WIER & WIER.

Invention of Improvements in Pneumatic Apparatus employed in transmitting Motive Power for Signalling and Indicating, or for other purposes.

117025 PATENTED JUL 11 1871

Fig. 1.

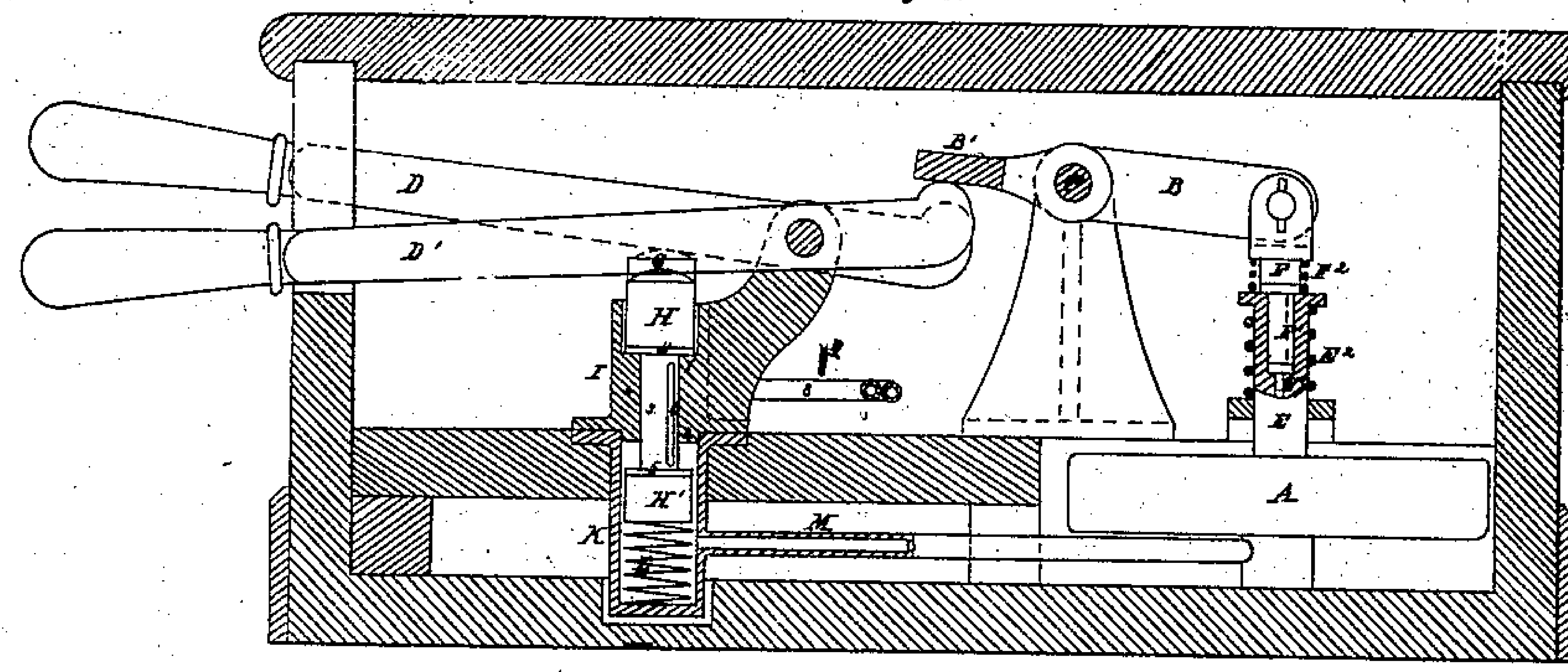


Fig. 2.

