

(No Model.)

J. CRAWFORD & J. B. KER.

TELEPHONE SYSTEM.

No. 375,925.

Patented Jan. 3, 1888.

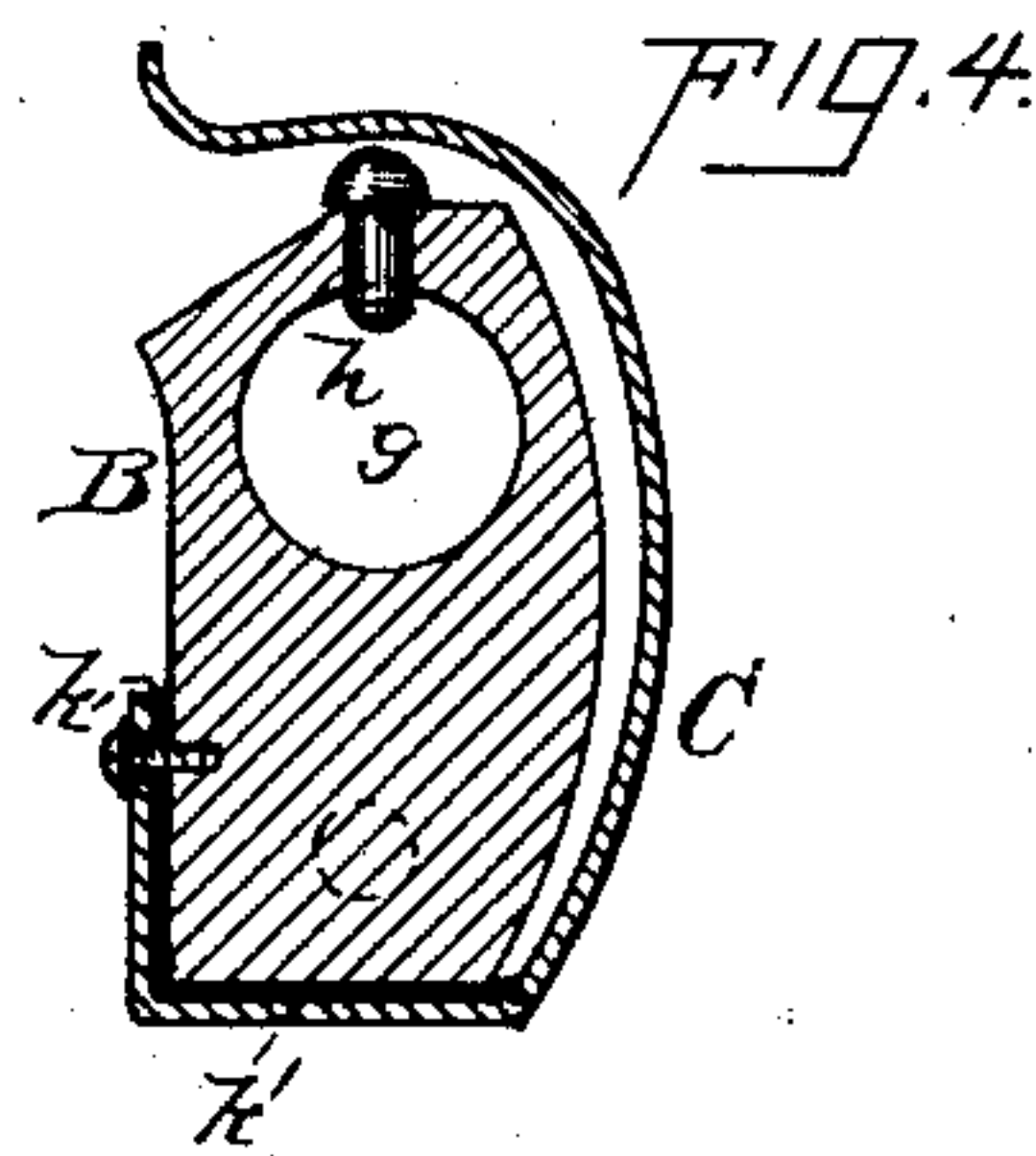
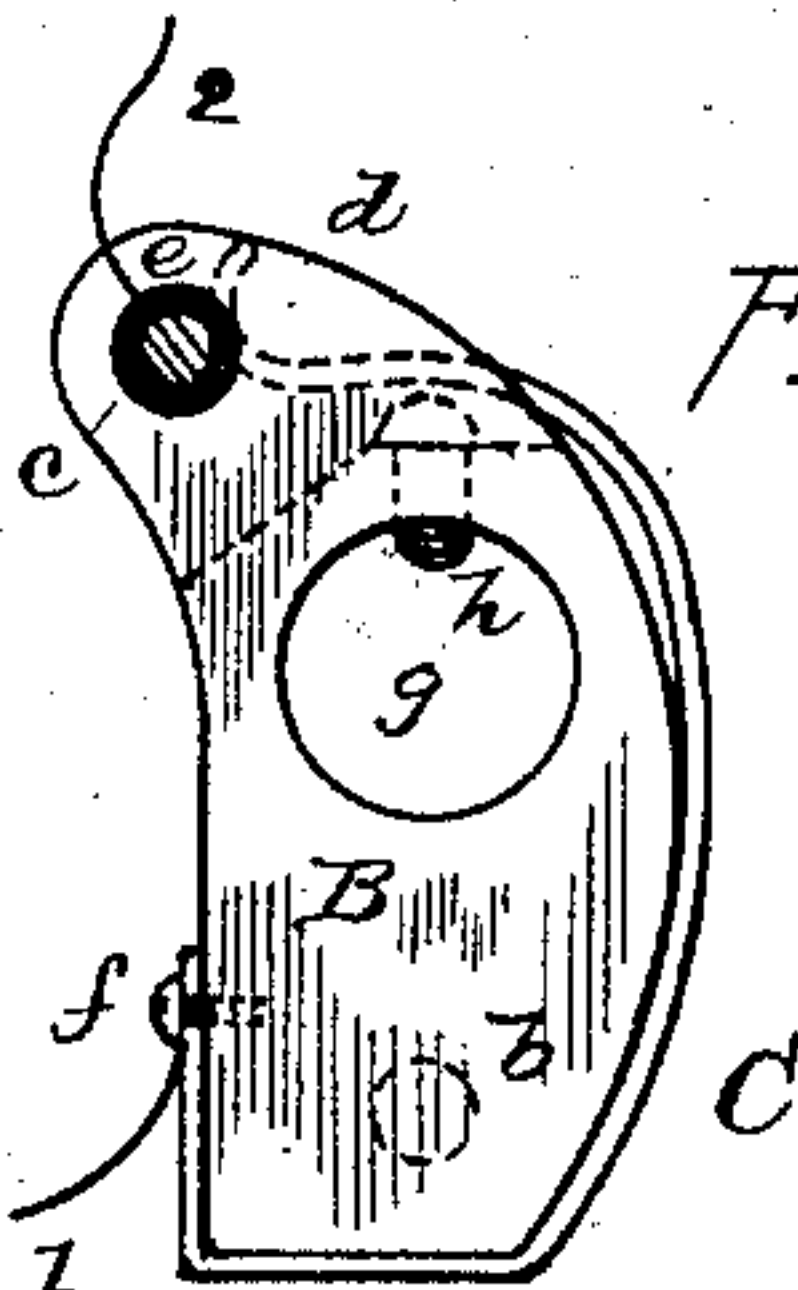
