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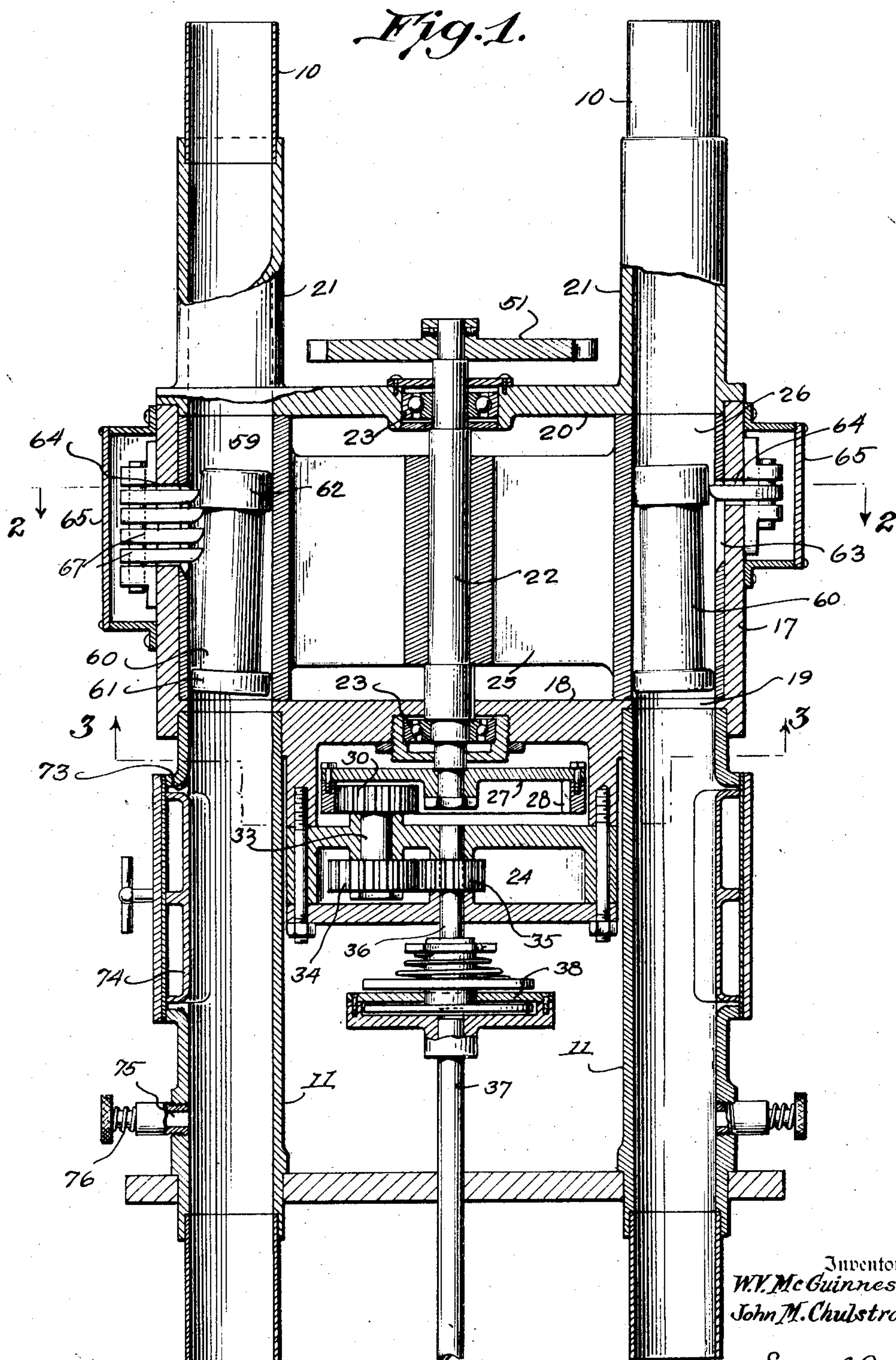
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1,733,026

AUTOMATIC SELECTIVE PNEUMATIC TUBE CARRIER RELAY

Filed Feb. 25, 1929

5 Sheets-Sheet 1



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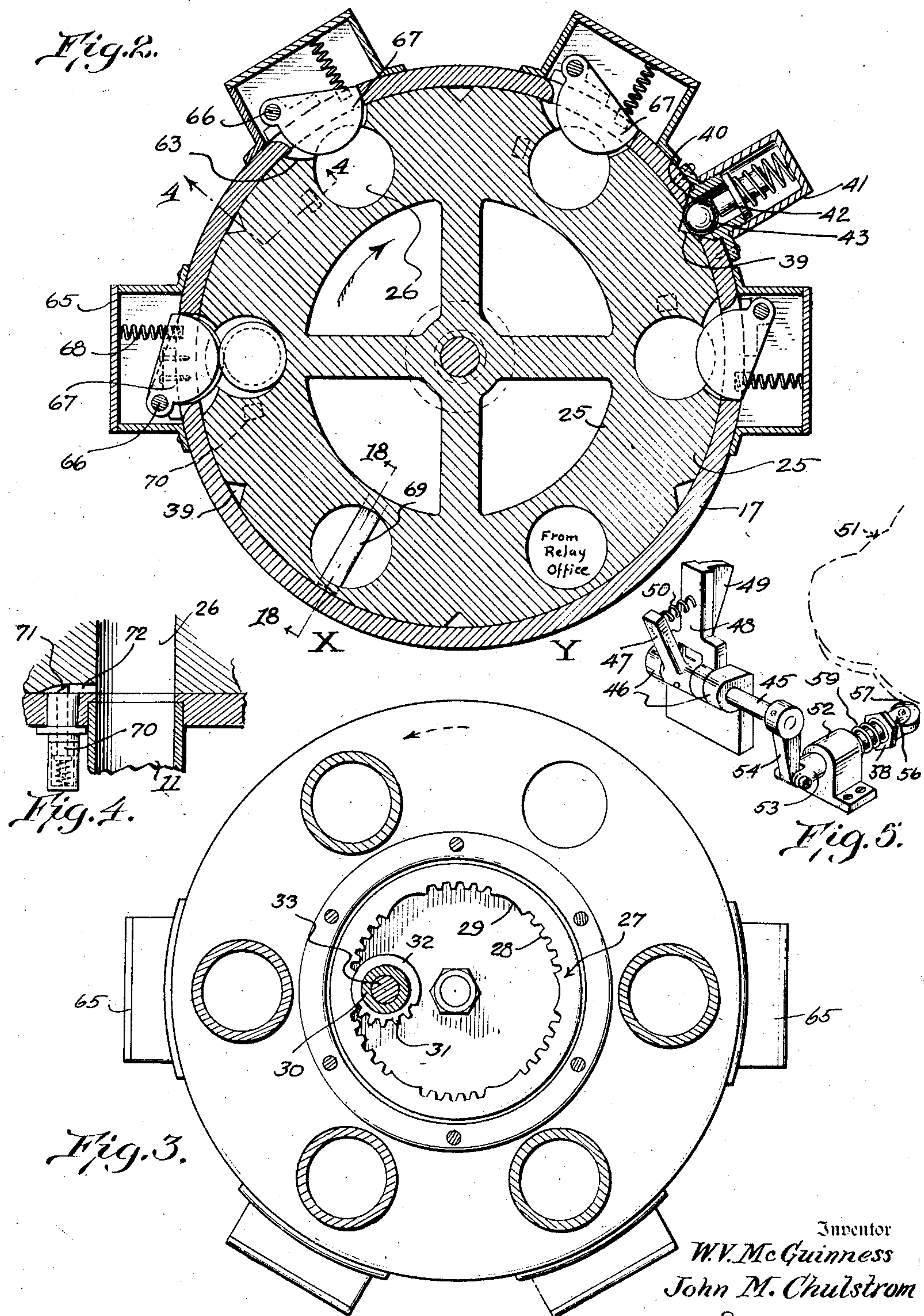
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AUTOMATIC SELECTIVE PNEUMATIC TUBE CARRIER RELAY

