

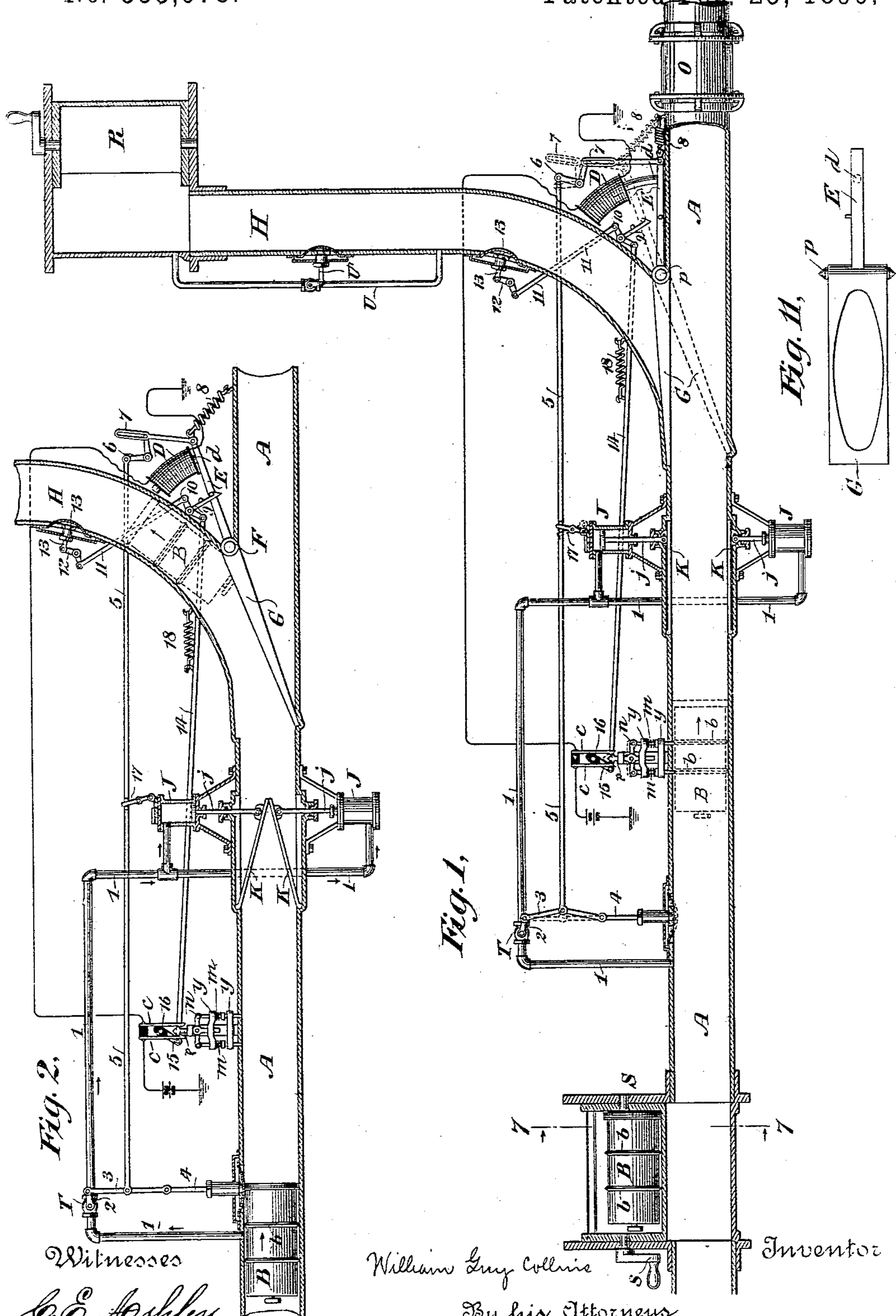
(No Model.)

2 Sheets—Sheet 1

W. G. COLLINS.
PNEUMATIC TUBE.

No. 555,078.

Patented Feb. 25, 1896.



Witnesses
C. E. Ashley
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William Guy Collins
By his Attorneys
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Inventor