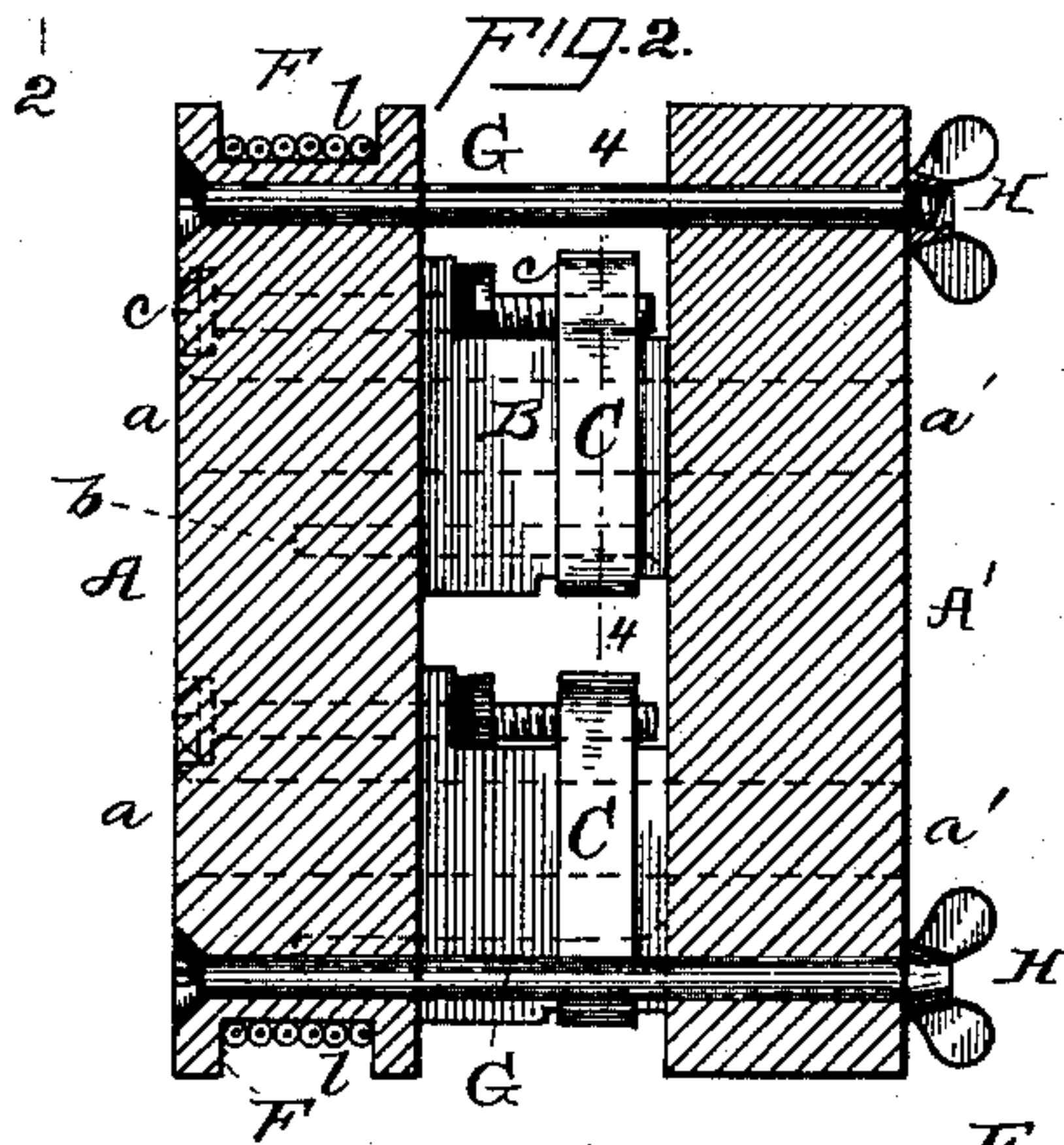
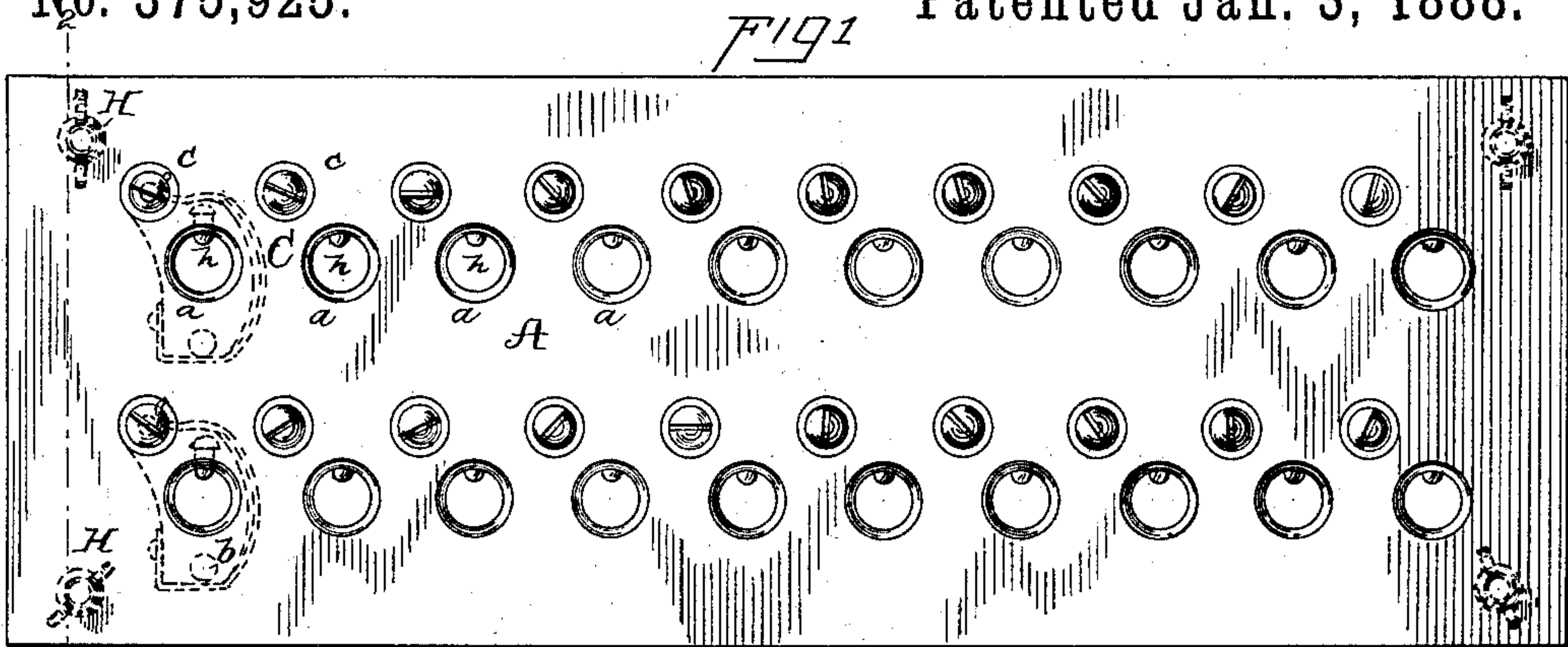