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5 Sheets-Sheet 2



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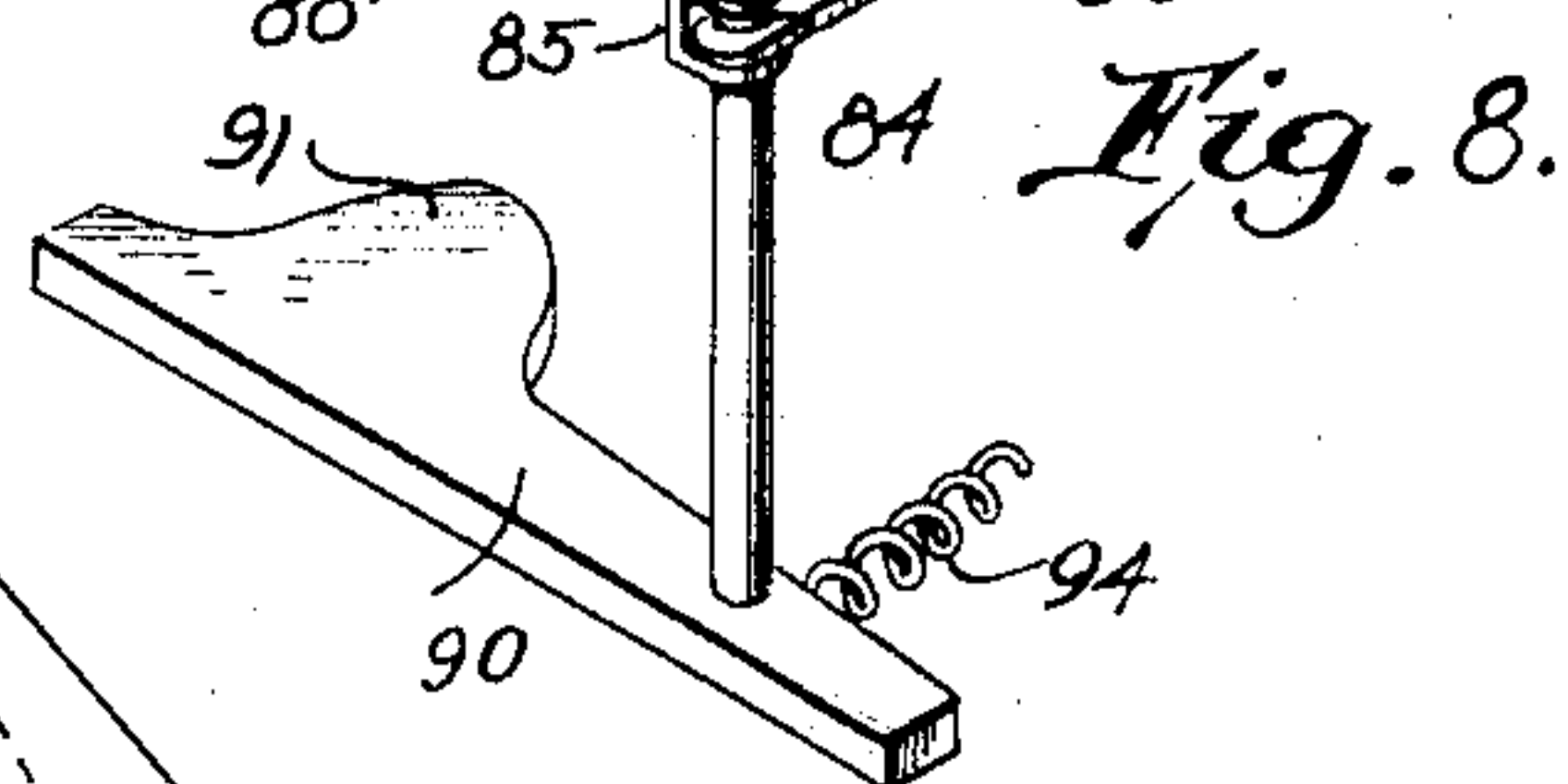
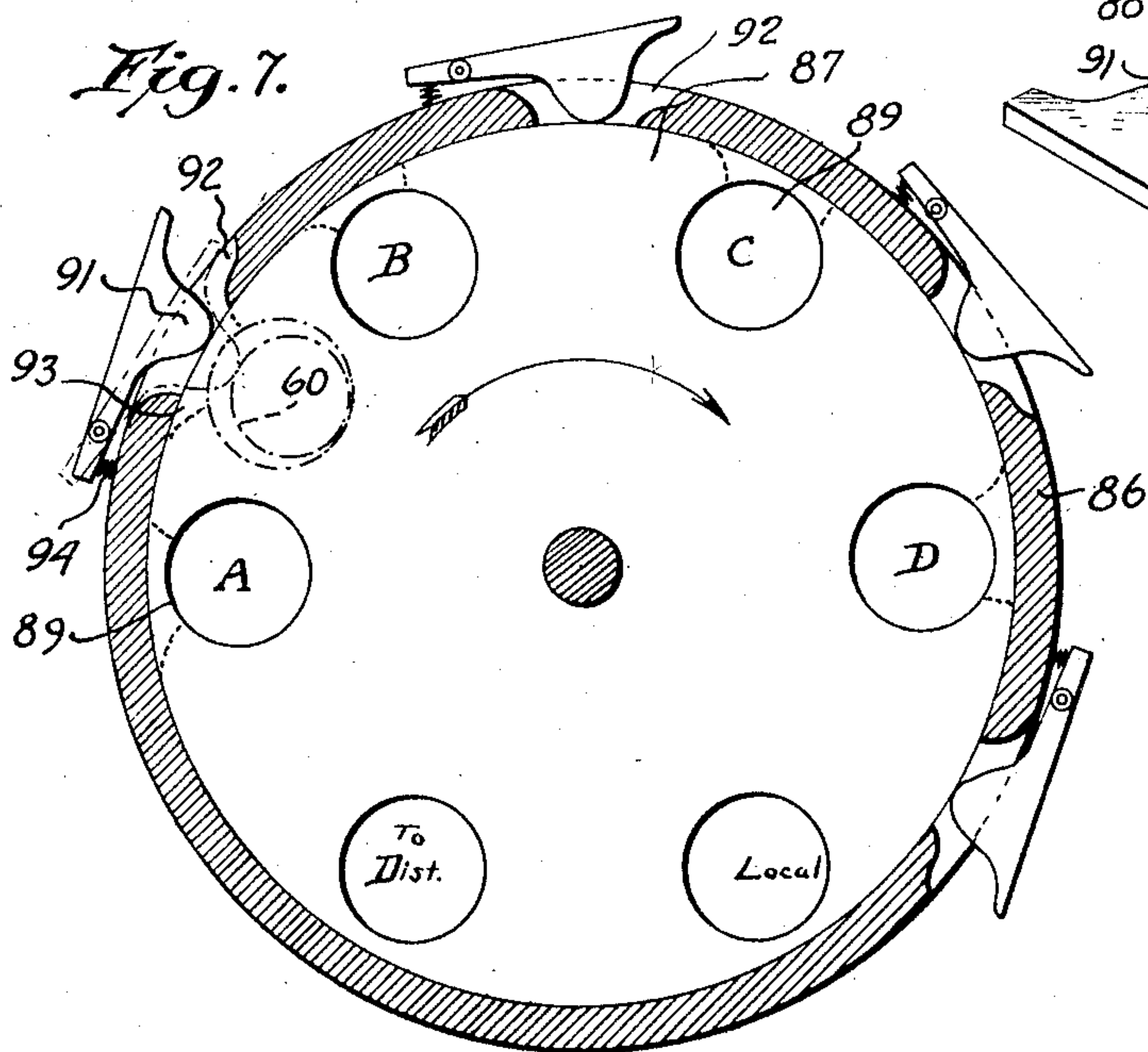
