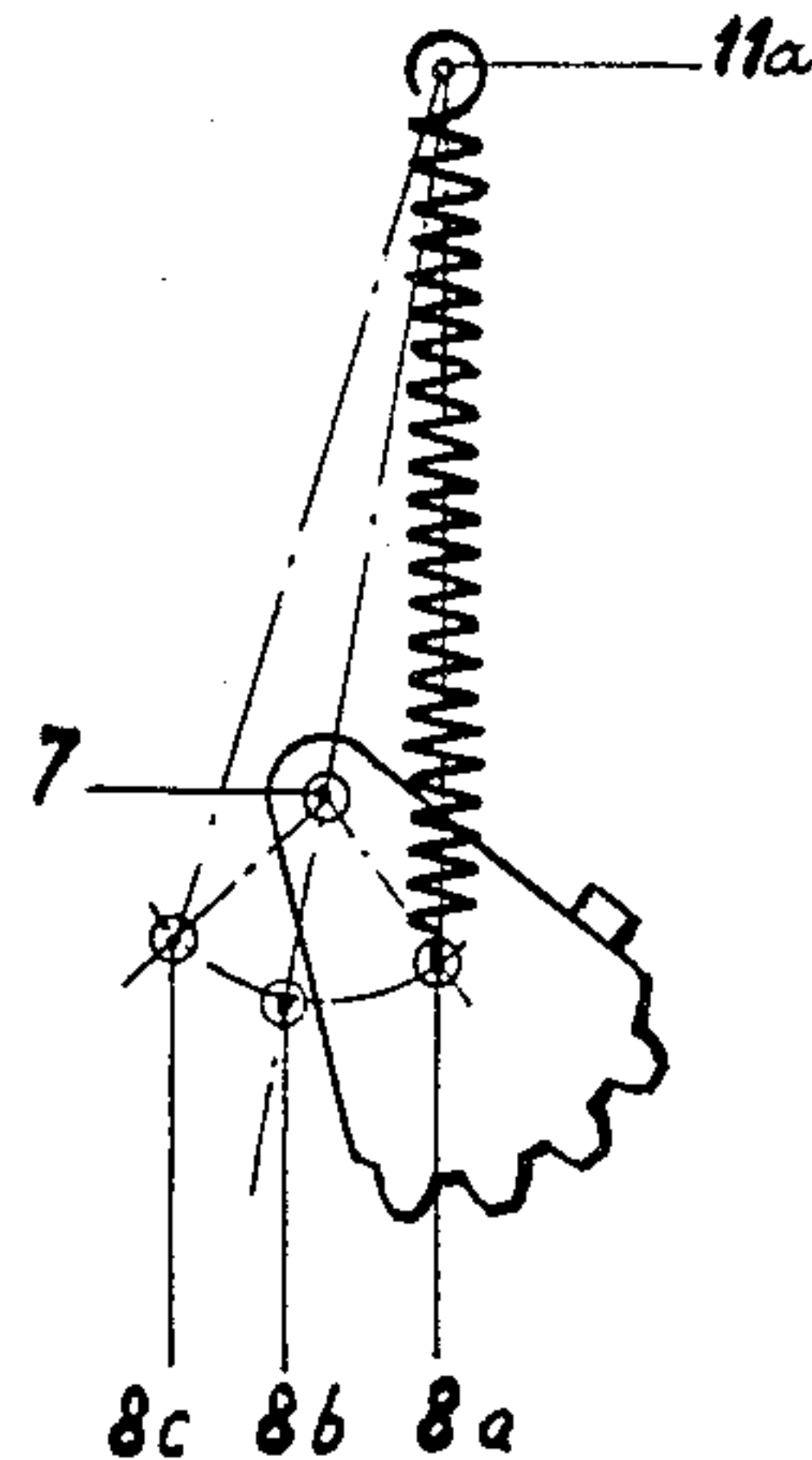