FIG. 6.

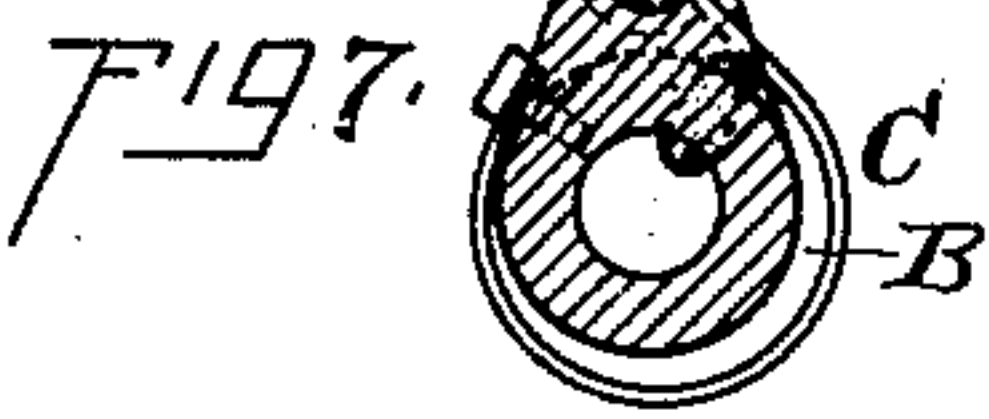
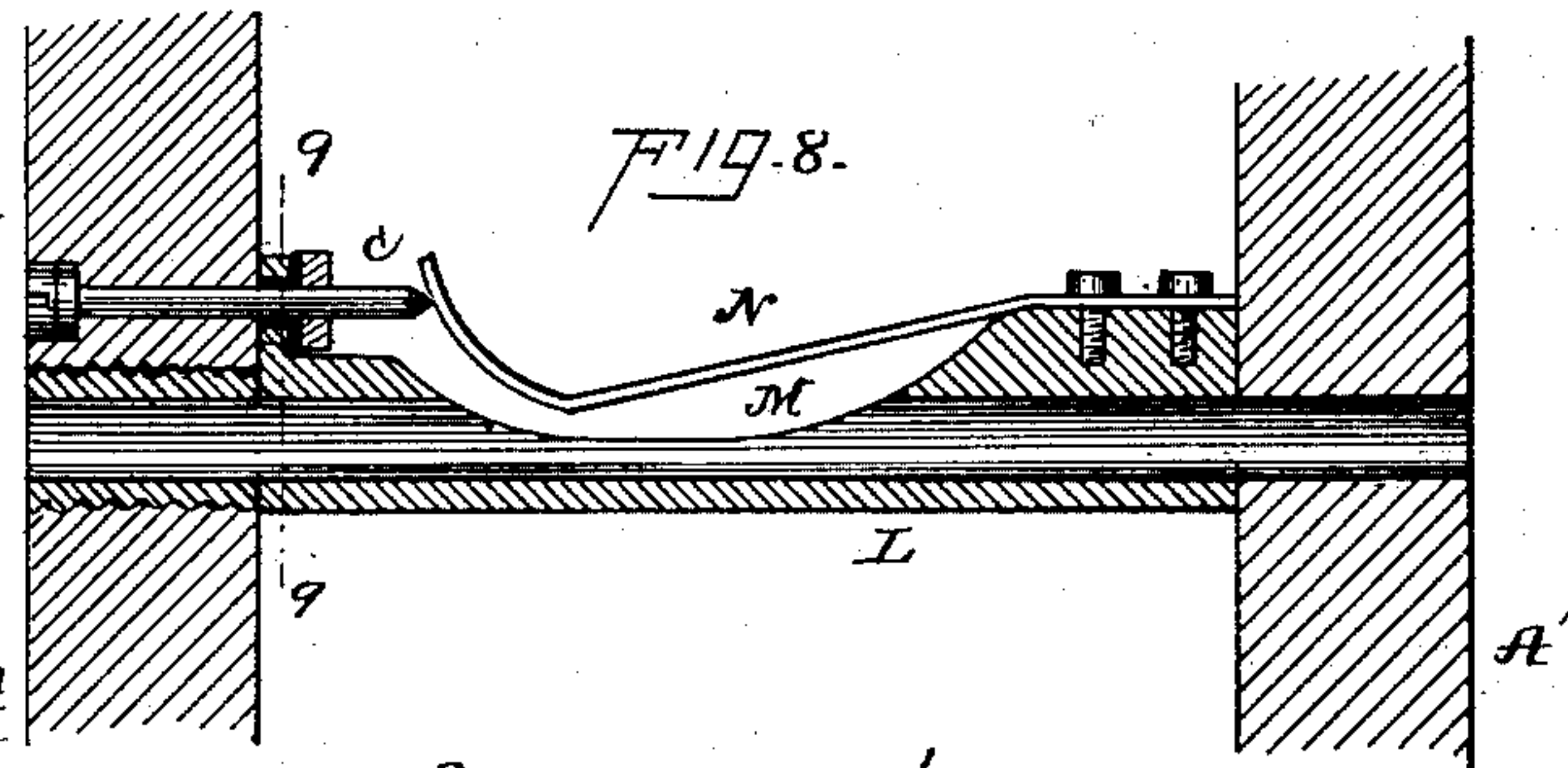