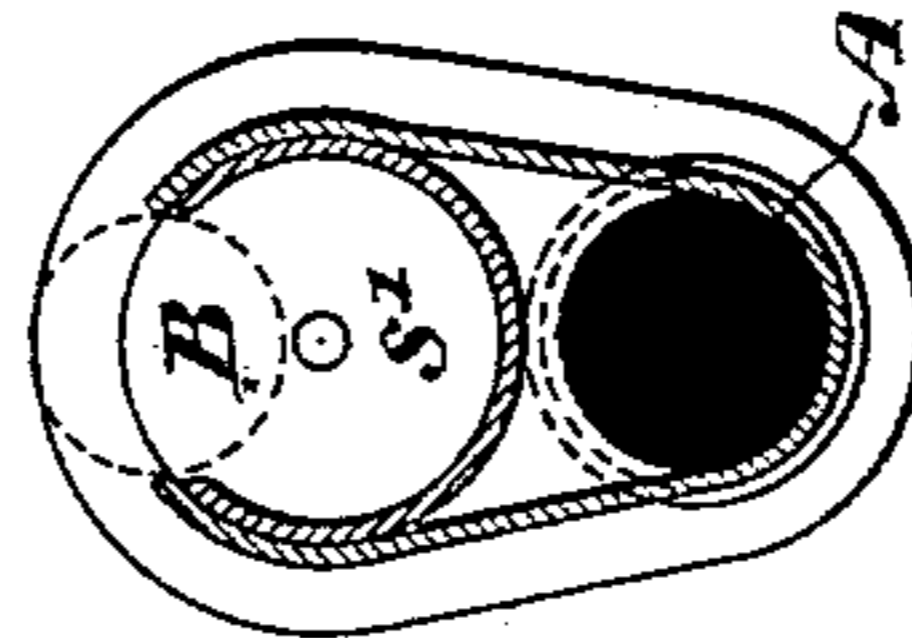
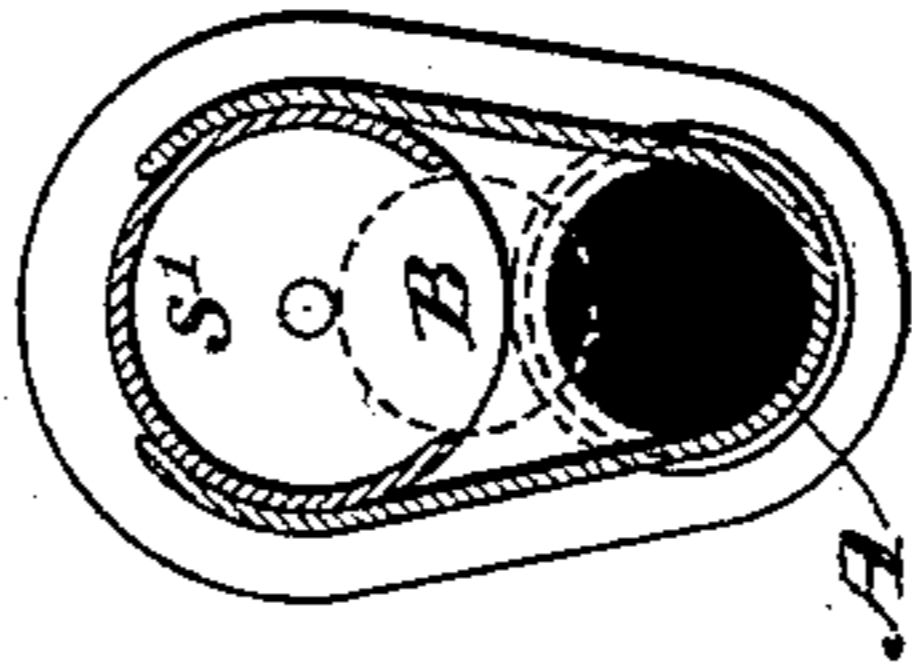
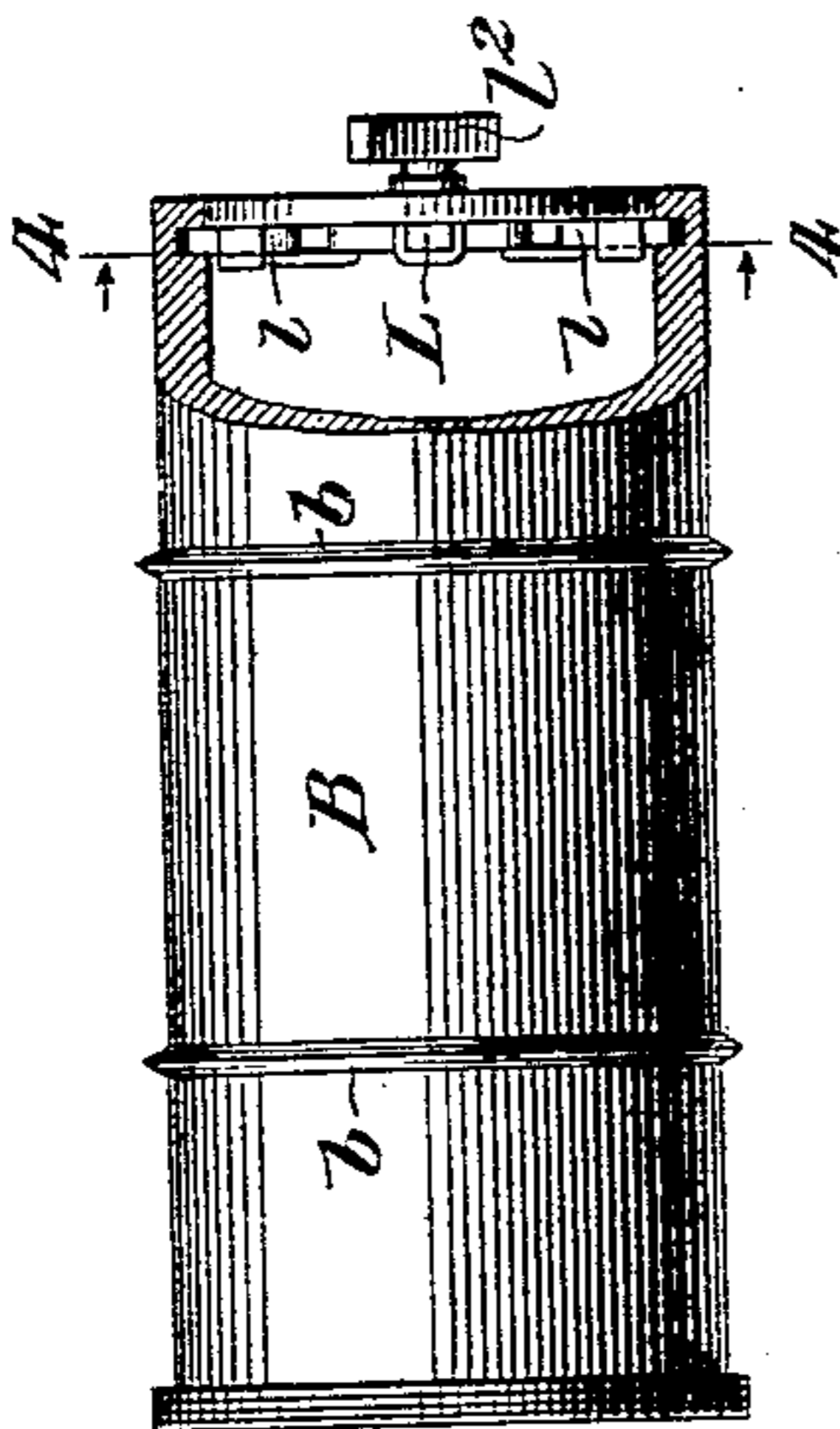