Fig. 4

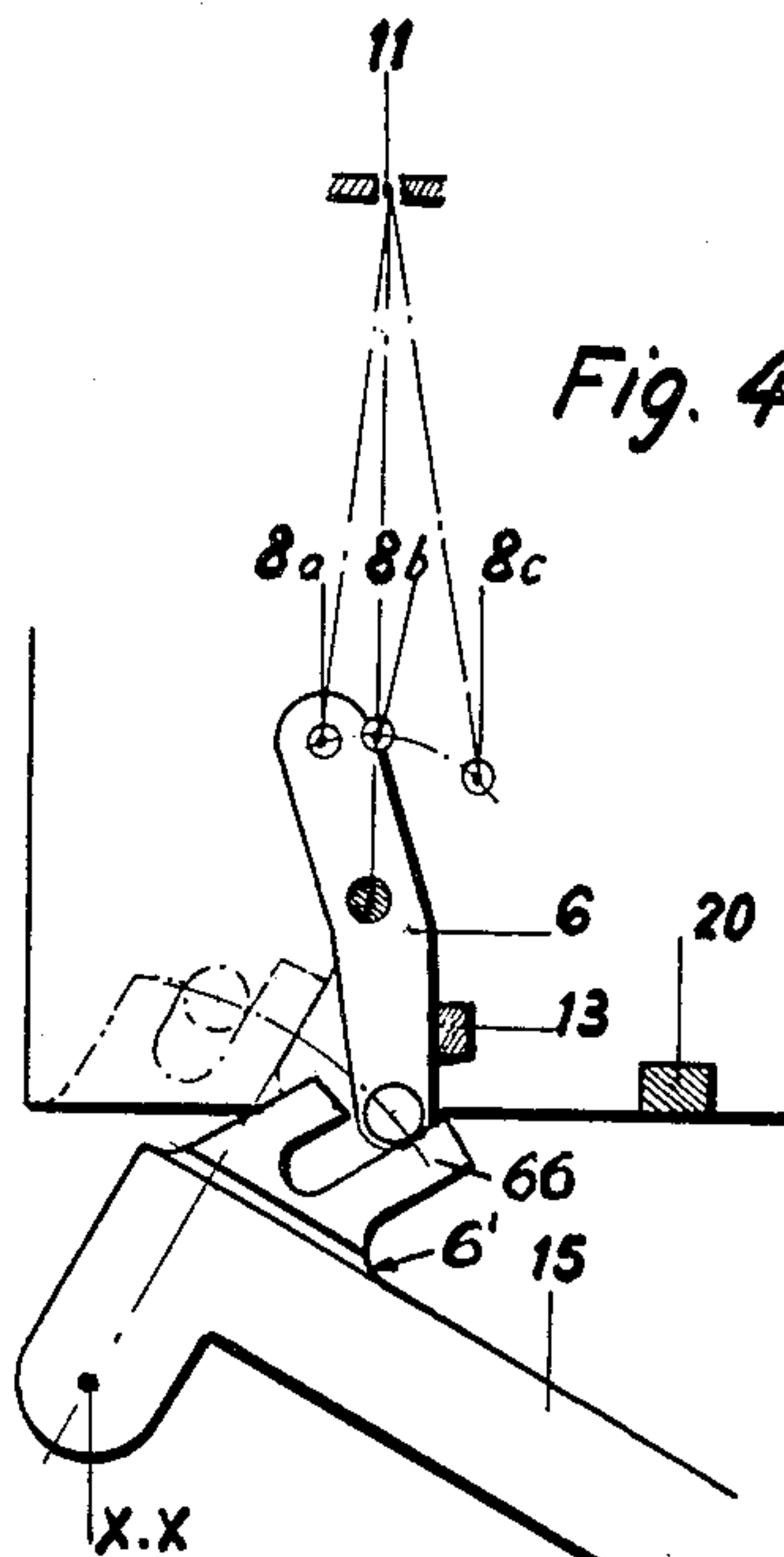