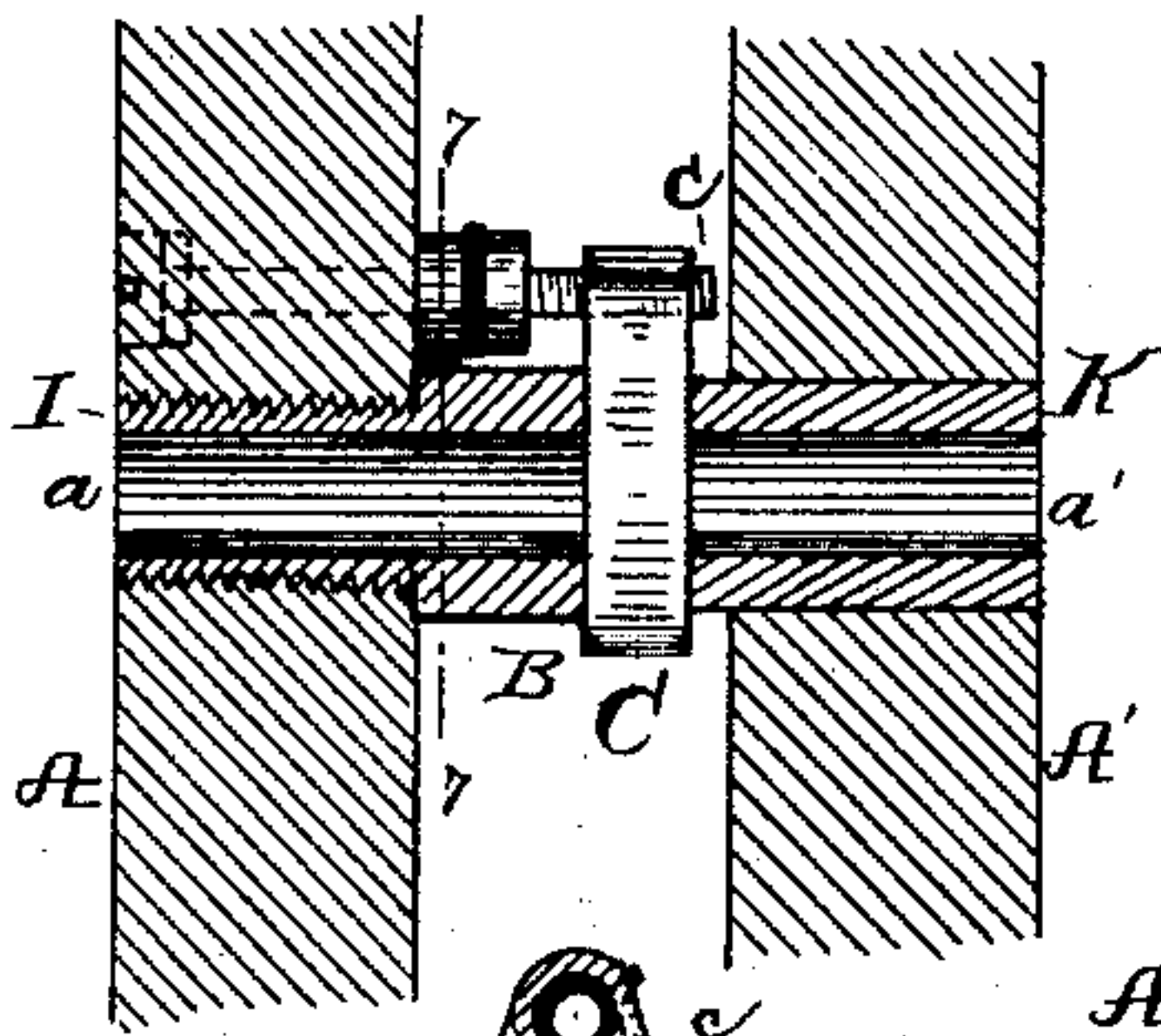
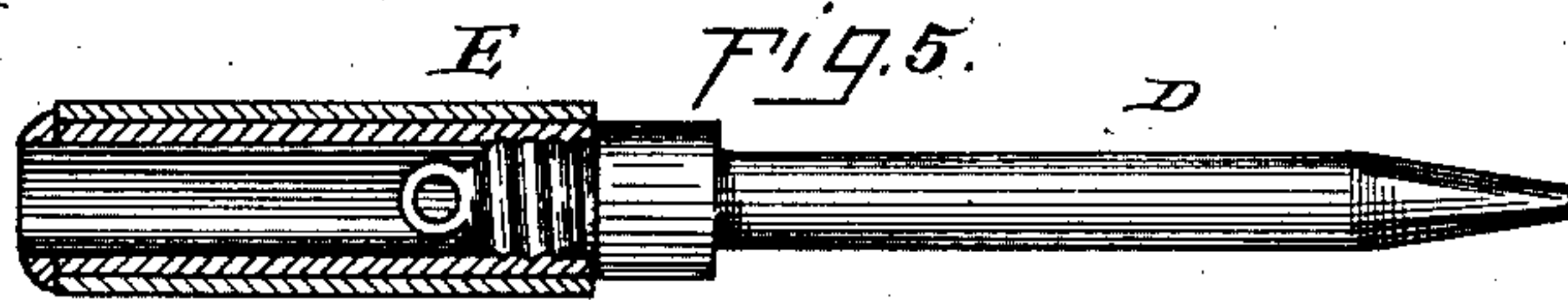