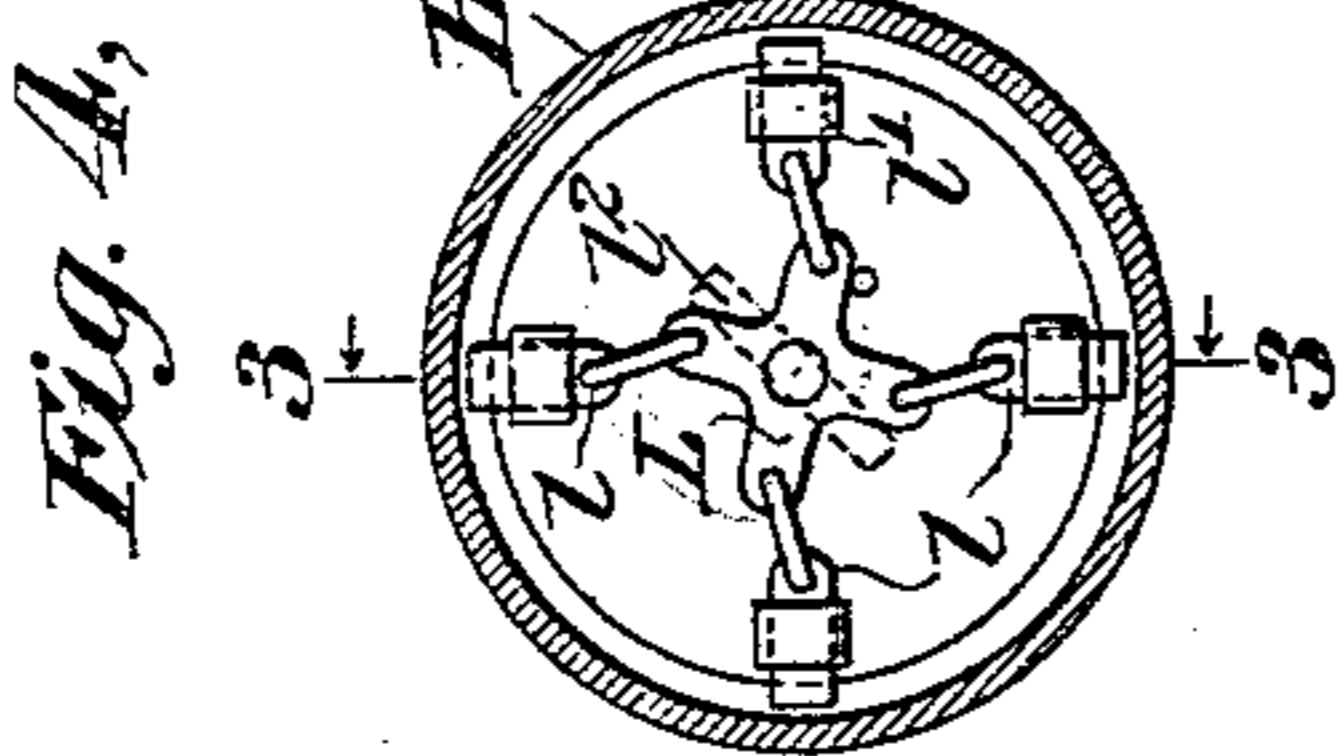
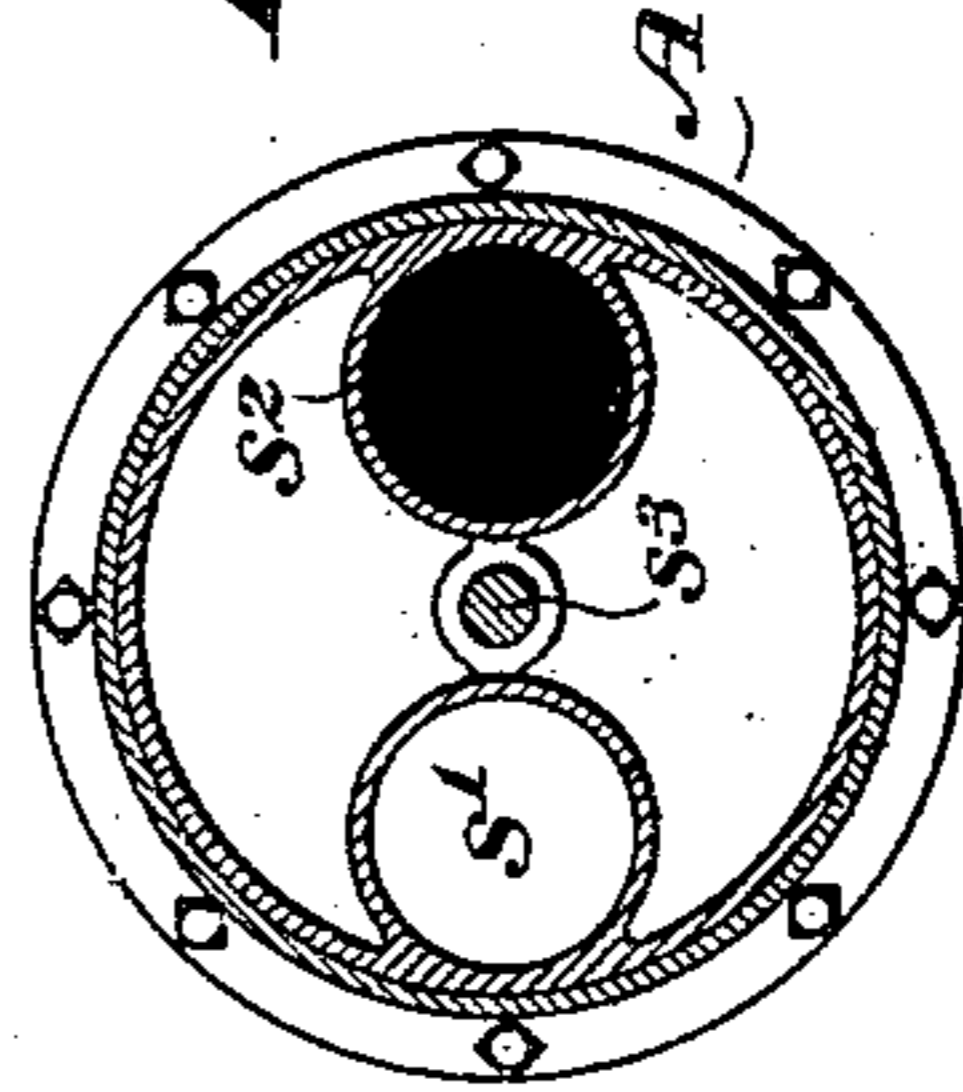
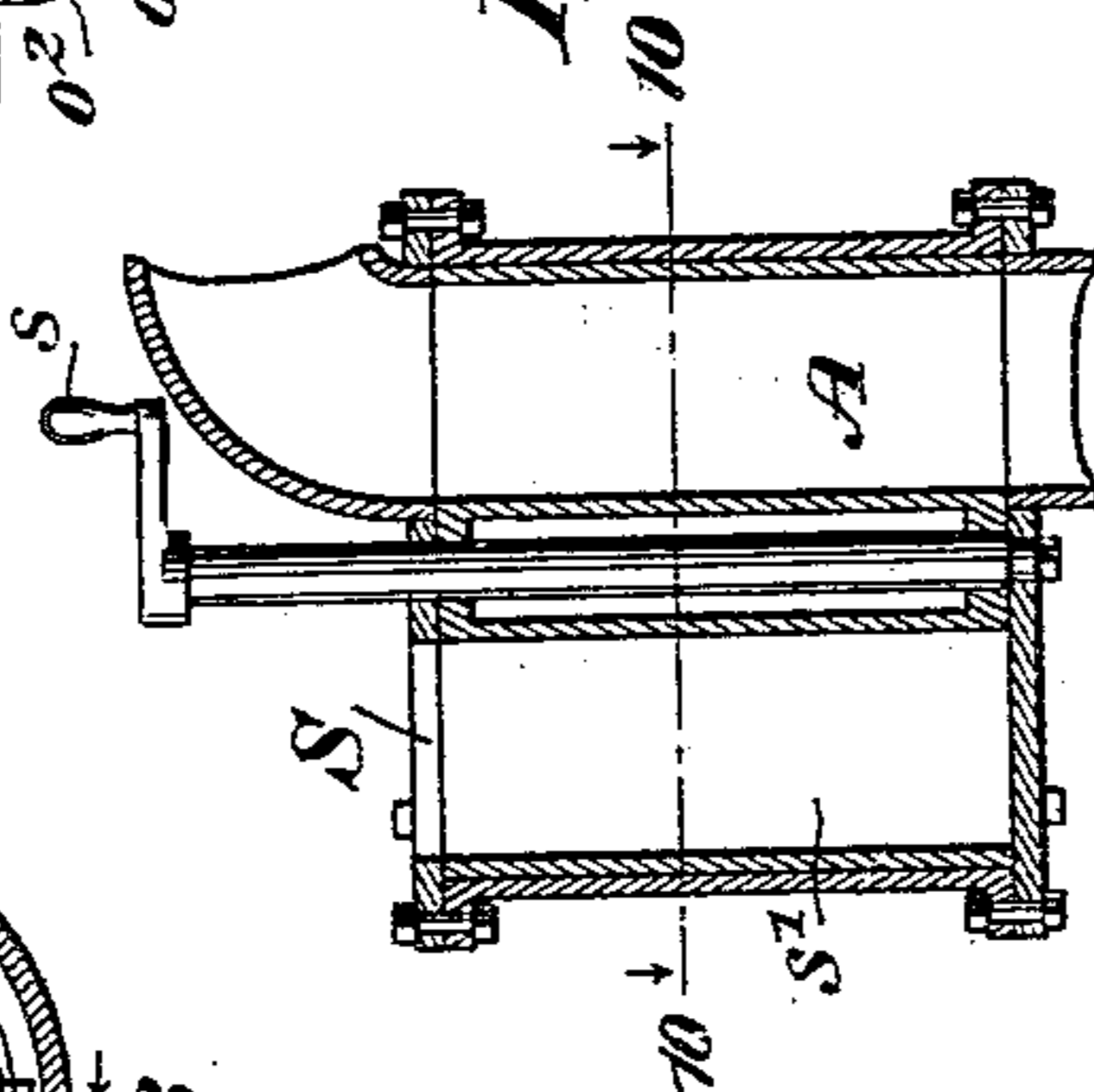