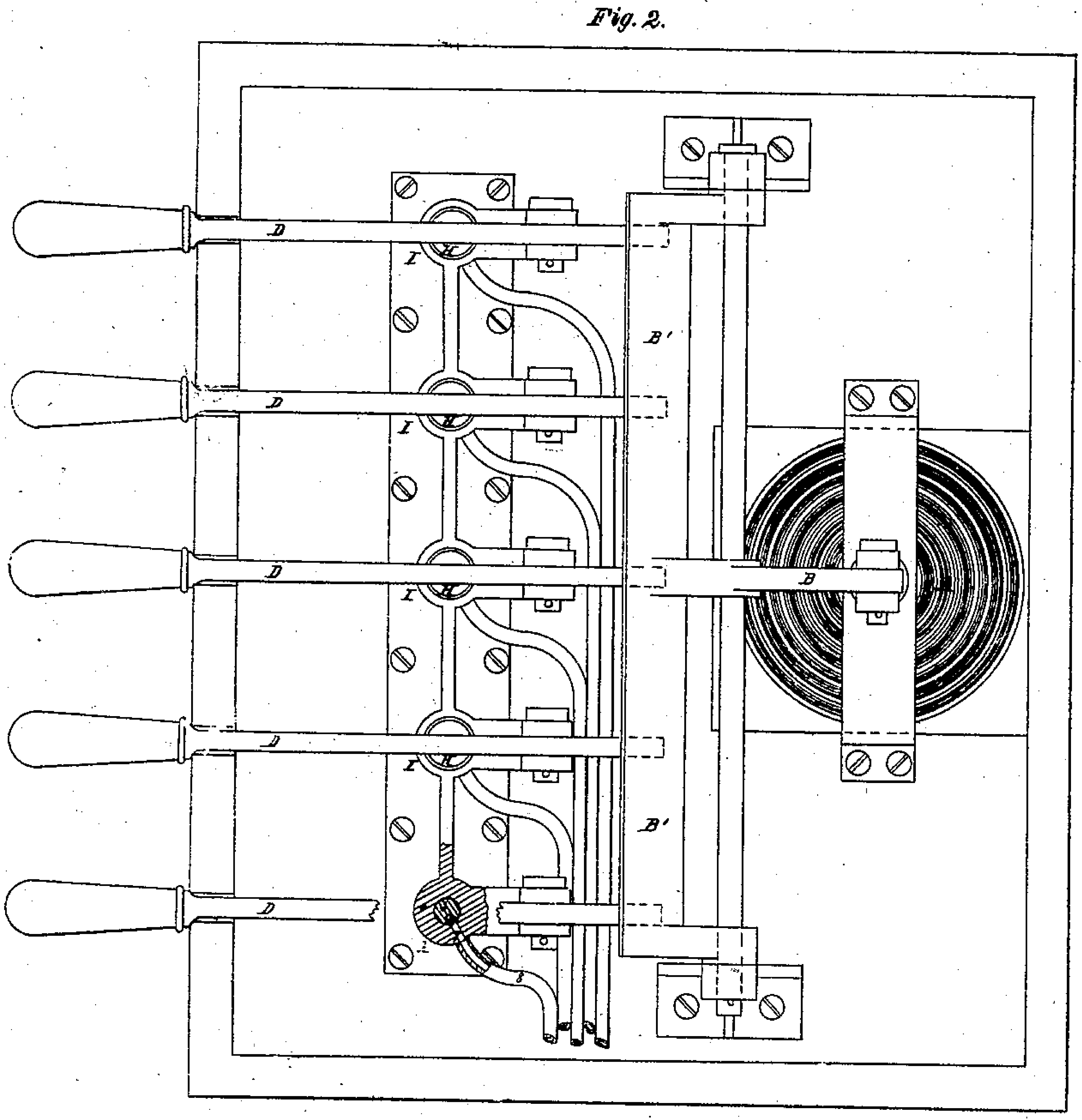
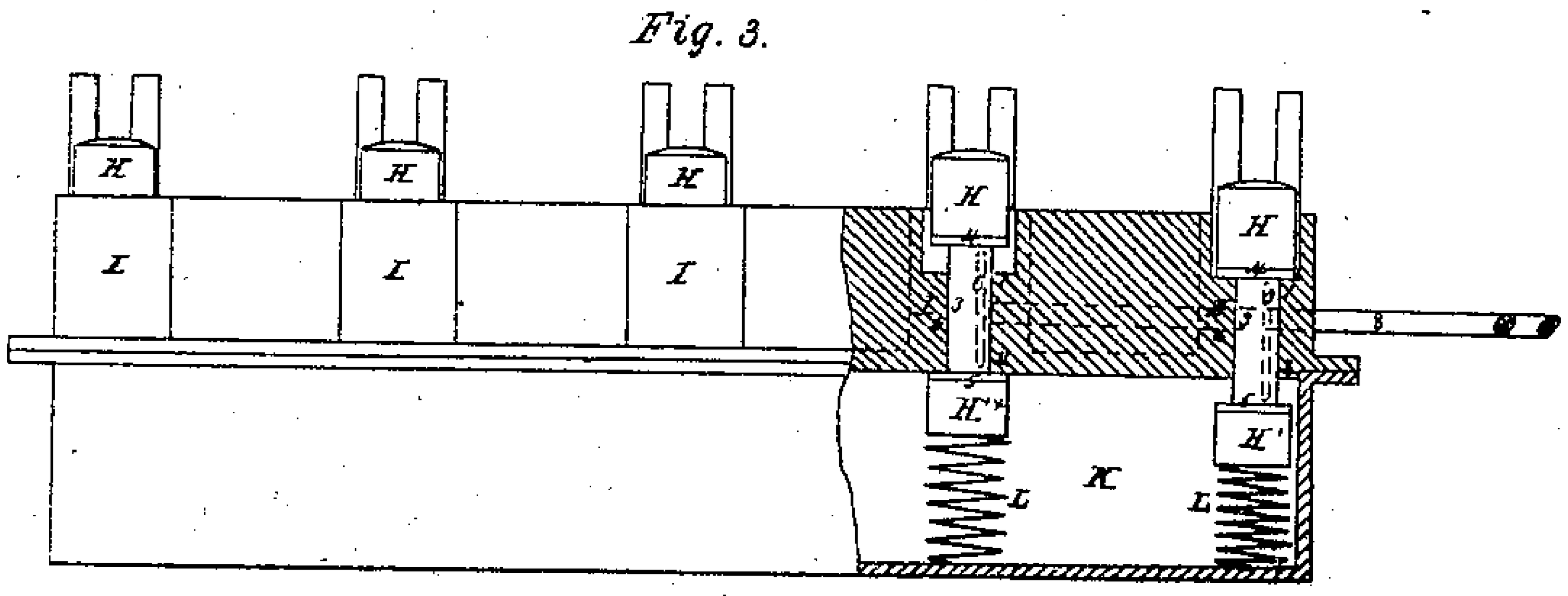


Fig. 3.



WITNESSES.

Saml. Hughes

Wm. Blakiston

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Marshall Arthur Wier

Sheet 2
3 sheets

Fig. 4.