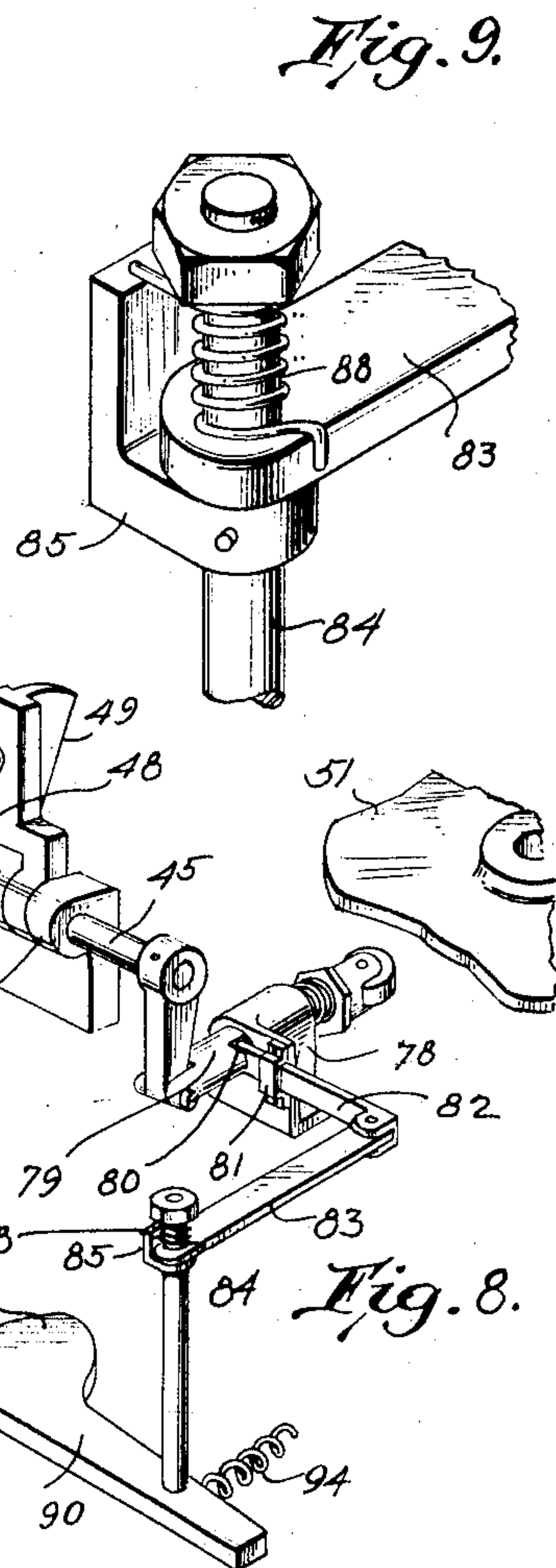
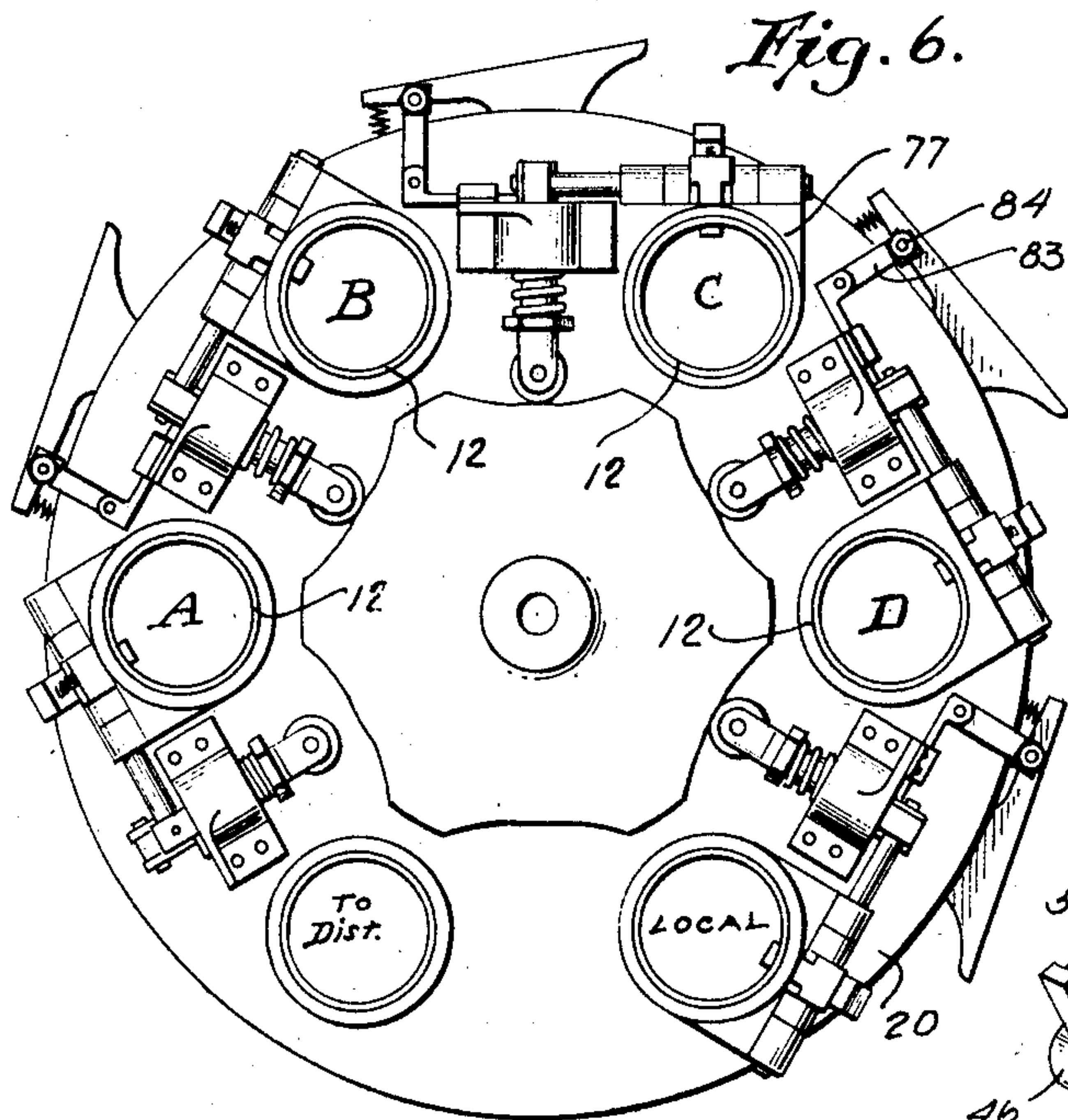
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AUTOMATIC SELECTIVE PNEUMATIC TUBE CARRIER RELAY