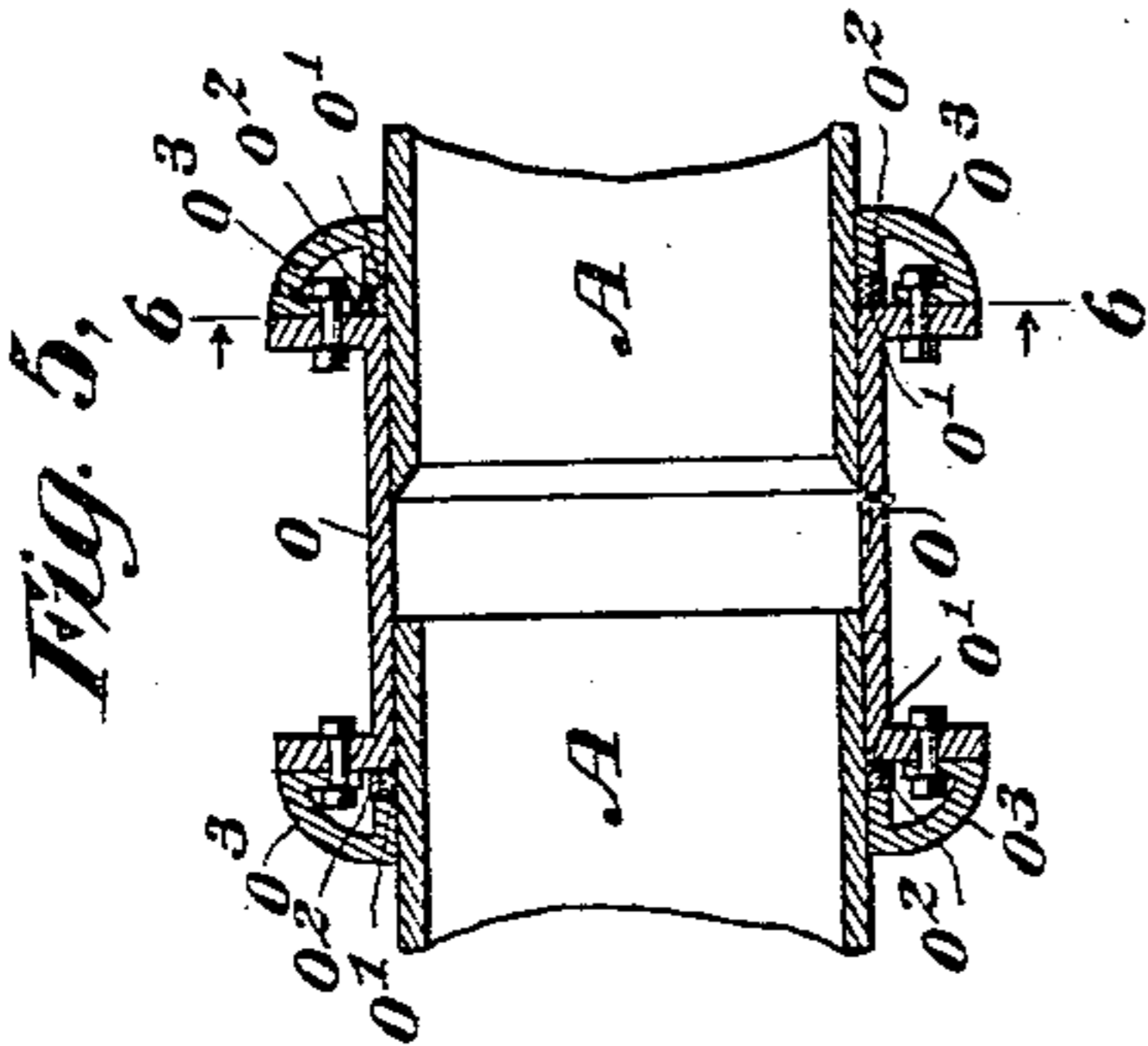
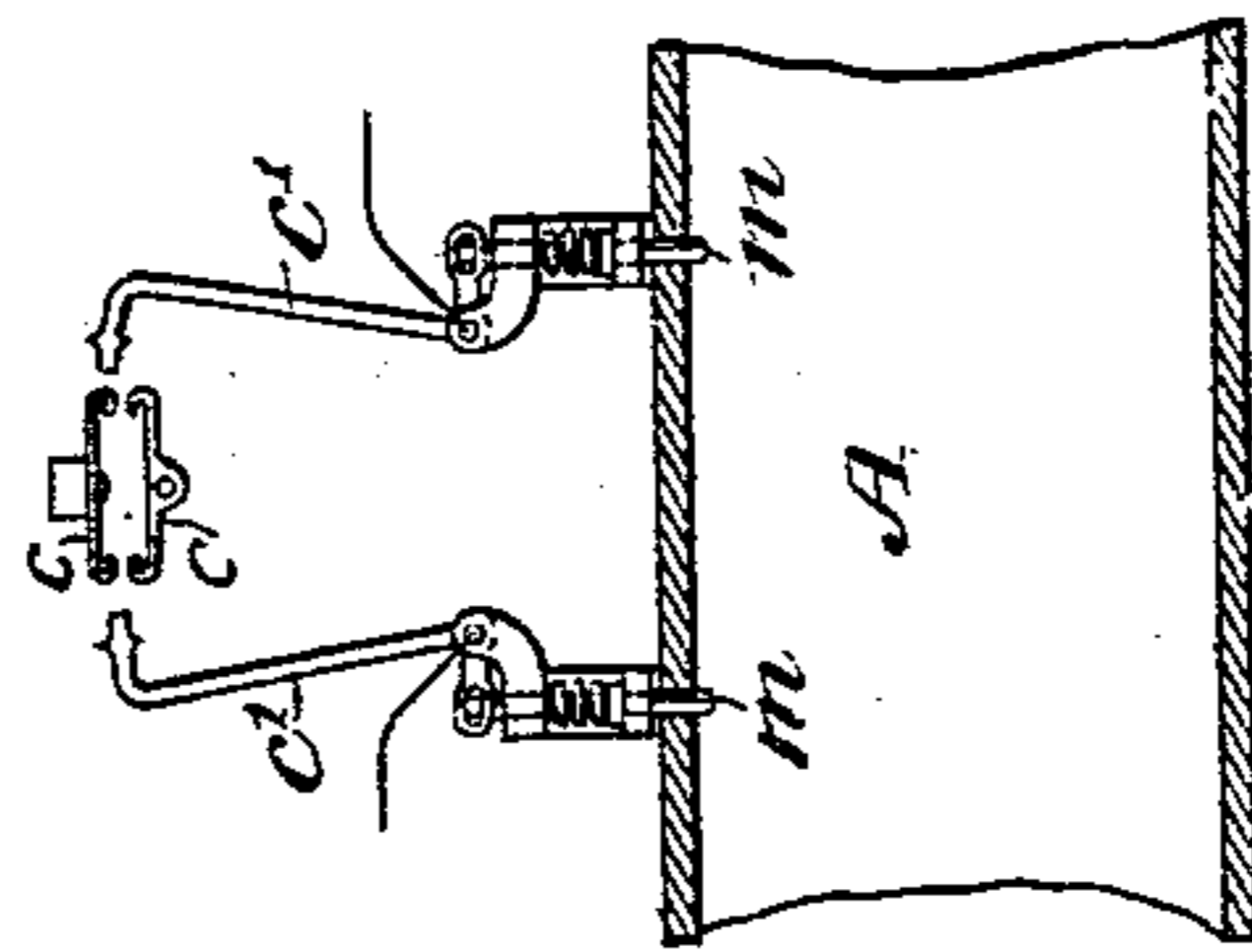