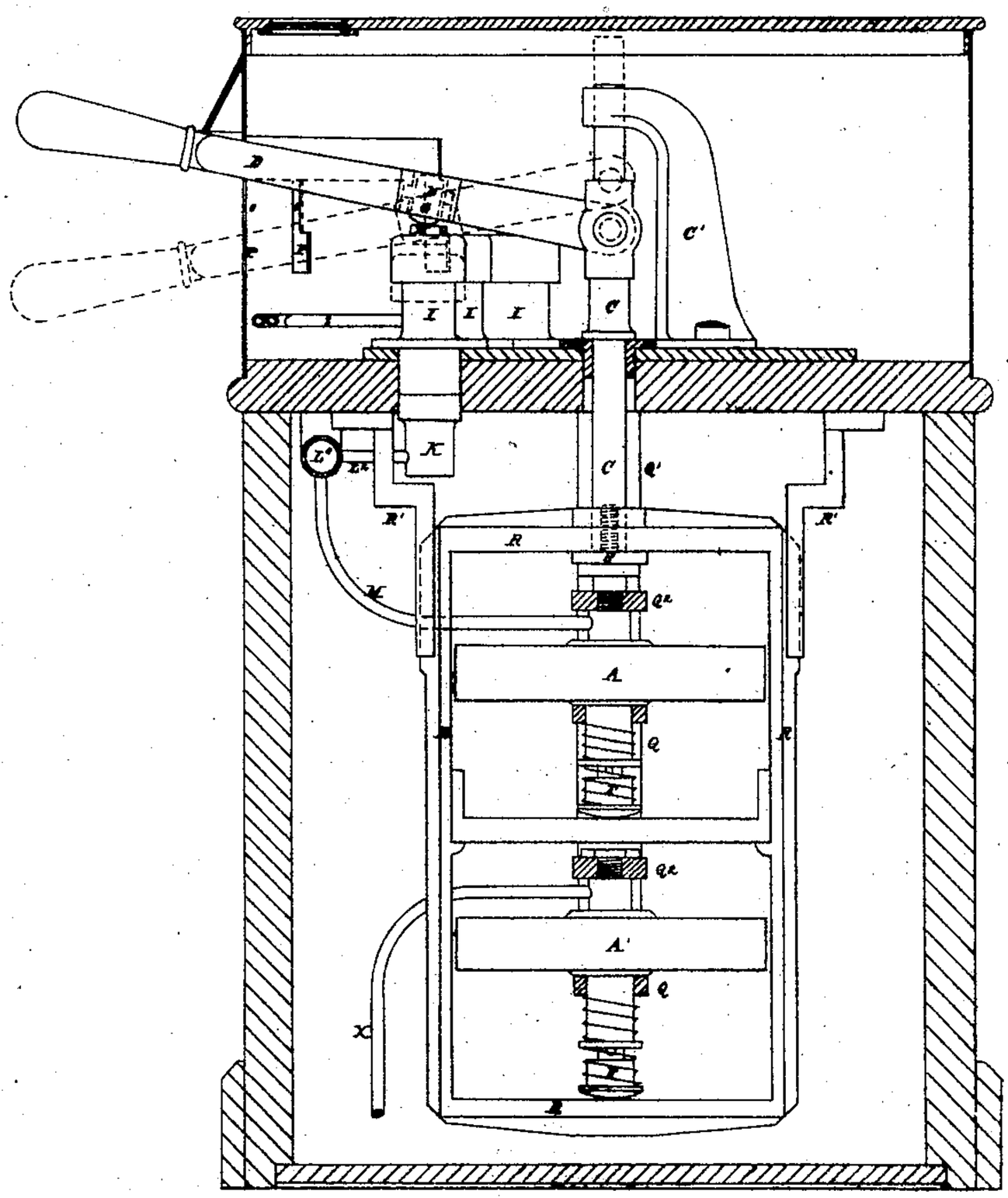
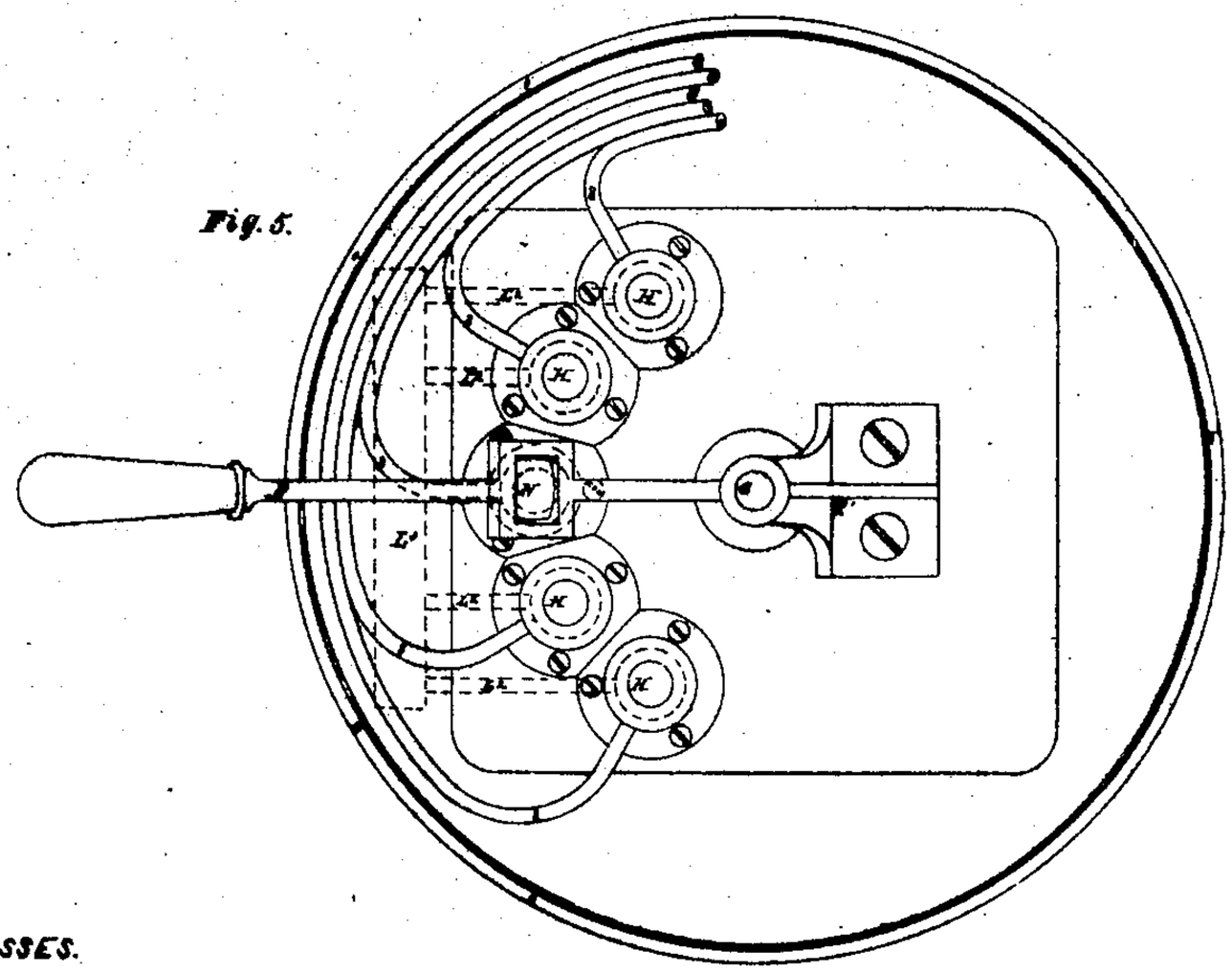


Fig. 5.



WITNESSES.

Samuel Taylor
B. Blakistone

Arthur M. Marshall
Marshall Arthur Brew

Sheet 3.
5 Sheets.

Fig. 6.