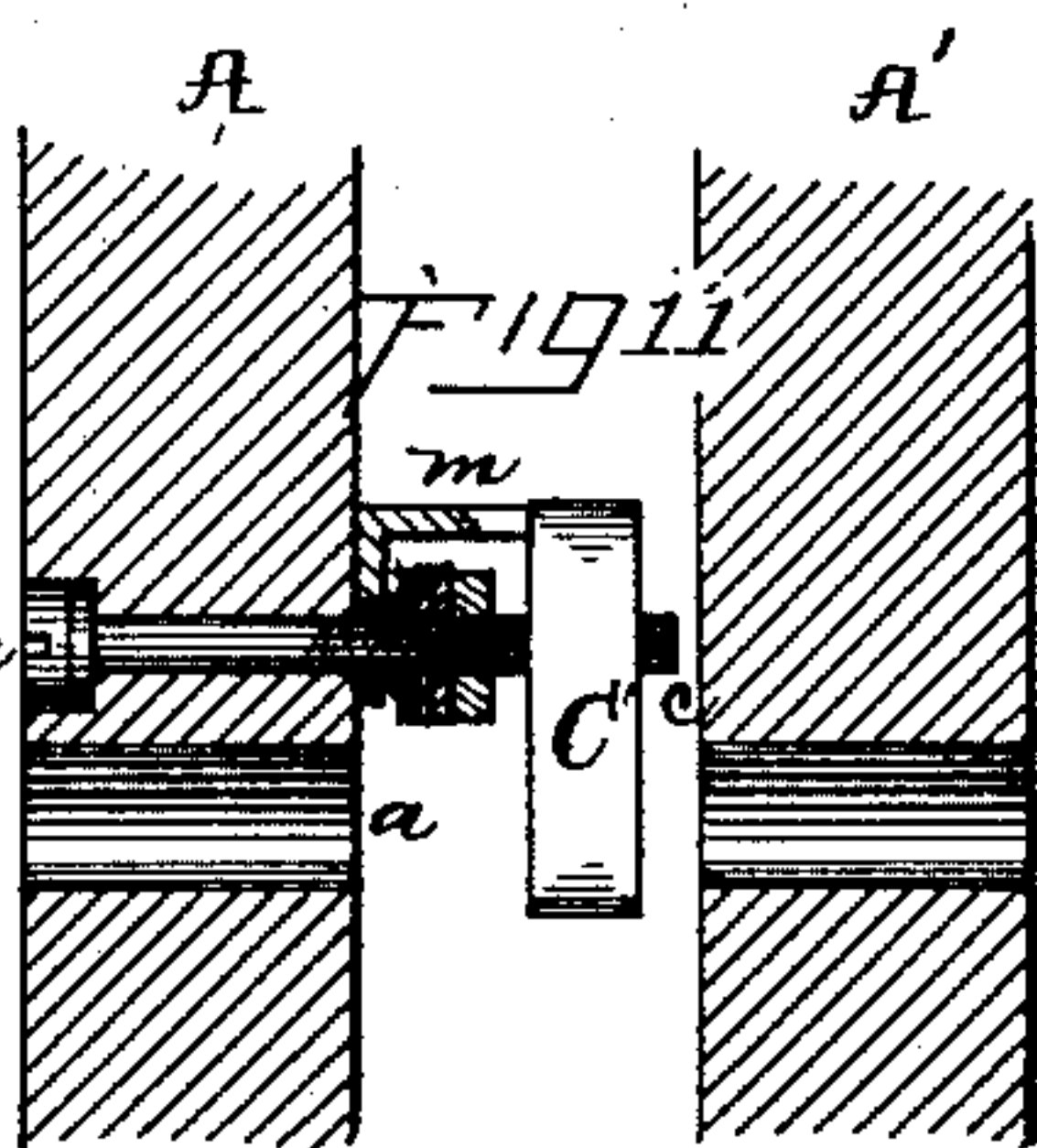
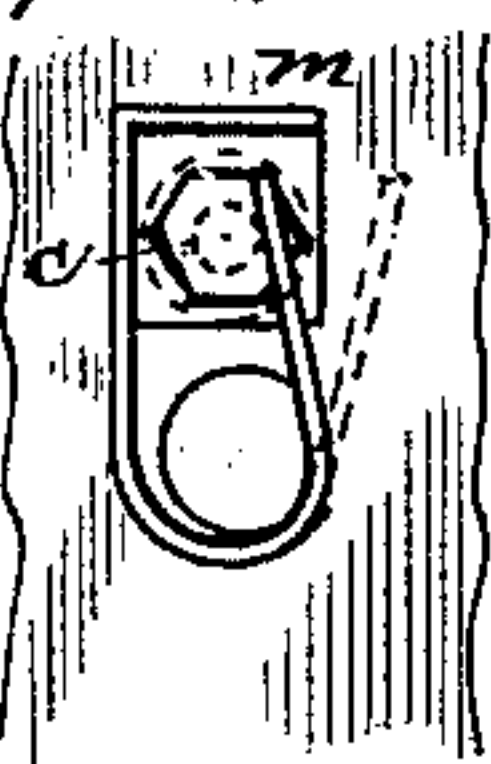