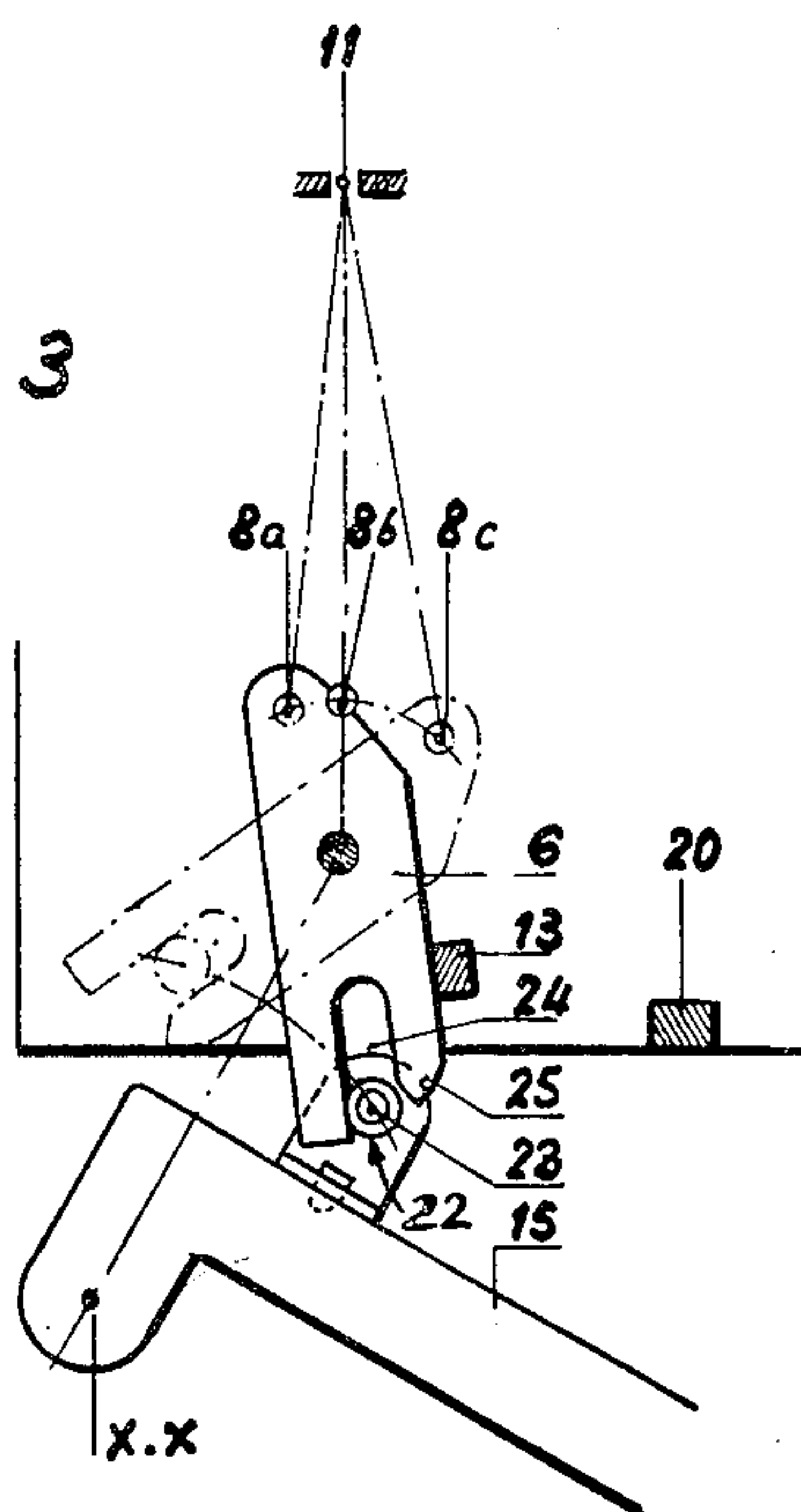