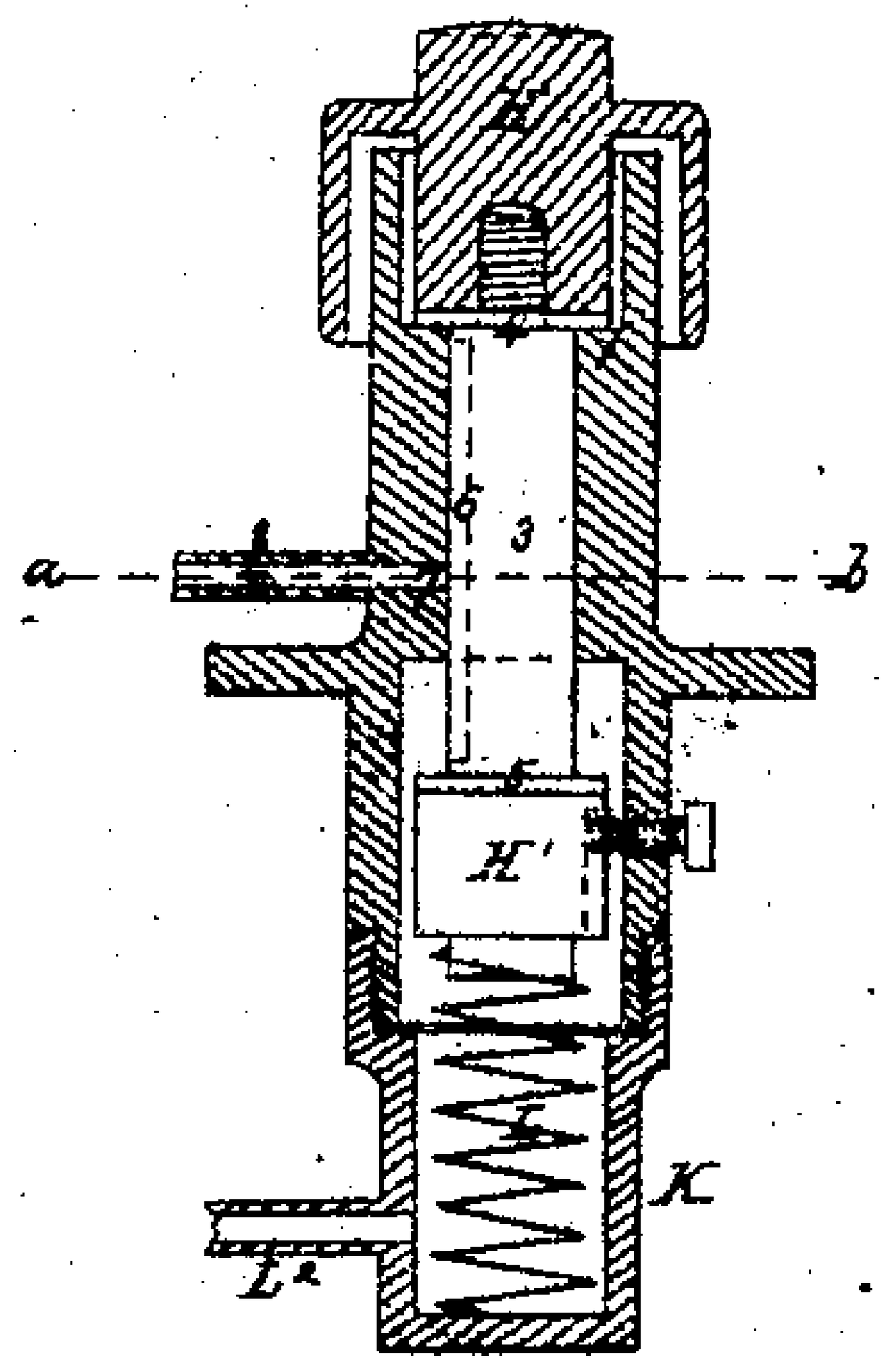


Fig. 8.

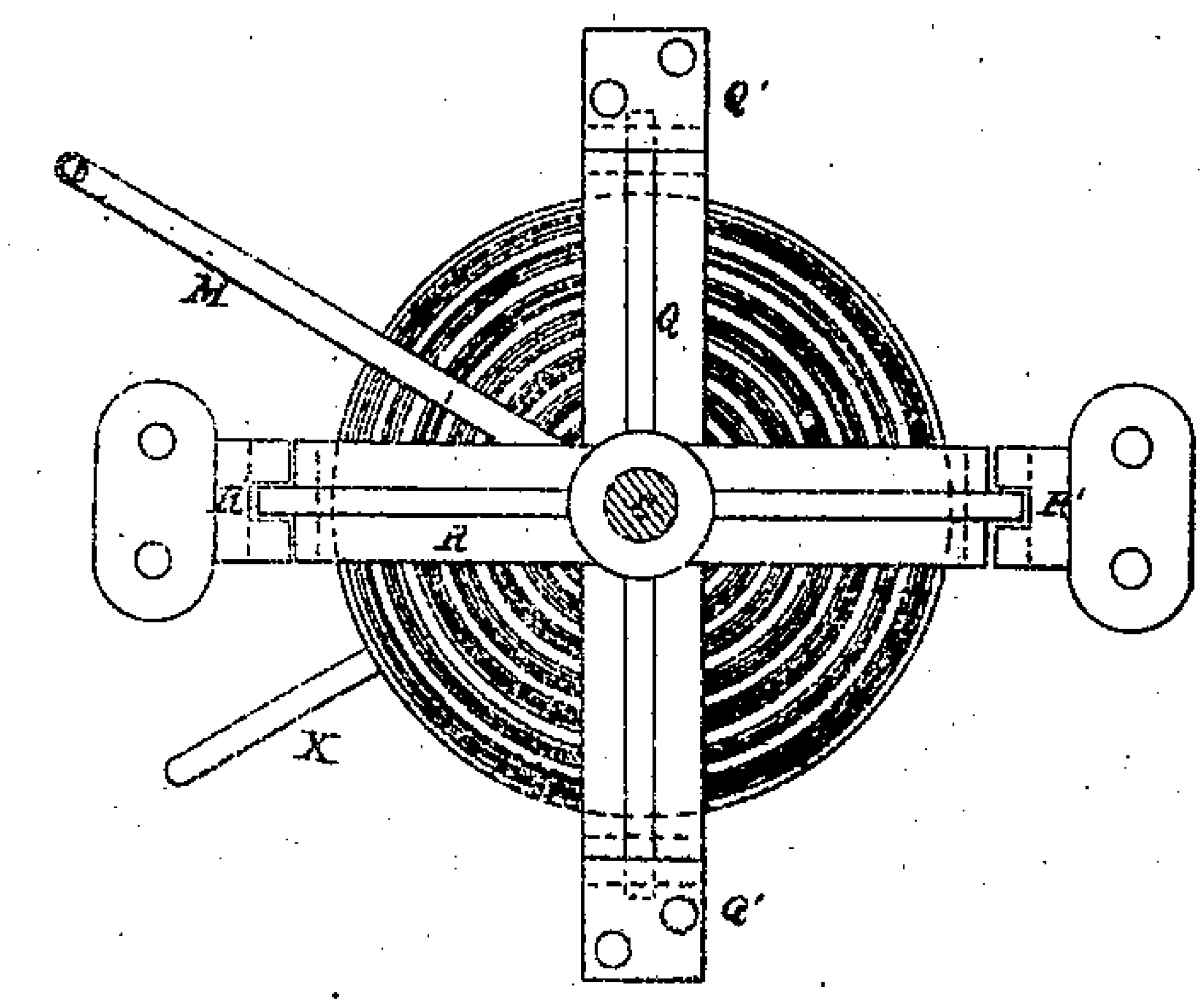
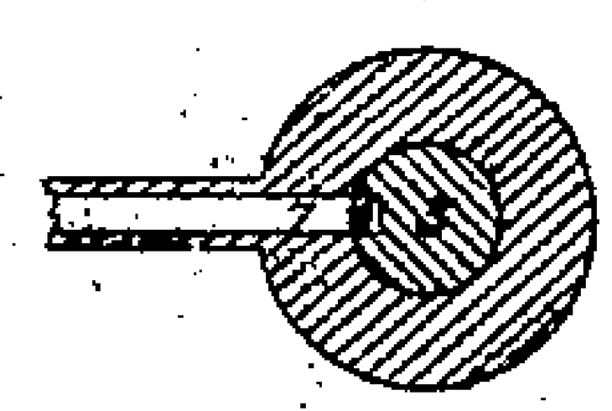