FIG. 10.



ATTEST:

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UNITED STATES PATENT OFFICE.

JOHN CRAWFORD, OF READING, AND JOHN BALFOUR KER, OF HARRISBURG, PENNSYLVANIA.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 375,925, dated January 3, 1888.

Application filed March 24, 1887. Serial No. 232,219. (No model.)

To all whom it may concern:

Be it known that we, JOHN CRAWFORD, a citizen of the United States, residing at Reading, in the county of Berks and State of Pennsylvania, and JOHN BALFOUR KER, a subject of the Queen of Great Britain, residing at Harrisburg, in the county of Dauphin and State of Pennsylvania, have jointly invented a certain new and useful Improvement in Telephone Systems, of which the following is a specification.

Our invention relates to switch-boards for telephone exchanges in which double-jacks are employed accessible from both sides of the board, so that connection may be made with a line by an operator on either side of the board; and our object is mainly to increase the simplicity and convenience of construction of switch-boards of this character.

To this end our invention consists in the novel devices and arrangements, hereinafter set forth and claimed.

Our invention is illustrated in the accompanying drawings, in which Figure 1 is a front elevation of a switch-board section embodying said invention with some of the jacks shown in dotted lines; Fig. 2, a vertical section thereof on line 2 2 of Fig. 1; Fig. 3, an enlarged elevation of one of the spring-jacks; Fig. 4, a section thereof showing a modification employed for multiple switch-board systems; Fig. 5, a view of a plug which we may use, with its handle in section; Fig. 6, a section of a switch-board with a modified way of attaching the jacks thereto; Fig. 7, a section on the line 7 7 of Fig. 6; Fig. 8, a section of a switch-board with another form of spring-jack; Fig. 9, a section on line 9 9 of Fig. 8, and Figs. 10 and 11 illustrate another form of spring-jack.

Referring first more especially to Figs. 1 to 5, inclusive, A and A' are boards, made of wood or any other suitable insulating material. These are secured together, back to back, in a manner to be presently described, and may be supported in a vertical position in any desirable way. Each of these boards has apertures *a* or *a'* through it, placed opposite each other, there being an aperture in each board for each subscriber of the system. Between the boards are placed the jacks. These consist, prefer-

ably, each of a metal body, B, attached to board A by a short screw, *b*, and by a long screw, *c*, extending from the outer side of the board and through the lug *d*, from which it is insulated by a flanged insulating-collar, *e*, and projecting out toward the other board, A'. Secured to the body B by a screw, *f*, is the flat spring C, which passes around the body and at its free end rests normally against the screw *c*, so that the circuit from the subscriber to his annunciator-drop is normally closed at this point. The line from the subscriber is indicated by the wire 1, connected to the jack and the line leading from the jack to the annunciator, and thence to ground by wire 2, Fig. 3.