Fig. 3



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## UNITED STATES PATENT OFFICE

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DEVICE FOR THE AUTOMATIC RETURN OF  
DOORS AND THE LIKE PIVOTING MEMBERSHenri Jacques Marc Lambert, Sevres, and Georges  
Paul Mongin, Saint-Gratien, FranceApplication April 13, 1949, Serial No. 87,172  
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6 Claims. (Cl. 16—79)

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Doors, whatever applications they are intended for, are normally mounted on hinges so as to allow their pivoting round a vertical axis. Different types of spring operated devices have been produced for returning said doors into a closed or open position. In certain of said arrangements there are used so-called tumbler switches as applicable for the control of electric circuits, said switch systems including a lever pivotally secured to a spindle and controlled by a compression, tractional or the like spring the stationary bearing point of which and the bearing point of which on the pivoting lever are arranged in a manner such that starting from a medial position of unstable equilibrium the lever is urged back by said spring in either direction until one of two stable positions against a corresponding stop is reached.

In known spring-urged devices used for returning doors into normal position, this tumbler system is stationary and its lever controls the door directly or through the agency of pivoting links. The suitable medial position of the lever of the tumbler corresponds to a door opening at about 45°. To either side of this medial position, the tumbler system carries the door along either towards its closed position or towards an open position at about 90° of its closed position.

This connection of the tumbler lever with the door either directly or through the agency of links shows as a first serious drawback that of preventing the opening of the door throughout the angular stroke allowed for its operation as a door and also of preventing it from being completely collapsed in the surface containing it without projecting outwardly beyond the surface of the piece of furniture or wall carrying it, after a travel of generally 180° or even through a larger angle if the hinges are located on a projecting angle of the piece of furniture or of the wall.

Furthermore, with such a system, any fortuitous stress that urges the door further open than is allowed by the arrangement and the associated links leads to a deformation of the latter that serve as stops for the opening of the door and can only be of reduced size and housed near the pivotal axis of the door for reasons of bulk and aesthetic appearance.

Our invention has for its object to remove such drawbacks in a very simple, elegant and economical manner.

It is applicable to the control of doors, trap doors, closing means and the like that are pivotally secured to pieces of furniture, partitions, walls or the like supporting members.

The arrangement according to the invention is chiefly remarkable through the fact that the

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door or the like pivoting element includes a member cooperating with a corresponding part forming part of the actual tumbler, the action of said parts on one another being an intermittent one and the points at which the common action of these members begins and finishes are defined through a pivoting angle of the door or similar element with reference to the stationary element to which it is pivotally secured.

Thus the door or the like member is connected with the tumbler system no longer throughout the angular stroke allowed for its operation as a door but only for a predetermined angular stroke that is the sum of a first angle which may be termed the spring closing angle during which the tumbler lever starting from its unstable medial position drives the door up to its position of closure and holds it against its stop and of a second angle or cocking angle during which the tumbler lever moving in the opposite direction starting from its medial unstable position drives the door until said lever abuts in its turn against a stop corresponding to its cocked position, the door being then entirely released beyond said cocking point with reference to the tumbler device during the remainder of its possible movements allowed for its operation as a door.

According to a further essential feature of the invention, the connection between the lever of the tumbler and the door is provided through a first mechanical member such as a cylindrical projection, a roller, a suitable cam, gear teeth or the like carried on the tumbler lever or on the door and meshing preferably without any play, for the system of two operative angles of rotation of the door disclosed in the preceding paragraph, with a second member forming a suitable counterpart for the former and carried on the opposite part, that is on the door or on the lever of the tumbler, according to the case, the mutual drive of the door through the lever and of the lever through the door being provided through a sliding contact between the two abovementioned mechanical members, the arrangement of said members being such that the engagement is at an end when the tumbler lever rests on the cocking stop and the door thus released continues its opening movement beyond the cocking point.

Preferably, the connection between the tumbler lever and the door is provided through the engagement between two toothed sectors that provide a better continuity of the mutual driving engagement between the lever and the door during their travel through the two above mentioned operative angles.



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Further features of my invention will appear in the reading of the following description.

In the accompanying drawing there have been illustrated solely by way of example various embodiments of the arrangement according to the invention. In said drawing:

Fig. 1 illustrates by way of example a door controlled by a tumbler system with a compression spring, the connection being performed through interengaging toothed sectors.

Fig. 2 is a diagrammatic view of a modified tumbler system with a tractional spring.

Fig. 3 illustrates a connection through a forked tumbler lever engaging a roller carried on the door.

Fig. 4 shows reversely the forked lever mounted on the door and a cylindrical projection secured to the tumbler lever.

In the example illustrated in Fig. 1, the pivoting door is hinged round the axis X—X which may be a pintle rigid for instance with a piece of furniture 1 through the agency of a hinge 2 secured to the side 3 of said piece of furniture that is illustrated as stationary.