Fig. 7.



section at a,b.

Fig. 10.

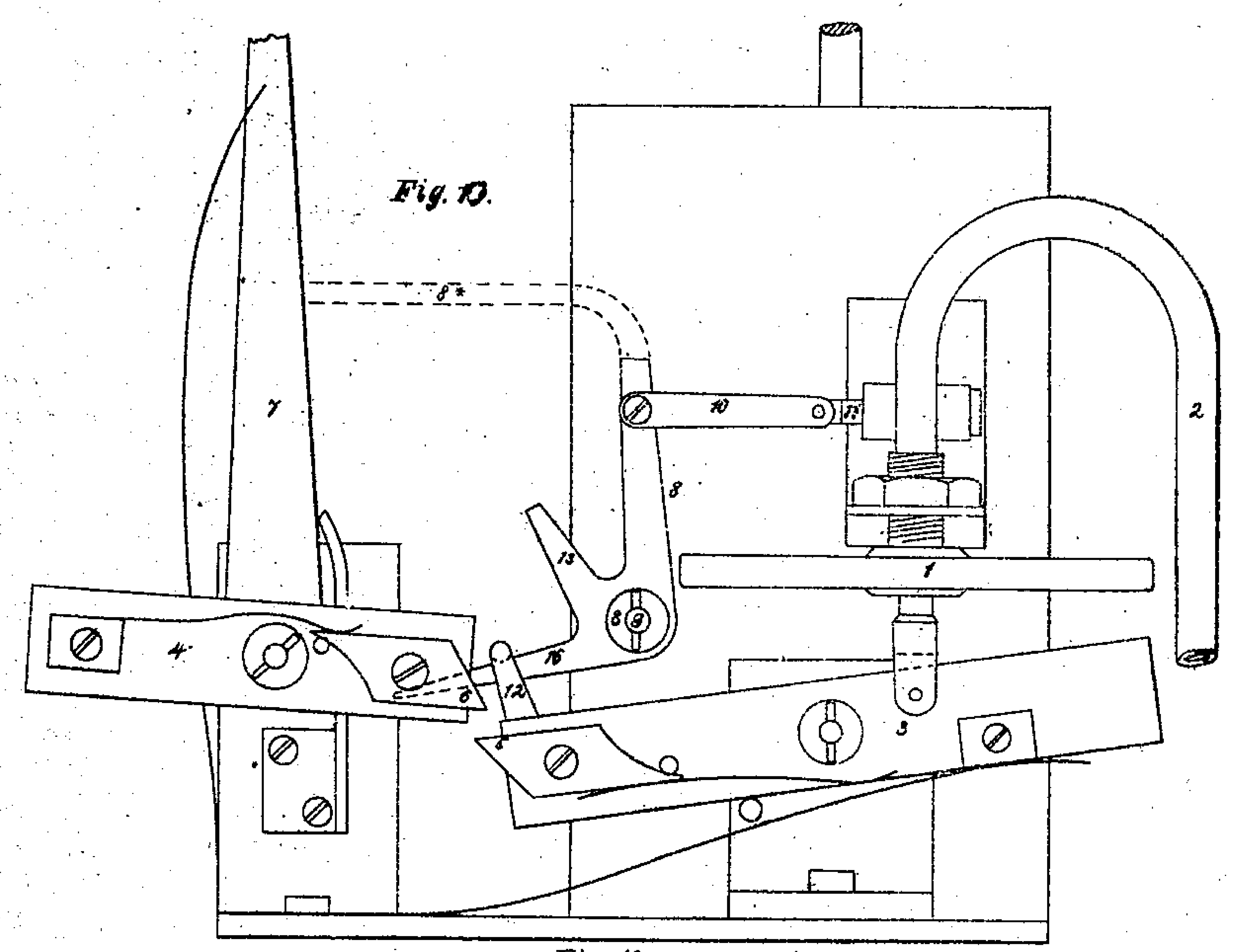


Fig. 11.