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5 Sheets-Sheet 3



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Fig. 10.

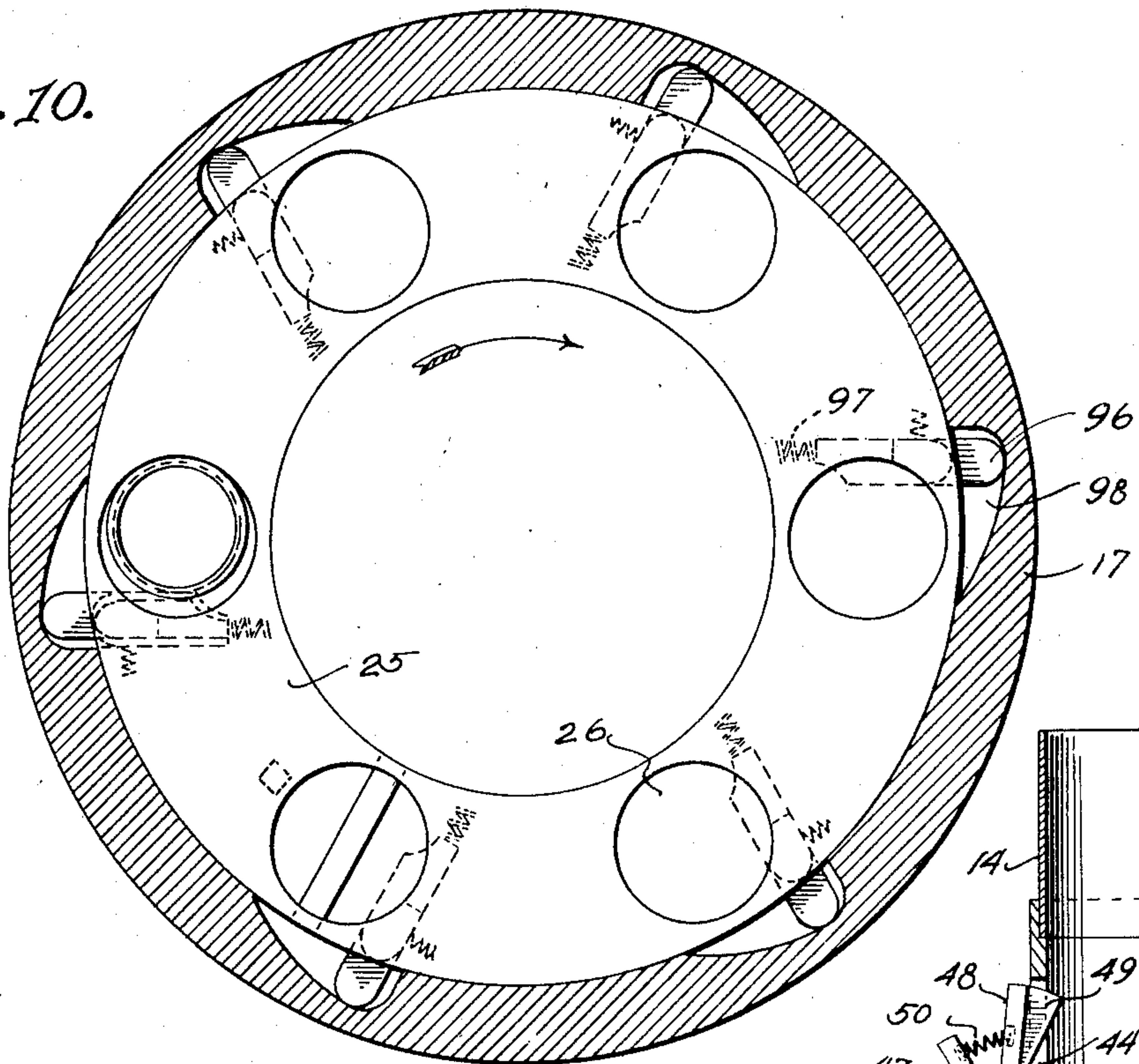


Fig. 11.

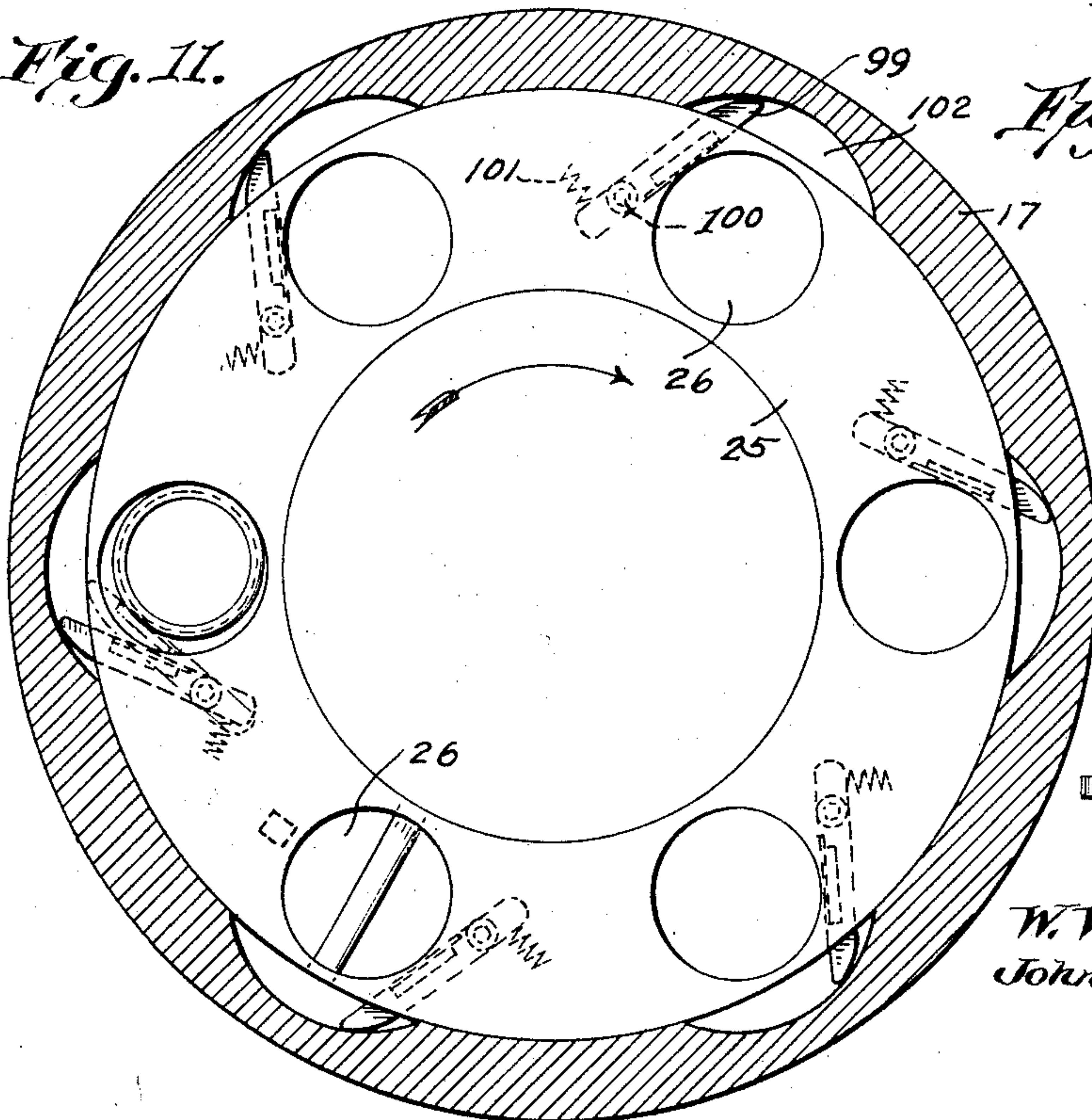
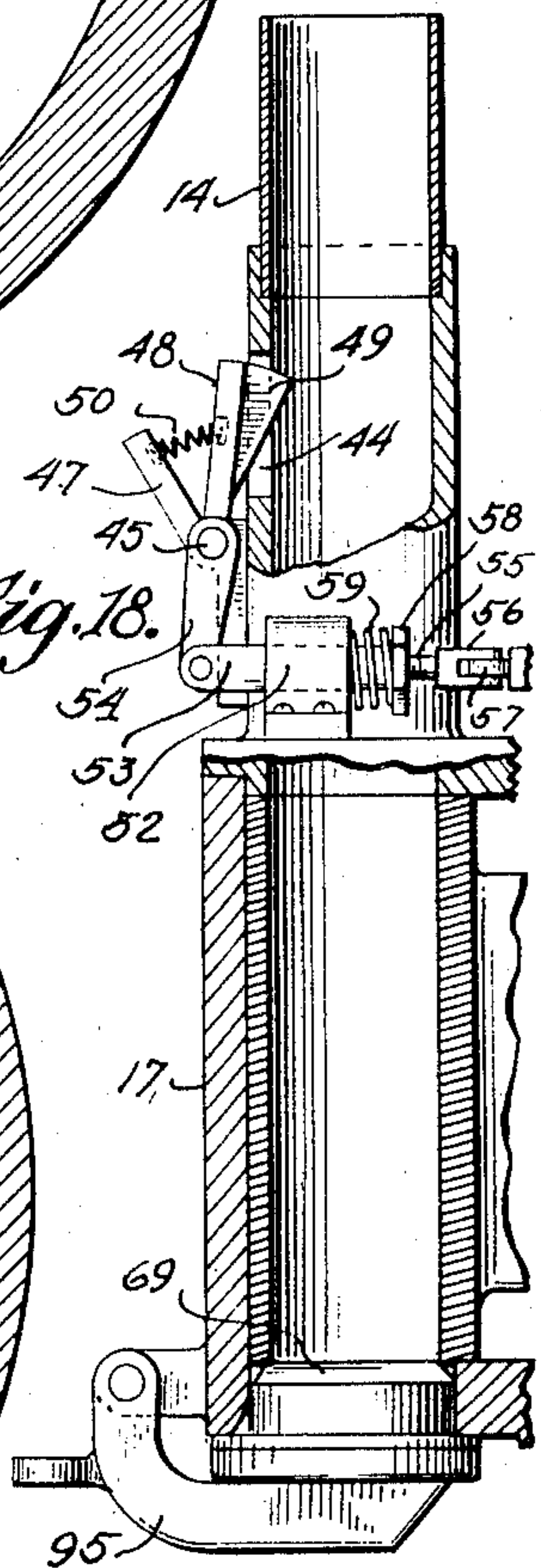


Fig. 18.