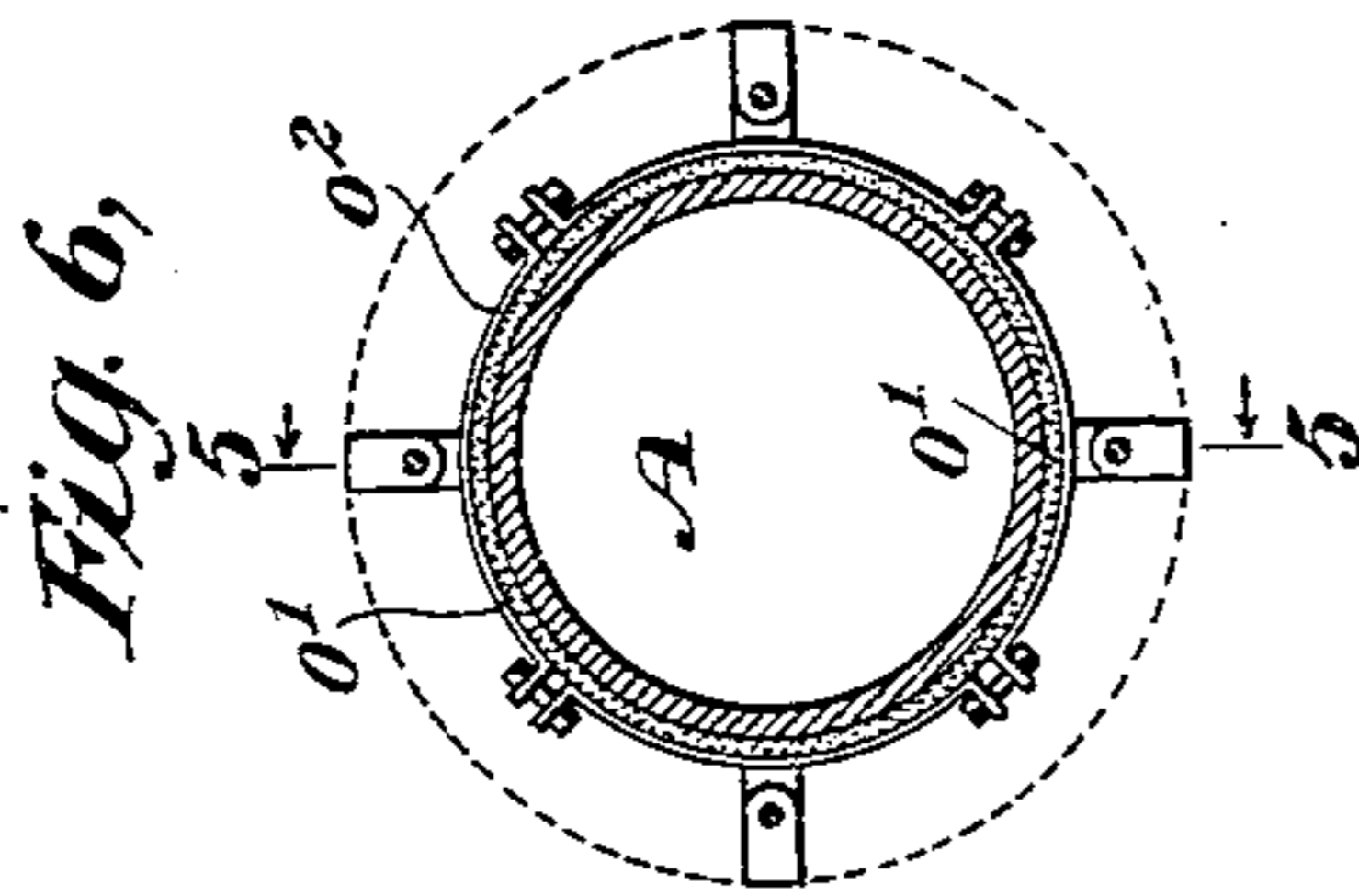
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UNITED STATES PATENT OFFICE.