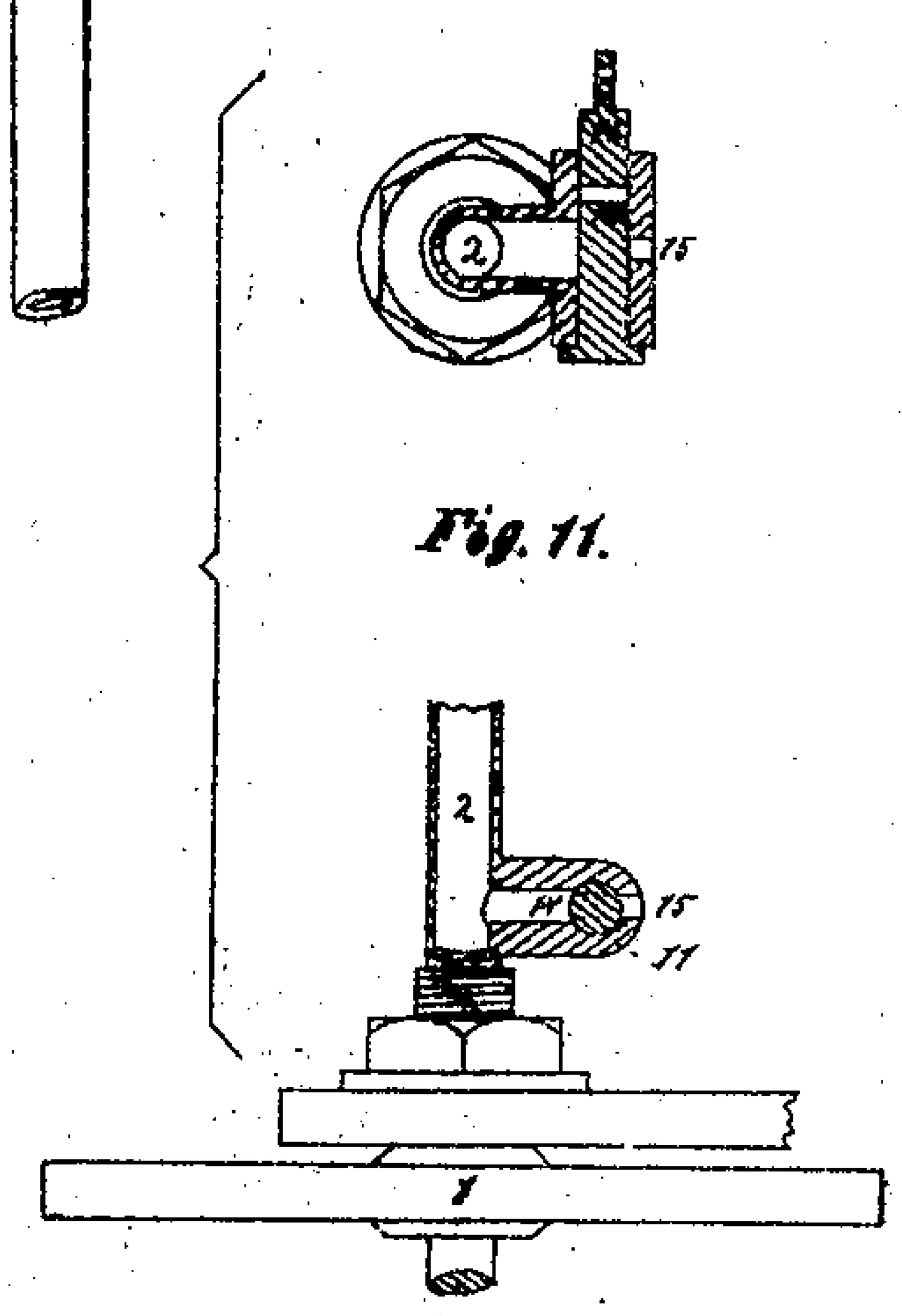
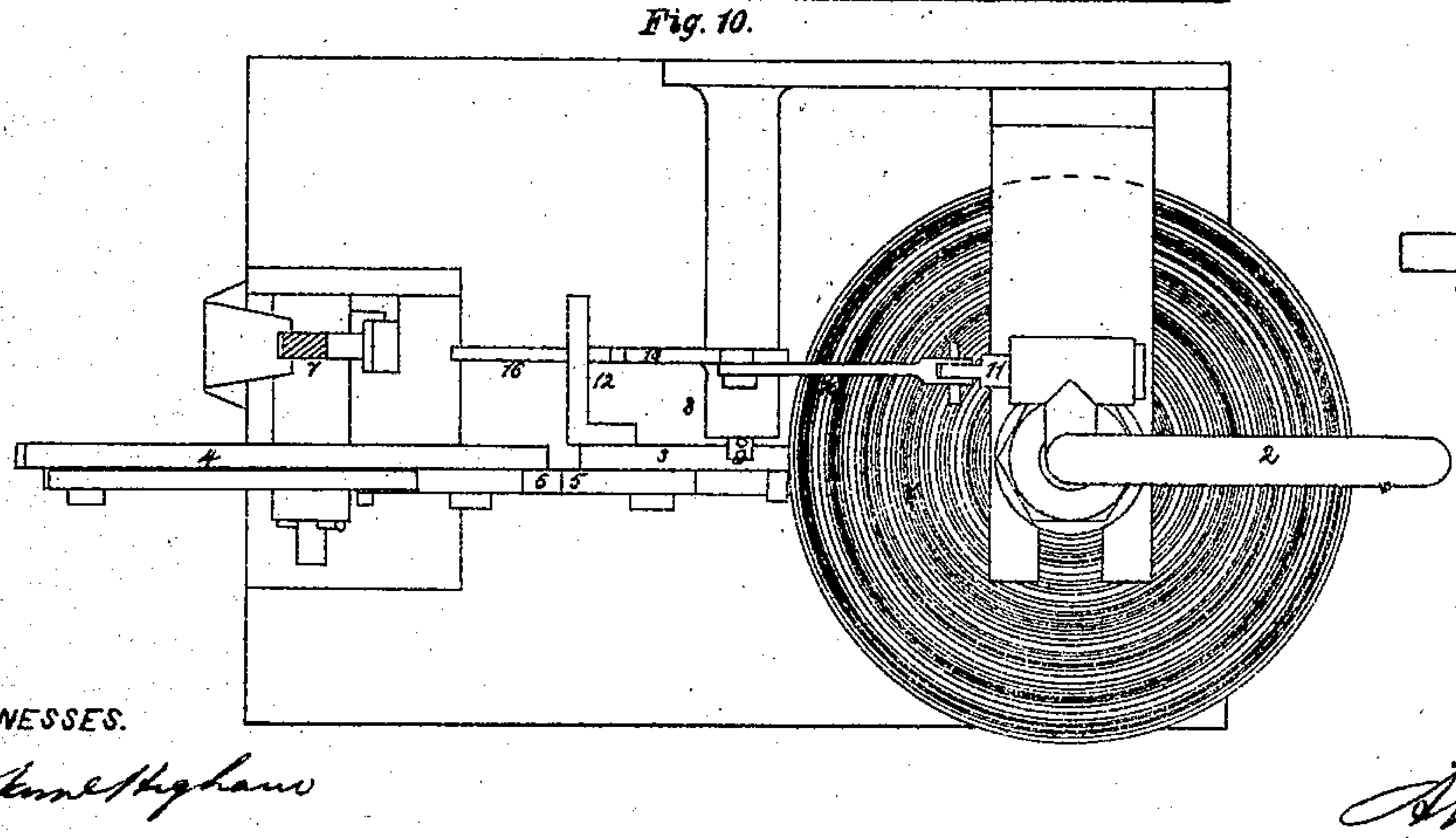