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AUTOMATIC SELECTIVE PNEUMATIC TUBE CARRIER RELAY

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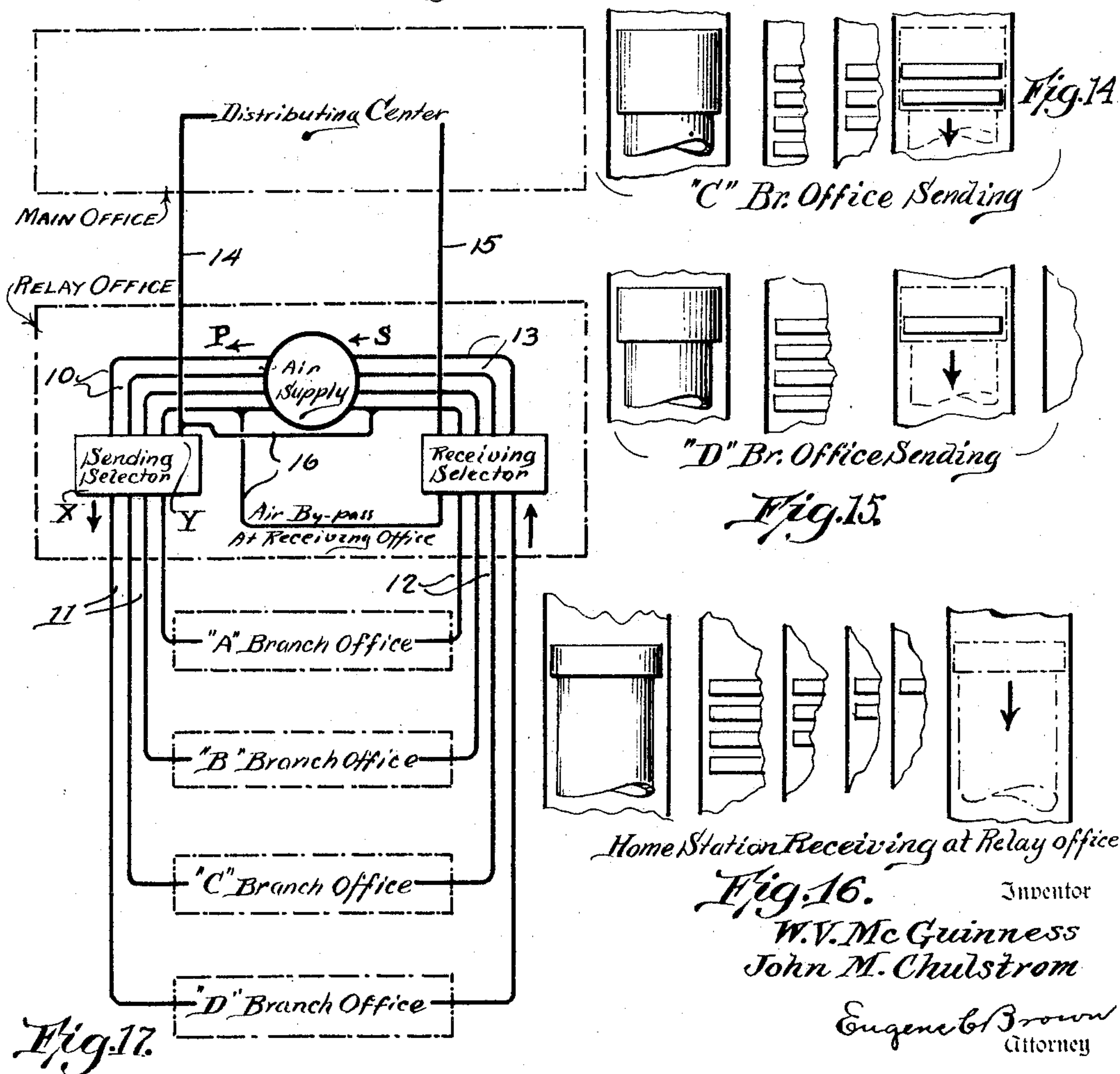
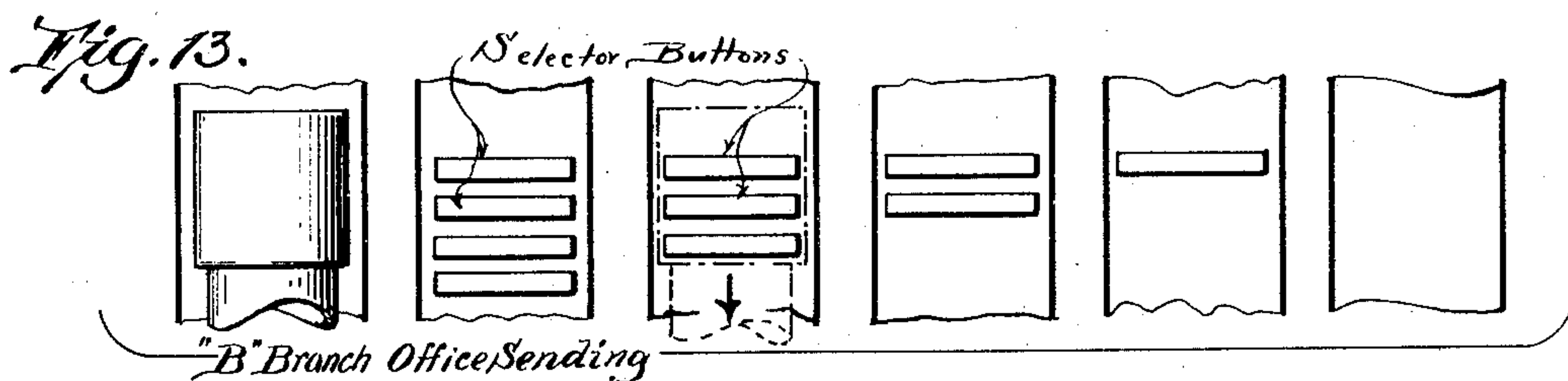
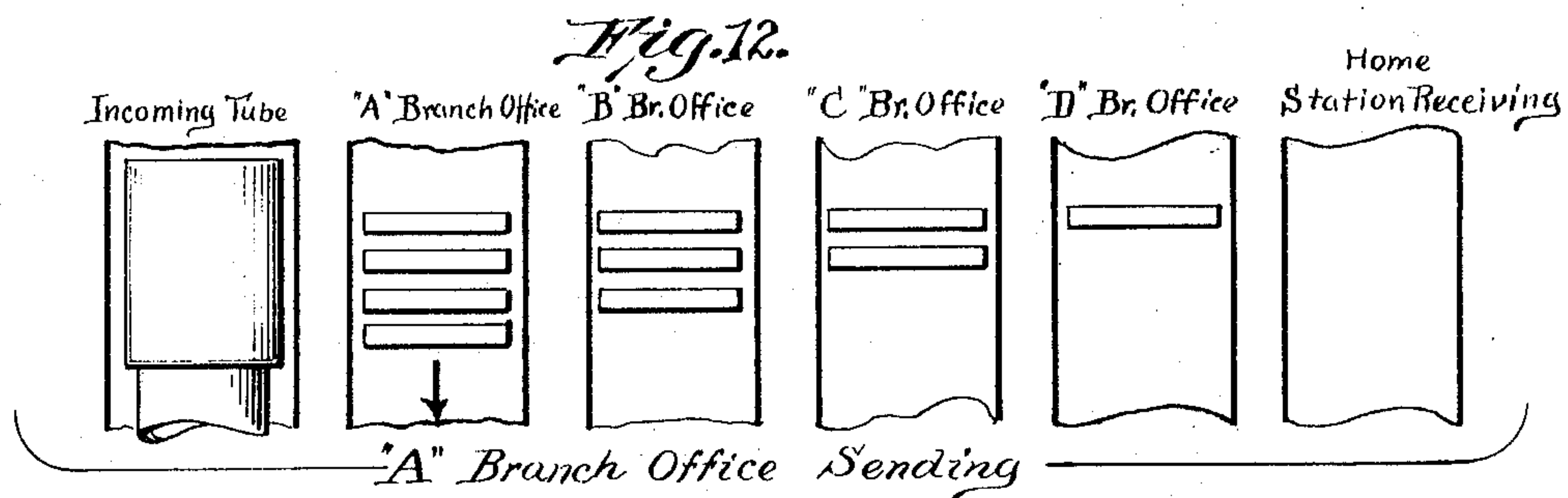