To the door is secured a toothed sector 4 having for its axis the vertical projection of the axis X—X.

To the side 3 of the piece of furniture is secured a tumbler system 5 including a tumbler lever 6 pivoting round a spindle 7 mounted in the casing 12 which will be presently described. To the lever 6 is pivotally secured at 8a a link 9 surrounded by a compression spring 10 bearing at 11 against the casing 12 of the tumbler system 5.

The lever 6 is illustrated in its operative cocked position for which it abuts against the stop 13. The pivot 8a on the lever enters the position 8b for the unstable medial position of the tumbler system and the position 8c for the closed position of the door.

At the periphery of the lever 6 is arranged a toothed sector 14 having as a center the pivot point 7 and meshing with the toothed sector 4 rigid with the door.

In order to allow the movements of the door 15 to be understood, I have shown in Fig. 1 different positions of an arrow passing through the axis X—X, parallel with the plane of the door and carried along by it in its movements. The door 15 being pivotally secured to the piece of furniture over a projecting ledge thereof may be completely folded over the outer side of the piece of furniture as shown in dot and dash lines at 16, that is for a complete opening through 270°. Starting from this latter position, the arrow moves with the door out of the position 16d when the door is being closed, and there is no connection with the tumbler system during such a rocking movement until the arrow reaches the angular position 16a. Consequently the door is completely free during the rotation of the door through the angle 17. When the arrow arrives at 16a, the first tooth of the sector 4 bears against the corresponding tooth of the sector 14 rigid with the tumbler lever 6 illustrated in its inoperative cocking position for which it is in contact with the stop 13 under the pressure of the spring 10 that urges the lever angularly in an anti-clockwise direction.

When pushing the door by hand through an angle 18 so as to bring the arrow into the angular position 16b, the lever 6 is now carried along and compresses the spring 10 into an unstable mean position, the pivotal connection thereof to lever 6 passing from the position 8a into the

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position 8b in alignment with the line 7—8b—11 of unstable equilibrium.

Now if the door is urged slightly further in the same direction, the action of the spring 10 becomes a driving one and urges said pivotal connection beyond 8b towards 8c, the sector 14 driving in its turn the sector 4 and consequently the door 15 that closes automatically through an angle 19 until it bears against its own stop 20, the indicating arrow entering the position 16c.

The opposite cycle of operations will be readily understood according to which the opening of the door is obtained by drawing it out from 16c to 16b against the compression of the spring 10, said pivotal connection passing then from 8c to 8b. From this moment onwards the lever 6 continues advancing under the action of the spring 10 until it bears against the stop 13 while the door is caused to move from 16b to 16a. The tumbler remains in its cocked angular position imparted to it as defined by the angle 21 between the unstable equilibrium line 7—8b—11 and the radius leading from 7 to 8a, and the door may now rock freely throughout the angle 17 without acting in any manner on the tumbler device and independently thereof.

Fig. 2 shows a modification of the tumbler device including a tractional spring engaging the stationary point 11a, the said pivotal connection being located in this case beyond the pivoting point 7 with reference to 11 (Fig. 1) in order to obtain an unstable position at 8b on the line 11—7 and cocked positions at 8a and 8c corresponding to the engagement of door 15 with stop 20 and lever 6 with stop 13 respectively.

Fig. 3 shows by way of example a further modification, in which a roller 22 is mounted on a spindle 23 rigid with the door 15. This spindle is mounted on a suitable support secured to the door. The lever 6 shows at its end facing the door a fork with a recess 24 cooperating with the roller 22. The lever and the door are illustrated in solid lines in the position corresponding to the solid lines of Fig. 1 at the moment at which the roller begins to engage or to disengage the fork. It will be noticed that the arm 25 of this fork is shaped so as to allow the release of the door for an opening thereof through a larger angle. The lever 6 is illustrated in dot and dash lines for the position of the door in its closed position.

Fig. 4 illustrates the opposite modification for which the fork 6 is carried by the door through the intermediary of a suitable support 66 and the roller by the lever.