Fig. 10.



WITNESSES.

Anne Higham

Wm Blakiston

Arthur McNutt Mies

Marshall A Wier

117,025

UNITED STATES PATENT OFFICE.

ARTHUR McNUTT WIER AND MARSHALL ARTHUR WIER, OF ELM LODGE, NEWTON ROAD, BAYSWATER, GREAT BRITAIN.

IMPROVEMENT IN PNEUMATIC TELEGRAPHS.

Specification forming part of Letters Patent No. 117,025, dated July 11, 1871.

To all whom it may concern:

Be it known that we, ARTHUR McNUTT WIER and MARSHALL ARTHUR WIER, both of Elm Lodge, Newton Road, Bayswater, in the county of Middlesex and Kingdom of Great Britain, have invented certain Improvements in Pneumatic Apparatus employed in Transmitting Motive Power for Signaling and Indicating, or for other purposes, for which said invention Letters Patent for the United Kingdom of Great Britain and Ireland have been granted unto us bearing date the twenty-fourth day of September, Anno Domini one thousand eight hundred and sixty-eight; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

Our invention relates to pneumatic signaling apparatus in which one large or compressing air-vessel—such as is described in the specification of a patent granted to us for Great Britain, dated the twenty-ninth day of August, one thousand eight hundred and sixty-seven, No. 2,468—a forcing air-pump, or other similar contrivance, is employed in the communicating instruments, connected with several distinct tubes leading to smaller air-vessels which actuate different indexes, pointers, or shutters in one or more indicator instruments. The invention consists, first, in certain improvements in the apparatus employed for opening and closing communication between the tubes and compressing air-vessel, or between them and the external atmosphere for the purpose of maintaining an equilibrium between the pressure of the air contained in the tubes and that external thereto at all times when the instruments are not actually in use. Also, in an improved arrangement of the sending mechanism whereby one movement of the handle or key is made to operate upon both the valve and air-chamber at the same time, so as to obviate the necessity of distinct movements having to be made for this purpose, as heretofore. We also employ an arrangement whereby one handle or key is made to operate upon any one of the transmitting-valves and air-chamber at pleasure, instead of employing a separate handle or key for each. We likewise employ an arrangement of mechanism connected with pneumatic bell-sounding apparatus, whereby a relief-valve communicating with the receiving air-vessel of such apparatus is caused to open when the bell is struck in order to liberate the surplus air in the said receiving air-vessel, and to close again as soon as the said air shall have been liberated and the air-chamber has collapsed ready to receive another signal.

Figure 1 is a transverse section of an apparatus in which distinct handles or keys are employed to operate one air-vessel for sending different signals; Fig. 2, a plan view of same; Fig. 3, a partial section and elevation of valve-box, showing valves in position.

A represents the metallic air-vessel with collapsible sides, or other compressing instrument; B, a lever working on center spindle C′; D D D, &c., a series of lever-handles or keys, the inner ends of which act on the part B′ of lever B when the handle end of any one of them is depressed, so as to compress the air-vessel A. The lever-handles D each bear at the part G of their length upon a valve, H, working in the valve-box I, the construction of which is as follows: Cylindrical holes are bored out in the box at the parts marked * for the reception of the cylindrical valves or plugs H. Each cylindrical hole is terminated at top and bottom by a flat seating, 1 and 2. The part 3 of the valve H fits the cylindrical hole with tolerable accuracy, and slides freely up and down therein. The upper part or head, which is secured to the part 3, is formed with a seating to fit against the seat 1 of the box, a leather washer, 4, being interposed between the annular surfaces so as to make them perfectly air-tight when pressed together. The lower part H′ of the valve is formed in a similar manner to the upper, and has also a leather washer, 5, to bear against the lower seat 2. In the cylindrical part 3 of the valve is formed a groove, 6, extending nearly or quite the whole distance between the two valve-faces 4 and 5, the said groove 6 coinciding as to position with a hole, 7, made through the body of the valve-box, as shown in Fig. 2. The hole is in communication with a tube, 8, leading to the particular apparatus in the indicator instrument to which the valve belongs. An air-reservoir or chamber, K, is attached, air-tight, to the under side of the body of the valve-box, and springs L L placed therein act against the under sides

of valves H′ to keep them closed against the lower seats 2 when the levers D are not pressed down, as seen in Fig. 3 at H′*. The air-reservoir K is connected by pipe M with the air-vessel A.