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UNITED STATES PATENT OFFICE

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AUTOMATIC SELECTIVE PNEUMATIC-TUBE-CARRIER RELAY

Application filed February 25, 1929. Serial No. 342,494.

This invention relates to pneumatic tube systems and has special reference to a pneumatic tube system employing carriers and arranged to move the carriers over a selected path automatically.

The invention has for some of its objects the provision of an automatic distributing device or sending selector by means of which a carrier intended to be delivered to one of a series of stations or branch offices will be permitted to enter the tube leading to the selected station and will be prevented from entering the tube leading to any other station; to provide an automatic gathering device or receiving collector having tube connection with several branch stations and arranged to receive carriers from such tubes and deliver them into a tube leading to the delivery center or main station; to provide a selector with carrier receiving chambers arranged to receive carriers and to provide the tubes leading to the selector or collector with means to prevent a carrier from entering an already occupied chamber; to provide a movement, either step by step or continuous slow motion of the selector or collector so that the carriers are delivered to and pass from the selector or collector during the period of rest between steps or in the case of slow motion, the period during which the carrier passes over the discharge opening; to provide means for the proper centering or alining of the selectors at the rest periods with the tubes leading from the selector or collector when step by step motion is employed; to provide means for the proper positioning in the chambers of any carrier which may be irregular in design and be apt to pass into the wrong tube; and to provide means whereby carriers may be received and dispatched manually in the event that a break-down occurs in the operation of the mechanism.

With the above and other objects in view the invention will now be described in detail and then specifically claimed, reference being had to the accompanying drawings, wherein:—

Figure 1 is a vertical median section

through the sending selector and parts closely associated therewith.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 2.

Figure 5 is a detail perspective showing certain latch or safety means used to prevent a carrier entering an already occupied chamber of the sending selector.

Figure 6 is a plan view of the receiving selector.

Figure 7 is a view somewhat similar to Figure 2 but showing the receiving selector arrangement.

Figure 8 is a perspective view of the latch or safety arrangement for the receiving selector.

Figure 9 is an enlarged detail perspective of a portion of Figure 8.

Figure 10 is a view similar to Figure 2 but showing a modification of the sending selector.

Figure 11 is a view similar to Figure 10 showing a second modification of the sending selector.

Figure 12 is a diagrammatic view showing the conditions existing at the sending selector when dispatching a carrier to branch office "A".

Figure 13 is a similar diagram showing the conditions when dispatching to branch office "B".

Figure 14 is a somewhat similar diagram showing the conditions when dispatching to branch office "C".

Figure 15 is a diagram similar to Figure 14 showing the conditions when dispatching to branch office "D".

Figure 16 is a similar diagram showing the conditions when dispatching from the distributing center to the home station at the relay point.

Figure 17 is a diagram showing the general arrangement of the tubes and offices or stations.

Figure 18 is a detail section through the tube leading to the sending selector and the

associated parts of said sending selector, taken on line 18—18 of Fig. 2.

This invention is especially intended for the handling of telegrams or the like although it may be used for various other forms of pneumatic dispatch but, for the better understanding of the device and to present a concrete example of its utility, it will be particularly described in connection with a main and branch telegraph office. To this end reference will now be had at first to Figure 17 where it will be seen that the invention is shown as used in connection with a main office and four branch offices, indicated individually by the letters "A", "B", "C" and "D". Also there is shown in this figure a relay office wherein is located the sending selector, the receiving selector and the air pressure and vacuum means bearing the legend "Air supply." From this air supply, pipes 10 lead to the sending selector and these pipes communicate through the sending selector with pipes 11 leading to the respective branch stations or offices. Similarly, pipes 12 lead from these branch stations to the receiving selector through which they communicate with pipes 13 leading to the "Air supply." Also pipes 14 and 15 respectively connect the sending and receiving selectors with the main office. These pipes are connected by by-passes 16 to the air supply. For convenience the pipes 12 have been shown as leading to the bottom of the receiving selector but in practice the pipes delivering the carriers to the selectors will always enter the tops of such selectors while the pipes receiving carriers from the selectors will be connected to the bottom so that the air pressure will be assisted by gravity at the selectors.

Considering now the sending selector in detail as shown in Figures 1 to 5 and 18, it will be seen that there is provided a housing having a cylindrical body portion 17, having a flat bottom 18 provided with delivery openings 19 to which are led the tubes 11. The top of this housing is closed by a plate 20 having thimbles 21 alined with the openings 19 and receiving the ends of the tubes 10 and 14. Centrally through this housing extends a shaft 22 supported in bearings 23 in the closures 18 and 20 and the lower end of this shaft extends into a gear housing 24 extending downwardly from the bottom 18 and positioned between the tubes 11. Within the housing 17 and fixed on the shaft 22 is a rotor or rotary carrier holder 25 provided adjacent its periphery with equally spaced chambers 26, there being six of these chambers in the present instance so spaced that five at times are alined with the tubes connected with the housing.

On the lower end of the shaft 22 within the housing 24 is an internal gear 27 of the Geneva type, being provided with spaced sets of teeth 28 alternated with segmental dwell

points 29. Meshing with this gear is a Geneva pinion 30 having teeth 31 to engage the teeth 28 and a cylindrical portion 32 engaging the dwells 29. Thus as the pinion 30 rotates the ring gear will be rotated in a step by step movement. The pinion 30 is fixed on a shaft 33 journaled in the gear housing and on the lower end of this shaft is fixed a gear 34 wherewith meshes a gear 35 fixed on a short shaft 36 connected to the driving shaft 37 by a spring pressed plate clutch 38 so that slippage may occur in case of the rotary holder becoming jammed. The shaft 37 is driven by any suitable means (not shown) as by an electric motor. It is to be noted that the step by step movement just described has the effect of bringing the chambers successively into alinement with each of the tubes connected to the selector and of causing said chambers to remain for a period of time motionless in such alinement. To ensure accurate alinement in this manner the periphery of the rotary holder is provided intermediate the chambers with notches 39 and in the wall 17 is an opening 40. A small housing 41 is secured to the wall 17 over this opening and in this housing is a spring pressed plunger 42 engaging a ball 43 to force it into the respective notch 39 as the same comes opposite the opening 40. Since the notches 39 are V-shaped this effects accurate alinement of the chambers and tubes.