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PNEUMATIC TUBE.

SPECIFICATION forming part of Letters Patent No. 555,078, dated February 25, 1896.

Application filed January 15, 1892. Serial No. 418,195. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM GUY COLLINS, a citizen of the United States, residing in the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Pneumatic Tubes, (Case B,) of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, forming part hereof.

My invention relates to pneumatic tubes for carrying or sending objects by pneumatic pressure or suction, and has for its object to provide better and more efficient means for such transmission and for switching carriers into their appropriate branch tubes.

It consists in an improved apparatus for that purpose, the several parts of the invention being set forth in detail in the claims at the end of this specification. In order that they may be fully understood I have represented in the accompanying drawings and will now describe the form of apparatus which I prefer to use for the purpose and the mode of operation by its use.

Figures 1 and 2 represent side views of my improved device, partly in section. Figs. 3 and 4 are respectively side and end views of my improved carrier and cover. Figs. 5 and 6 are respectively side and end views of my improved expansion-joint. Figs. 7 and 8 are cross-sections of the sender. Figs. 9 and 10 are respectively vertical and cross sections of a modification of such sender. Fig. 11 is a side view of the switch, and Fig. 12 shows a modification of the communicating rods and their connections.

In the apparatus shown in the drawings, A is a main tube, and H is a branch tube through which carriers are forced by air-pressure or suction by any suitable means. At each angle formed by a branch tube with the main tube is pivoted a switch G. The switch preferably employed consists of a plate having in it an opening, (shown on Fig. 11,) a pivot F, and an extension-arm E. The switch is preferably made so that when closed, as shown in full lines, Fig. 1, its outer surface forms a continuation of the wall of the main tube. The other side is preferably somewhat in-

clined. A small recess is made in the opposite wall of the tube, and in this the end of the switch lies when the switch is open, as shown in dotted lines, Fig. 1.

The opening in the switch allows the forward and rear projecting edges of the carrier room within which to turn in rounding into the branch tube H, and also permits the free flow of air at all times down both the main and branch tubes. To the end of the extension-arm E is fastened the armature *d*, working in the electromagnet or solenoid D, by means of which the switch G is opened or moved into the position shown on Fig. 2 and closed or moved into the position shown in full lines in Fig. 1.

S is the sender. It consists of a cylinder mounted on horizontal bearings and capable of being revolved by the handles. This cylinder has an opening, as shown in Figs. 7 and 8, wide and long enough to permit the entrance of the carrier. The carrier is placed in *s'* of the sender when the latter is in the position shown in Fig. 7, with the opening upward. The handle *s* is then turned and *s'* inverted, when the carrier drops out into the main tube, as shown in Fig. 8, and is then forced by pneumatic pressure to its destination.

My improved sender affords ready and efficient means for introducing carriers into the main tube without leakage of air therefrom.

My improved receiver R is of the same construction, the revolving cylinder being in this case of course placed below the end of the main or branch tube where the carrier is deposited. It is shown as connected with the branch tube, and a pipe U, having a cock, and a device U', adapted to be actuated by the carrier to control said cock, are also preferably employed to direct an extra supply of compressed air into the receiver, and thus offer a cushion to the impact of the carrier at that point, this, however, forming no essential part of my invention.

The carrier consists of a cylindrical box B, (shown in Fig. 3,) having around it metal bands *bb*. Each carrier is provided with such bands; but the distance between the bands on any carrier intended for a branch tube differs

from the distance between the bands on the carriers not intended to switch off into that particular branch tube.

In my improved apparatus the switch of any branch tube is automatically opened and closed by those carriers intended to pass through that particular branch tube, but by no other carriers. This is accomplished by an electromagnet D having an armature *d* fastened to the extension-arm E near its end. When a current is passed through D the armature *d* is drawn up and the switch is opened, as shown in Fig. 2. When the current ceases the spring 8 pulls the switch back into its normal closed position.