Obviously our invention is by no means limited to the embodiments disclosed and illustrated that have been given out solely by way of examples.

What we claim is:

1. In a door closer for a door hingedly secured to a piece of furniture or wall or the like stationary member, the provision of a tumbler system including a pivot on the member to be closed by the door parallel to the pivoting axis of the door, a lever pivotally carried by said pivot, spring means associated with said lever for urging said lever away from a neutral position of alignment to either side thereof, a stop for engaging and thereby limiting the movement of the lever beyond a predetermined point on one side of the neutral position, a stop arresting the movement of the door in its closed position and consequently of the lever for a predetermined position of said lever on the side of its neutral position opposed to the first mentioned stop and interengaging means on the door and lever, through



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which the angular movement of the door between predetermined limits corresponding to the stops provides for the rocking of the lever to either side of its neutral position, the action of the interengaging members on one another ceasing when the lever meets the first mentioned stop.

2. A door closer according to claim 1 in which said interengaging means comprises two members one of said members being disposed for movement with said door and the other of said members being disposed for movement with said lever, one of said members comprising at least two spaced projecting teeth and the other of said members comprising at least one projection engaged by said teeth and movable therebetween.

3. In a door closer for a door hingedly secured to a piece of furniture or wall or the like stationary member, the provision of a tumbler system including a pivot on the member to be closed by the door parallel to the pivoting axis of the door, a lever pivotally carried by said pivot, a rod pivotally secured to one end of said lever and a spring associated with said rod and adapted to urge the rod and lever away from a neutral position of alignment to either side thereof, a stop limiting the movement of the lever beyond a predetermined point on one side of the neutral position, a stop arresting the movement of the door in its closed position and consequently of the lever for a predetermined position of said lever on the side of its neutral position opposed to the first mentioned stop and interengaging means on the door and lever, through which the angular movement of the door between its closing position and a predetermined limit corresponding to the first mentioned stop provides for the rocking of the lever through a comparatively large angle until it reaches its neutral position and then through a smaller angle beyond said neutral position up to a limit position for which the interengaging means are no longer operative and the door is allowed to swing freely through a path of predetermined amplitude.

4. In a door closer for a door hingedly secured to a piece of furniture or wall or the like stationary member, the provision of a tumbler system including a pivot on the member to be closed by the door parallel to the pivoting axis of the door, a lever pivotally carried by said pivot, a rod pivotally secured to one end of said lever and a spring associated with said rod end adapted to urge the rod and lever away from a neutral position of alignment to either side thereof, a stop limiting the movement of the lever beyond a pre-

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determined point on one side of the neutral position, a stop arresting the movement of the door in its closed position and consequently of the lever for a predetermined position of said lever on the side of its neutral position opposed to the first mentioned stop and interengaging arcuate toothed elements rigid with the door and lever respectively and adapted to provide for an angular movement of the door between predetermined limits corresponding to the stops in unison with the rocking of the lever to either side of its neutral position, the action of the interengaging members on one another ceasing when the lever meets the first mentioned stop.

5. In a door closer for a door hingedly secured to a piece of furniture, a wall or like stationary member, the provision of a tumbler system located in the angular space determined by the pivotal movement of the door in the direct proximity of the pivoting axis thereof and including a pivot on the member to be closed by the door parallel to the pivoting axis of this latter, a lever member pivotally carried by said pivot, a rod pivotally secured thereto, stop means determining two angular limit positions of said lever and a recoil means associated with said rod and adapted to positively urge the rod and lever away from a neutral position of alignment to either side thereof, and interengaging means rigidly mounted on the door and lever consisting of two arcuate toothed members through which the angular movement of the door between predetermined limits corresponding to the said two positions of the lever to both sides of the said neutral position provides for the rocking of said lever, the action of the interengaging members on one another ceasing when the lever attains one of said two limit positions.

6. A door closer according to claim 2, in which said two members consist of meshing gear sectors.  
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#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
847,909	Conklin	Mar. 19, 1907
1,831,800	Bales et al.	Nov. 17, 1931
2,016,519	Schmidt	Oct. 8, 1935
2,028,424	Van Dillen	Jan. 21, 1936
2,032,078	Adams	Feb. 25, 1936