Each of the thimbles 21 which receives the tubes 10, is uninterrupted throughout its length since the tubes 10 serve merely for the passage of air. The tube 14, however, leads to a thimble 21 which is especially equipped. At one side of this thimble 21 is a slot or opening 44, (see Fig. 18) below which is a rock shaft 45 which extends transversely of the thimble 21 and has fixed thereon between bearings 46 a rock arm 47. This rock arm 47 is straddled by the forked end of a stop member or pawl 48 which revolves freely on the shaft 45 and has a tongue 49 moving into and out of the thimble 21 through the slot 44 according as the pawl 48 is rocked in one direction or the other. The arm 47 and pawl 48 are connected by a spring 50 so that the rocking of the arm 47 may actuate the pawl 48 while yet permitting said pawl to yield in case it encounters one of the carriers, presently to be described, as it is moved into the thimble 21. By this means crushing of the carrier is prevented. On top of the shaft 22 is a cam-member 51 having six high and six low spots. Positioned on the top 20 is a guide 52 wherethrough slides a plunger or stem 53 having pivotal connection with the end of a rock arm 54 fixed on the shaft 45. The plunger 53 has its inner end bored out and threaded to receive the shank 55 of a yoke member 56 carrying a roller 57 engaging the cam 51. On the stem 55 is also a lock nut 58 which locks the stem to the

plunger 53 in adjusted position and between this lock nut and the guide 52 is a spring 59 which holds the roller 57 normally in contact with the cam wheel 51. The cam wheel 51 is so arranged that its high points are in radial alinement with the respective chambers 26 so that each time one of said chambers stops in alinement with the tube 14, the tongue 49 will be projected into the thimble 21 and thus block the passage of any carrier down through that thimble, it being noted that the tongue is sufficiently far above the chambered member 25 to allow one of the carriers to rest in position ready to drop into said member upon a chamber 26 being alined with the tube 14.

Each of the carriers has a cylindrical body 60, a lower head 61 and an upper head or collar 62. All of these carriers are the same length from end to end but the collars 62 vary in length in accordance with the station or branch office to which the message, inserted in the carrier in the usual way, is intended to be transported. In the outer wall of each of the chambers 26 is a slot 63 and in the wall 17 is a series of corresponding slots 64 which are covered by housings 65 fixed to the outside of the wall 17. It will be seen from Figure 2 that the slots 63 are cam-shaped in plan and that in each of the housings 65, there is provided a vertical shaft 66, whereon is mounted a series of fingers 67 urged inwardly through the slots 64 by springs 68. These fingers 67 form with the collars 62 the distributing selector by means of which the carriers intended to travel through the tubes 11 to particular branch offices are allowed to pass to the proper tubes only. The operation is effected in the following manner, reference being had to Figure 2 at this time.

Beginning with the left hand housing 65 and moving around the drawing in a clockwise direction there are four fingers 67 arranged one above the other in the left hand housing, three of said fingers in the upper housing to the left, two in the upper housing to the right and one in the right hand housing. Now the tube 14 is positioned to feed into the chambers 26 as they arrive at the point marked "X" in that figure. Suppose for instance that the carrier 60 has a collar 62 of such length that it overlaps all four of the fingers 67, it being understood that the top fingers in each housing lie in the same horizontal plane. The carrier 60 will drop down in the chamber 26 until its lower end rests on a bar 69 fixed across the opening in the head 18. The top face of this bar is flush with the top of the head. On the next step in the revolution of the member 25, the carrier 60 will be brought into alinement with the left hand tube 10, the four fingers 67 resting against the side of this long collar 62. Then under the influence of the air

pressure in the tube 10 the carrier will be forced past said fingers as they only hold it by light frictional engagement. On the contrary if the collar 62 be only long enough to engage the upper three fingers 67, the lower fingers 67 in this position will engage the shoulder at the bottom of the collar and the air pressure in the tube 10 will not be able to force the carrier past their lower finger. The same thing takes place when the collar is only long enough for two of the fingers 67 to engage it and when the collar is only long enough for one of the fingers 67 to engage it as may be seen by reference to Figure 1, where it will be noted, in the latter case, that the second finger would not engage beneath the shoulder of the collar 62 and since there are three fingers at the second station, two at the third and one at the fourth it will only be possible for the carrier 60 of Figure 1 to be discharged downward when it arrives at the right hand position of Figure 2. Carriers which are intended for the relay office will not be released until they reach the local discharge opening Y.

In order to accurately position the carriers in the chambers 26 there is provided in front of each of the tubes 11, a vertically movable spring pressed lifter member 70, having a beveled upper end 71, over which the bottom end of each carrier 60 rides as it approaches the respective delivery tube, being thus brought into proper vertical relation with the fingers 67. The member 25 has a cam recess adjacent each chamber 26 as indicated at 72, this cam recess serving to ride over the beveled end 71 and depress it so that the member 25 may rotate.

The use of the pawl 48 and tongue 49 will now be understood since it will be seen that if the carriers 60 be fed too fast into the tube 14, one of these carriers will be positioned ready to drop into the next chamber 26 which alines with that tube, while the next carrier will be held back by said tongue until the tongue has been retracted from the thimble 21 by the action of the cam 51.

Provision is made for manual operation or feeding of carriers into the tubes 11 by providing the upper end of each of these tubes, just below the automatic selector, with a slotted opening 73 normally closed by a cover 74 which may be removed for the insertion of carriers 60 through the openings 73. Also beneath each of the openings 73 there is provided a stop plunger 75 movable into and out of the respective tube 11 and normally held in withdrawn position by a spring 76. By pushing this stop member 75 inwardly any carrier 60 fed into the respective tube 11 may be stopped and withdrawn through the openings 73 is desired.

In Figures 6 to 9 is disclosed the arrangement of the carrier collector which collects the carriers from the various tubes 12 and

delivers them to the tube 15 for transporting to the distributing center or main office, this device being termed the receiving collector. The construction of the receiving collector is substantially identical with that of the sending selector except that there is provided on the upper plate 20, a series, in the example here shown, of six nipples 77, each of which is slotted and there is provided for each of these members the arrangement of rock shaft 45, arm 47 and pawl 48 previously described as being associated with the tube 14. The guide 52 of Figure 5 is, however, replaced by a guide 78 and the plunger 53 is replaced by a slightly different plunger 79, the parts otherwise being the same. No fingers 67 are needed when the device is used as a receiving collector as no selection is necessary.

In this plunger 79 there is a notch 80 and on the guide 78 is a lateral guide 81 where-through passes a latch finger or bar 82 pivoted to the end of a rock arm 83, fixed to the upper part of a shaft 84, carried by a bracket 85, on the side of the housing 86, for the rotary member 87 of this part of the device. The arm 83 is urged by a spring 88 in such direction as to force the bar 82 into the notch 80 upon the plunger 79 being moved outwardly by the action of the cam 51 in this part of the device. The member 87 has six chambers 89 of the same type as the chambers 26 in the member 25 and is driven by a step by step mechanism of the same kind as drives said member 25.

Now referring to Figure 6 it will be seen that the four tubes 12 are connected to the thimbles 77 in the same relative positions as the tubes 10 are connected to the thimbles 21, that is to say, at the left, upper left, upper right and right. Also the lower right hand tube is equipped for local service in sending from the relay office to distributing center, being provided with the arrangement of rock shaft 45, arm 47 and pawl 48. Fixed on the bottom of each shaft 84 is a rock arm 90 carrying a finger 91 which projects through a respective slot 92 in the casing 86 so that it may drop through the slot 93 leading from a respective chamber 89.

A spring 94 constantly urges the finger 91 inwardly but, by reference to Figure 7, it will be seen that whenever a carrier 60 is in one of the chambers 89 the finger 91 will not drop fully into the chamber so that while the shaft 84 may rock slightly under these conditions it does not rock sufficiently to free the trigger or latch finger 82 from the notch 80 and consequently, irrespective of the position of the cam 51, the tongue 49 will project into the respective tube and prevent the carrier 60 therein from dropping into the chamber 89 below. Thus when a chamber 89 is filled it will pass around to the position of the tube 15 where it is ejected from the collector and carried to the distributing center.