The circuit is automatically closed and opened by the following devices: *m m* are two short rods pivoted to the cross-bar *n* at its opposite ends and working in slots cut in the cross-bar *y y*. These rods *m m* project into the main tube A far enough to be struck by the bands of a passing carrier, but not far enough to reach the main body of the carrier itself. The cross-bar *n* is fastened at its center to the upright metallic arm *p*, which is shaped at its upper end like the head of an arrow. When a carrier passes, the distance between whose bands is the same as the distance between the points of the two rods *m m*, these rods are both forced up by the bands at the same time and the arrow-head of the arm *p* strikes against and forces apart the metallic spring-jaws *c c*, which are pivoted at their upper ends. The spring-jaws at once catch and hold the head of the arm *p* until it is released, as hereinafter described. As soon as *p* touches the spring-jaws *c c*, the circuit through the electromagnet D is closed and remains so until *p* is released in the following manner: 13 is a rod working in a cylinder and has a round enlarged surface at its end. This rounded end projects slightly into the branch tube H, as shown in Fig. 2. The other end of the arm 13 is pivoted to the bell-crank 12, the latter to the arm 11, this to the bell-crank 10, and the latter to the rod 14. The rod 14 is pivoted to the lever 15, which latter is pivoted at its other end to a fixed pin and carries at its said end an elliptical button 16. When the carrier strikes the rounded end of the arm 13, it pushes that arm in, and thus through the bell-cranks and arms 12, 11, 10, and rod 14 pushes out the lever-arm 15, and by turning to the proper extent the button 16 forces the spring-jaws *c c* apart and releases the head of *p*, when it and the rods *m m* drop to their normal position. The circuit is thus opened and the spring 8 pulls back the switch into its normal closed position. If desired, the spring-catch 9 can also be used in connection with or as a substitute for the catches on the end of *p* and *c c* for the purpose of holding the switch open. A stud on the extension-arm E engages with the spring-catch 9 as the switch is opened, and the spring-catch then holds the extension-arm E up until the carriers strike 13, when,

as is evident from an inspection of the drawings, the spring-catch 8 is unlocked from the stud. The rod 14 and its connecting bell-cranks and arms are held in their normal position by means of the spring 18.

When a carrier passes whose two bands are either closer together or farther apart than are the two rods *m m*, these rods *m m* will be struck by the bands successively and not both at the same time. The rod *p* will thus only be very slightly raised, not enough to engage with the spring-jaws *c c*, and the switch will remain closed. Only those carriers, therefore, will operate the switch the distance between whose bands equals that between the carrier-actuated rods *m m*. But one branch tube is shown in the drawings, but of course as many can be used as are desired, the switching apparatus being in every case the same as that already described, with the exception that the distance between the points of the carrier-actuated rods *m m* will vary with each switch.

To avoid the danger of blocking the apparatus should a carrier intended for the main tube or a switch farther on follow too closely upon a carrier intended for a nearer switch, I have devised the following apparatus: K K are two levers pivoted at one end in a recess in the wall of the main tube. These levers in their normal position lie in these recesses out of the way of carriers in the main tube. At the other end of each lever is pivoted a piston-rod *j*, working in the cylinder J. The cock T on the pipe 1 controls the admission of air from the main pipe A into the cylinders J. When T is opened air rushes from A through pipe 1 into the cylinders J, forces out the piston-rods *j j*, and pushes the levers K K into the position shown in Fig. 2, where they would arrest or retard the progress of any succeeding carriers until the switch and the cock T have been again closed, when the succeeding carrier or the air-pressure in A, or both, would push in the levers K K and the piston-rods *j j* and clear the tube A for the passage of the succeeding carrier. The cock T is opened and closed in the following manner: Connected with the cock T is the arm 2, pivoted at its other end to the toggle-joint 3, which latter is also pivoted to the rod 4. The rod 4 works in a cylinder, as shown in Fig. 1, and has an enlarged rounded end. This rounded end of the rod 4 projects slightly into the tube A when the toggle-joint 3 is in the dotted position shown in Fig. 1, but at other times is withdrawn from the tube. The rod 5 is fastened at one end to the middle of the toggle-joint 3 and at the other end is pivoted to the bell-crank 6. The other end of the bell-crank 6 works in a slot in the arm 7, which latter is fastened at its other end to the extension-arm E. When the switch is closed, these various arms, bell-crank and toggle-joint are in the position shown in full lines in Fig. 1. When the switch is open and as long as it remains open, they assume and re-

main in the position shown in dotted lines in the same figure and shown by full lines in Fig. 2. In this latter position the rounded end of the rod 4 projects into the tube A. If a carrier passes at this juncture it pushes up the arm 4 and the toggle-joint 3 and opens the valve T, and the levers K K are thereupon at once forced out and the carrier is detained. When the switch is closed by the preceding carrier as it passes into the branch tube H, the toggle-joint is pulled back and the cock T is closed, when the levers K K are at once forced back into their recesses and the carrier passes on down the main tube.

To assist a carrier or the air-pressure in A to close the levers K K after the switch G has been closed, an opening into the atmosphere is made in the head of each of the cylinders J J, closed by a sliding valve operated by a lever 17, secured at one end to the rod 5 and at the other end to the valve. When the switch G is open the lever 17 closes the valve. When the switch is closed it opens the valve and allows the air in the cylinder to pass into the atmosphere as the levers K K are closed. Only one lever 17 is shown, it being understood that another lever precisely like it connects with the valve on the other cylinder.

My improved cover for carriers is shown on Figs. 3 and 4, Fig. 3 being a sectional side view on the lines 3 3 of Fig. 4, and Fig. 4 being a cross-section on the lines 4 4 of Fig. 3. Four bolts *l* working in the slots *l'* are each flexibly connected by a link to an arm of the piece L. The latter is turned by the key *l*². As is evident from an inspection of the drawings, a turn of the key *l*² in one direction will force the bolts into the groove shown in Fig. 3 and fasten the cover on tightly, while a turn of the key in the other direction will withdraw the bolts and unloosen the cover.

A modified form of my improved sender and receiver is shown in Figs. 9 and 10, Fig. 9 representing a side view partly in section, and Fig. 10 a cross-section on the lines 10 10, Fig. 9. This sender is designed to be used in vertical pneumatic tubes. It consists of a cylinder considerably larger than the tube A with a solid top and bottom plate, except that through the cylinder and the top and bottom plates are cut two or more cylindrical holes of a diameter corresponding to that of the main tube A. The drawings show two such holes *s'* and *s*². A carrier is placed in *s'*, and the handle *s* is turned until *s'* is in line with the tube A, when the carrier is forced onward through the tube A to its destination. The sender is simple and efficient and prevents leakage of air.