It will now be understood that, when it is desired to send a signal, the handle corresponding thereto, say D′, is pressed down, the valve H′ opens communication between the reservoir K, and consequently the air-vessel A, and the tube 8 leading to the apparatus in the indicator instrument which is in connection with the particular shutter or pointer it is desired to move by means of the groove 6, the end of which, as seen at Fig. 3, is brought below the seating. As the act of depressing lever-handle D′ also compresses the air-vessel A by means of lever B, &c., the air is forced through the groove 6 into the tube 8 and gives the signal, the external atmosphere being shut off for the time being by the valve H. As soon as the pressure is removed from the handle D′ the spring L acts to close valve H′ at bottom, returning handle D′ to its place and opening valve H at top. The upper end of groove 6 then coming above seat 1, the atmospheric air is allowed to circulate through it and the tube 8 to restore the equilibrium. Instead of groove 6 the cylindrical part 3 of the valve may be made hollow, and lateral holes drilled from the circumference to meet the hollow, and to coincide with the positions of the hole 7 and ends of groove. The communication between the air-vessel A and tube 8 being now cut off by the closing of valve H′, the air forced into the tube in sending the signal could not return into the air-vessel, and when it was desired to send another signal it would be found not to contain sufficient air to act effectively. To obviate this inconvenience the stem E is bored out to receive a relief-valve, F, and a small passage, E^1, is formed leading into the body of the air-vessel. The valve F has a groove, F^1, formed in it, and a valve-seat furnished with a washer similar to that shown at H and H′ presses against the end of stem E when the air-vessel is compressed by lever B. The outer atmosphere is thus at that time shut off; but when the pressure is removed the spring E^2 acts to expand the air-vessel, and the spring F^2 opens the valve F sufficiently to bring the end of groove F^1 above that of stem E, so as to admit atmospheric air into the vessel A and restore the equilibrium.

Fig. 4 is a section of an apparatus in which one handle is made to act upon any one at pleasure of the valves before described, and at same time upon the air-vessel to give different signals in the indicator instrument; Fig. 5 is a plan view of the same; and Figs. 6 and 7, respectively, vertical and horizontal sections of one of the valve-boxes; Fig. 8 is a plan view with upper part of instrument removed.

In this arrangement the valves are of similar construction to those before described, and the same letters of reference refer to similar parts; but for convenience each valve is fitted into a separate valve-box, which has a distinct air-reservoir, K, beneath. The series of valves is arranged concentrically round a central spindle, C, which is free to slide up and down and revolve in a collar, as shown, being guided at its upper end by a bracket, C′. A lever-handle, D, is pivoted at its inner end to said spindle C, and at the part G acts upon the valve H to depress it. When the valve H has been pressed down to its seat a continuation of the pressure on handle D causes the latter to move round the point G, where it rests on valve H as a fulcrum, the valve being held down on its seat, and the spindle C will be raised. Q is a frame, fixed by brackets Q^1 to the under side of base. The air-vessels A and A^1 are attached to the cross-bars Q^2 of this frame, and are each provided with relief-valves F, as before described. R is a movable frame, sliding in guides R′, also attached to under side of base. The spindle C passes loosely through a hole in the upper bar of this frame and is free to turn therein. A broad-headed screw, S, tapped into its lower end, forms a collar, which acts on the frame to lift it when the spindle C is raised by the handle, as before explained. The middle and bottom bars of the frame R act against the heads of relief-valve F when it is raised, and after closing them compress each of the air-chambers A and A^1, the upper one A being connected by the pipe M with the collecting-chamber. L^3 is employed for the transmission of the signals, and the lower A^1 by means of the pipe X for ringing the attention-bell at the distant station. It will be seen that each of the valve-reservoirs K is connected, by a pipe, L^2, with a collecting-chamber, L^3, which is in connection with the air-vessel A by means of the tube M. The action of the apparatus is the same as that already described, except that the single handle D is to be moved round with the spindle C until the friction-bowl N, mounted in an opening in the lever D, is brought over the valve in communication with the tube leading to the desired signal-shutter or dial in the indicator, the grooves O in the case guiding the lever, while the notches P, cut laterally in the bottom of said grooves, allow of locking the handle in position as long as desired, so as to keep the signal in view, the friction-bowl N allowing of the necessary side play without straining the valve or lever.

Figs. 9, 10, and 11 represent one form of the relief-valve applied to the apparatus employed to ring the attention-bell at the distant station, so as to insure a more speedy return of the various parts to their normal position after having acted. 1 is the small air-vessel which is expanded by the action of the column of air contained in pipe 2 leading from the corresponding compressing air-chamber, as A^1, in the communicator instruments. This small air-vessel acts, by means of the levers 3 and 4 and their respective triggers 5 and 6, upon the hammer-lever 7 to strike the bell or gong in a manner now well known in connection with these signaling instruments. In order to adapt a relief-valve to act at the bell-end of the pipe 2 we employ the following mechanism: 8 is a bell-crank lever of three arms centered on a stud, 9. One arm of the lever is attached by connecting-rod 10 to the sliding relief-valve 11, adapted to the pipe 2 near the air-

chamber 1. The structure of this valve will be readily understood by reference to Fig. 11. When the small air-chamber 1 is expanded, and lever 3 thereby caused to move the hammer, the finger-piece 12, attached to said lever 3, will be brought nearly in contact with arm 13 of lever 8. At that moment the triggers 5 and 6 pass each other and the spring acts on the hammer to strike the bell. This slipping past of the triggers, and consequent sudden removal of resistance, causes the end 5 of lever 3 to spring upward, and the finger 12 then strikes arm 13 of lever 8, causing the latter to turn on its center sufficiently to move the valve 11 so as to bring the hole 14 in it to coincide with the opening 15 in the valve-case, and thus open the pipe and air-chamber to the atmosphere. The *plenum* of air now escaping through the valve from the chamber allows it to contract, and the lever 3 returns to its normal position, as shown, more quickly than heretofore. In doing so the finger-piece 12 comes to act on arm 16 of lever 8, and the valve is closed ready for the next signal.

What we claim as our invention is—

1. The combination of the compressing instrument A, the distributing and relieving-valves H H′, and the operating lever D, whether simple or compound, substantially as described and shown in Figs. 1 to 8, and for the purposes herein set forth.

2. The arrangement of the operating-lever D, whether simple or compound, whereby both the compressing instrument and the distributing-valve are operated by the same motion, substantially as herein set forth.

3. The swiveled lever D, arranged so as to operate both the compressing instrument and any one of the distributing-valves that may be desired, by a single movement, substantially as and for the purposes herein set forth.

4. The combination of the relief-valve 11 with the bell-crank lever 8 and connecting-rod 10, in Figs. 9, 10, and 11, the whole operating substantially as and for the purpose herein set forth.

In testimony whereof we have signed our names hereto in the presence of two subscribing witnesses this fourteenth day of October, one thousand eight hundred and seventy.

A. M. WIER.
M. A. WIER.

Witnesses:
W. H. BECK,
LEE BAKER.