Referring to Figure 18 it will be seen that there is provided, below the collector carriage and in alinement with the pipe 14, a valve or closure 95 adapted for manual operation so that if desired the chamber, in alinement with the tube 14 may be opened at the bottom to allow the carrier 60 to pass directly there-through and be removed at the relay office.

In the modifications of the sending selector shown in Figures 10 and 11 there is provided the casing 17 and the rotary carriage 25 having the chambers 26. However, the casing 17 is modified and in place of the fingers 67 there are provided a series of substantially radial fingers 96 urged outwardly by springs 97 and dropping into cam slots 98 formed on the inside of the casing 17.

Figure 11 shows a further modification in which there are series of fingers 99 swinging on pivots 100 and urged by spring 101 to such position that their outer ends drop into cam slots 102. Both in Figure 10 and in Figure 11 there are four fingers for each chamber but the cam slots 98 and 102 are of such depth that they accommodate from one to four of these fingers according to their position in the casing 17 thus acting in this respect the same as the fingers 67.

In the general operation of the machine the carriers are inserted, at the distributing center, one after another in the tube 14. They pass through this tube to the sending selector into which they drop successively and move around that selector until they reach the proper position to be sent to the particular branch office for which the carrier is intended. At this position they pass out of the selector to the branch office through the respective tube 11. In returning from the branch office the carriers are inserted in the respective tubes 12, pass to the receiving collector which carries them around into alinement with the tube 15 through which they pass back to the distributing center.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

We claim:

1. In a pneumatic tube system, a main station, a series of branch stations, a relay station between the main and branch stations, a sending tube and a receiving tube leading from the main to the relay station, pairs of tubes leading from the relay station to respective branch stations, each pair of tubes consisting of a sending tube and a receiving tube, and means at the relay station where-

with the tubes communicate and including a sending selector whereto the sending tube from the main station connects and a receiving collector whereto the receiving tube leading to the main station connects.

2. In a pneumatic tube system, a selector and collector mechanism including a cylindrical housing having a tube connection on one end and a plurality of tube connections on its other end, a carrier holder rotatably mounted in said housing and having a series of carrier receiving chambers positioned for successive alinement with each of said tube connections, and means for imparting movement to said carrier holder.

3. In a pneumatic tube system, a selector and collector mechanism including a cylindrical housing having a tube connection on one end and a plurality of tube connections on its other end, a carrier holder rotatably mounted in said housing and having a series of carrier receiving chambers positioned for successive alinement with each of said tube connections, means for imparting movement to said carrier holder, and means to prevent a carrier from entering an occupied chamber.

4. In a pneumatic tube system, a selector and collector mechanism including a cylindrical housing having a carrier delivery tube or tubes connected to one end and a carrier receiving tube or tubes connected to its other end, a carrier holder mounted in said housing to revolve axially therein and having a series of carrier holding chambers positioned to register successively with the delivery and receiving tubes, a stop mechanism for said delivery tube or tubes and positioned to engage and hold the second of a pair of carriers in said tube or tubes passing towards said housing, and means for revolving said carrier holder and intermittently releasing the stop mechanism.

5. In a pneumatic tube system, a selector and collector mechanism including a cylindrical housing having a carrier delivery tube or tubes connected to one end and a carrier receiving tube or tubes connected to its other end, a carrier holder mounted in said housing to revolve axially therein and having a series of carrier holding chambers positioned to register successively with the delivery and receiving tubes, a stop mechanism for said delivery tube or tubes and positioned to engage and hold the second of a pair of carriers in said tube or tubes passing towards said housing, and mechanism actuating the carrier holder and arranged to bring the chambers successively in alinement with said tubes.

6. In a pneumatic tube system, a selector and collector mechanism including a cylindrical housing having a carrier delivery tube or tubes connected to one end and a carrier receiving tube or tubes connected to its other end, a carrier holder mounted in said housing to revolve axially therein and having a series

of carrier holding chambers positioned to register successively with the delivery and receiving tubes, a stop mechanism for said delivery tube or tubes and positioned to engage and hold the second of pair of carriers in said tube or tubes passing towards said housing, mechanism actuating the carrier holder and arranged to bring the chambers successively to rest in alinement with said tubes, and means controlled by the actuating mechanism and moving the stop to release position intermediate the positions of the carrier holder upon alinement of said chambers with said tubes.

7. In a pneumatic tube system, a selector and collector mechanism including a cylindrical housing having a carrier delivery tube or tubes connected to one end and a carrier receiving tube or tubes connected to its other end, a carrier holder mounted in said housing to revolve axially therein and having a series of carrier holding chambers positioned to register successively with the delivery and receiving tubes, a stop mechanism for said delivery tube or tubes and positioned to engage and hold the second of a pair of carriers in said tube passing towards said housing, mechanism actuating the carrier holder and arranged to bring the chambers successively in alinement with said tubes, a cam actuated by the actuating mechanism and having alternate high and low portions, and a push rod actuating said stop mechanism and engaged by a high portion of the cam upon each chamber being alined with the delivery tube.

8. In a device of the kind described, a selector including a revolving carrier holder having a series of carrier receiving chambers, a housing for said carrier holder, a series of sets of fingers movable into and out of said chambers laterally thereof, and means controlled by the revolution of the carrier holder for controlling the action of said fingers.

9. In a device of the kind described, a sending selector for selecting and distributing pneumatic carriers to branch offices and including a casing having openings around its sides corresponding in number to the number of branch offices, a rotary carrier holder in said housing and having a series of carrier receiving chambers adjacent its periphery, each chamber being provided with a lateral port adapted to register successively with the casing openings as the holder rotates, and sets of fingers mounted on said housing and projected through the openings therein to enter the carrier chambers and engage the carriers in said chambers.

10. In a device of the kind described, a sending selector for distributing pneumatic carriers to branch offices and including a casing having openings around its sides corresponding in number to the number of

branch offices, a rotary carrier holder in said housing and having a series of carrier receiving chambers adjacent its periphery, each chamber being provided with a lateral port adapted to register successively with the casing openings as the holder rotates, sets of fingers mounted on said housing and projected through the openings therein to enter the carrier chambers and engage the carriers in said chambers, and a closure for the bottom of said housing having openings with which said chambers register successively, said openings being positioned for registry by the chambers during the protraction of the fingers into said chambers.

11. In a device of the kind described, a sending selector for distributing pneumatic carriers to branch offices and including a casing having openings around its sides corresponding in number to the number of branch offices, a rotary carrier holder in said housing and having a series of carrier receiving chambers adjacent its periphery, each chamber being provided with a lateral port adapted to register successively with the casing openings as the holder rotates, sets of fingers mounted on said housing and projected through the openings therein to enter the carrier chambers and engage the carriers in said chambers, a closure for the bottom of said housing having openings with which said chambers register successively, said openings being positioned for registry by the chambers during the protraction of the fingers into said chambers, and mechanism for driving the carrier holder and arranged to cause alinement of the chambers and said openings during protraction of said fingers into said chambers.

12. In a device of the kind described, a sending selector for distributing pneumatic carriers to branch offices and including a casing having openings around its sides corresponding in number to the number of branch offices, a rotary carrier holder in said housing and having a series of carrier receiving chambers adjacent its periphery, each chamber being provided with a lateral port adapted to register successively with the casing openings as the holder rotates, sets of fingers mounted on said housing and projected through the openings therein to enter the carrier chambers and engage the carriers in said chambers, a closure for the bottom of said housing having openings with which said chambers register successively, said openings being positioned for registry by the chambers during the protraction of the fingers into said chambers, mechanism to drive said holder, and means actuated by said mechanism for preventing entry of a carrier into an occupied chamber.

13. In a device of the kind described, a receiving collector for collecting pneumatic carriers from branch offices for dispatch into

one tube and including a casing, a rotary carrier holder in said casing or housing and having a series of carrier receiving chambers adjacent to its periphery, a closure for the bottom of said housing having an opening with which said chambers register successively, mechanism for providing motion to said holder and means actuated by said mechanism for preventing entry of a carrier into an occupied chamber.

In testimony whereof we affix our signatures.

WILLIAM V. McGUINNESS.
JOHN M. CHULSTROM.

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