A modification of the carrier-actuated rods and spring-catches is shown in Fig. 12. The upper catch *c* is preferably made stationary, while the lower catch *c* oscillates. It is thus evident that if one of the levers *c'* alone is actuated by the carrier the head of the lever *c'* will not force the spring-catches apart so

as to be held by them; but if both levers *c'* are actuated at the same time the catches will be opened and will hold the arms *c'*.

Certain parts of my apparatus which are shown and described in the drawings and specification, but not claimed in the present application, are claimed in a certain other application made by me and filed simultaneously herewith under Serial No. 418,194.

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

1. In a pneumatic-tube system, the combination with a switch controlling the junction between two tubes, of an electric circuit including a magnet and an armature for directly operating said switch, a circuit-maker in said circuit and rods projecting into the tube adapted when simultaneously struck by the bands of a carrier to operate said circuit-maker to close said circuit, substantially as set forth.

2. In a pneumatic-tube system, the combination with a switch controlling the junction between two tubes, of an electric circuit including a magnet and an armature for directly operating said switch, rods projecting into the tube automatically actuated by the carrier to close said circuit, and spring-catches to keep said circuit closed, substantially as set forth.

3. The combination with a main tube, a branch tube, and a switch controlling the junction between two tubes, of an electric circuit including a magnet and an armature for directly operating said switch, rods projecting into the tube automatically actuated by the carrier to close said circuit, spring-catches to keep said circuit closed, a rod projecting into the branch tube, and connecting arms and levers adapted to release said catches and open the circuit when said rod is struck by the carrier, substantially as set forth.

4. The combination with a main tube, a branch tube, a switch for controlling the junction between said tubes, and an electric circuit including an electromagnet and an armature for directly operating said switch, of the carrier-actuated rods *m m*, cross-bar *n* connected to the upper ends of said rods, vertical arm *p* carried by said cross-bar, and spring-jaws *c c* adapted to engage with the said vertical arm when said carrier-actuated rods are raised, and thus close said circuit, substantially as set forth.

5. The combination with a main tube, a branch tube, a switch for controlling the junction between said tubes, and an electric circuit including an electromagnet and an armature for directly operating said switch, of the carrier-actuated rods *m m*, cross-bar *n* connected to the upper ends of said rods, vertical arm *p* carried by said cross-bar, spring-jaws *c c* adapted to engage with said vertical arm when said carrier-actuated rods are raised to thus close said circuit, lever 15 having circuit-opening button 16, rod 14 connected to

said lever, carrier-actuated rod 13 in said branch tube, and lever connections 12, 11, 10, between said rods 13 and 14, substantially as and for the purpose specified.

5 6. In a pneumatic-tube system, the combination with a main tube, a branch tube, and a switch controlling the junction between said tubes, of carrier-actuated rods or points projecting into said main tube, devices connect-
10 ing said carrier-actuated rods with said switch whereby the movement of said rods will actuate said switch, and a carrier having bands or projections so spaced upon its body as to agree with the distance apart of said rods from
15 each other, so as to insure concurrent contact between said bands or projections and the ends of said rods, substantially as set forth.

7. The combination with a pneumatic tube and a switch therein, of a carrier-actuated rod
20 adapted to project into said tube, lever connections between said rod and said switch, carrier-retarding levers pivoted in the wall of the tube and controlled by the movement of said carrier-actuated rod and system of levers,
25 the whole being arranged so that when the switch is opened said carrier-actuated rod will be projected into the tube, and in such manner that when said rod is struck by the carrier said carrier-retarding levers will be
30 thrown out into the tube, substantially as and for the purpose set forth.

8. In combination with a switch in a pneumatic tube, levers in the side of the tube attached to piston-rods working in cylinders, a
35 pipe for supplying compressed air, gas or liquid to said cylinders, a cock regulating such supply, a rod for operating said cock and lever connections with said switch to throw said rod into position in the tube to operate said
40 cock when the switch is opened and to withdraw it as the switch is closed, substantially as shown and described.

9. The combination with a main tube, a branch tube and a switch controlling the junction
45 between them, of carrier-retarding levers K K, pivoted in and adapted to be thrown across said main tube, cylinders J J, having pistons and piston-rods in connection with said levers, air-pipe 1 having cock T, carrier-
50 actuated rod 4, toggle-joint 3 and lever 2 connecting said rod to said cock, arm 7, connected to the switch, and bell-crank 6 and rod 5 connecting said arm and said toggle-joint, substantially as and for the purpose set forth.

55 10. The combination with a pneumatic tube, of a receiver or sender composed of an outer casing smaller in cross-section at its lower part

than at its upper, its lower part being in line with and of the same size as the tube, and a horizontal hollow cylinder mounted in bearings in the upper part of said casing and capable of being rotated on its axis, a handle to rotate the same, and an opening in said cylinder to permit the entry or discharge of the carrier, substantially as shown and described. 60 65

11. In combination with a switch in a pneumatic tube, levers in the side of the tube attached to piston-rods working in cylinders, a pipe for supplying compressed air, gas or liquid to said cylinders, a cock regulating such supply, a rod for operating said cock and lever connections with said switch to throw said rod into position in the tube to operate said cock when the switch is opened and to withdraw it as the switch is closed, openings for the escape of air from said cylinders, valves controlling such openings, and lever connections between said valve and the switch whereby said valves are closed when the
75 switch is open and opened when the switch is closed, substantially as shown and described. 80

12. In a pneumatic-tube system, an electric circuit normally open, a circuit-maker therein, a carrier having two encircling bands of greater diameter than its body, in combination with a carrier-actuated device consisting of two rods or points projecting into the tube, the distance between which rods or points corresponds with the distance between the bands of the carrier, so that said rods and bands may come in contact with each other to operate said circuit-maker and close said circuit, a switch or gate in said tube controlled by an electromagnet or solenoid in said circuit, substantially as set forth. 85 90 95

13. In a pneumatic-tube system, an electric circuit normally open an electromagnet therein, a switch at the junction of two tubes under the control of said magnet a circuit-maker in said circuit, a carrier having two encircling bands of greater diameter than its body, in combination with a carrier-actuated device consisting of two rods or points projecting into the tube, the distance between which rods or points corresponds with the distance between the bands of the carrier, so that said rods and bands may come in contact with each other to operate said circuit-maker and close said circuit, substantially as set forth. 100 105

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