The body A of the jack has a hole, *g*, for the reception of the plug, and an aperture extends up from this hole through the body, in which is loosely placed a small metal pin, *h*, whose enlarged head keeps it from dropping through, and comes under the spring C. The hole *g* of each jack comes directly between two holes, *a a'*, of the switch-board. The plug, Fig. 5, consists of a metal rod, D, somewhat less in diameter than the holes in the switch-board and jack and having a tapered end. This rod is held in the tubular insulating-handle E, adapted to receive the flexible connecting cord or wire. The insertion of this plug in the jack from either side of the switch-board pushes up the loose pin *h* against the spring C and raises said spring off the screw *c*, breaking the circuit from the subscriber's line through the annunciator to ground, and closing, through the spring C, pin *h*, and plug D, the circuit from the subscriber's line through the operator's telephone to ground. To connect one subscriber with another two plugs joined by flexible conductors are, as usual, inserted in the two jacks of those subscribers.

For multiple systems the spring C is insulated from the body of the jack by insulating material at *k* and *k'*, as shown in Fig. 4.

In order to conceal the wires and protect them from injury we form grooves F F in the upper and lower edges of the switch-board A, of such size as to contain all the wires 1 1 connected with the switch-board, which wires, since they are not exposed, can be smaller than usual, and we place all such wires in said

grooves, making the connections from them to the jacks through holes bored in the wood of the board A. The grooves may, if desired, be filled with wax, paraffine, or similar material for the further protection of the wires. The board A is supported on suitable standards, and these standards may be made hollow, and the wires may pass through them to the grooves of the switch-board. Thus all the wires are out of sight and are protected from contact and injury.

It will be seen that the jacks are connected mechanically only with the board A. The board A' is attached to the board A by removable connections. Any suitable detachable clamps or catches may be used. We have shown rods or pins G set firmly in board A, and extending through board A' and having screw-threaded ends projecting a little from board A', on which are placed thumb-nuts H. These thumb-nuts may be quickly removed and the board A' then taken off, leaving the jack-plugs and their connections open for inspection or repairs, and without stopping the business of the exchange, for of course the operators on both sides can continue their work, as before.

The jacks are intended to be mounted in groups of from ten to twenty jacks in each group, and the back board, A', of each group is made removable. One of these groups is shown in Fig. 1. The entire switch-board will be made up of a number of the groups, as will be readily understood.

The metal portions of the plugs are made somewhat longer than the thickness of the double switch board, so that when a plug is inserted its metal end projects beyond the same board. Thus not only the operator at that particular point can see that that line is in use, but those adjacent can also see the projecting plug, and on the other side the operators can see the handle. Those operators, however, if there are any, who are too far away to see the plug, can make the usual test by inserting a plug a short distance, so as to touch the jack of the line in question, but without affecting the connections of the jack.

In the arrangement shown in Figs. 6 and 7 the body B of the jack has a screw-threaded extension, I, which is screwed into the board

A to secure the jack to said board. The other side of the jack may have a tubular extension, K, forming a bushing for the hole in board A'. The test may in this case be made by touching the plug to the bushing on either side.

Figs. 8 and 9 show another form of jack which may be used if a longer jack is desired. The metal tube L, having an aperture in its upper side, as shown at M, extends between the boards, and has a screw-threaded end, by which it is attached to board A. The screw c passes through the board A and is insulated from the jack. A long spring, N, attached to the other end of the jack, rests normally upon screw c, and the insertion of the plug from either end raises the spring off the screw and closes circuit between the spring and the plug.

Figs. 10 and 11 show still another form of jack, which may be called a "skeleton jack," since the metal body is dispensed with. From the screw c a bracket or support, m, extends, insulated from said screw. From bracket m the spring C' extends downwardly between the holes a a' of the switch-board. The insertion of the plug pushes the spring aside, as shown by the dotted lines in Fig. 10, breaking contact between the spring and the screw and closing it between spring and plug.

What we claim is—

1. A double switch board consisting of two boards placed back to back and both provided with plug-holes, in combination with jacks situated between said boards and permanently attached to one only of said boards, and the two boards being detachably secured together, substantially as set forth.

2. A double switch-board consisting of two boards placed back to back and having jacks mounted on one of said boards with plug-holes in both boards, said jacks being arranged in groups or sections, and the back board being removable for each of such groups or sections, substantially as set forth.

This specification signed and witnessed this 21st day of March, A. D. 1887.

JOHN CRAWFORD.

JOHN BALFOUR KER.

Witnesses:

HOWARD P. WANNER,
HARRY RITTER.