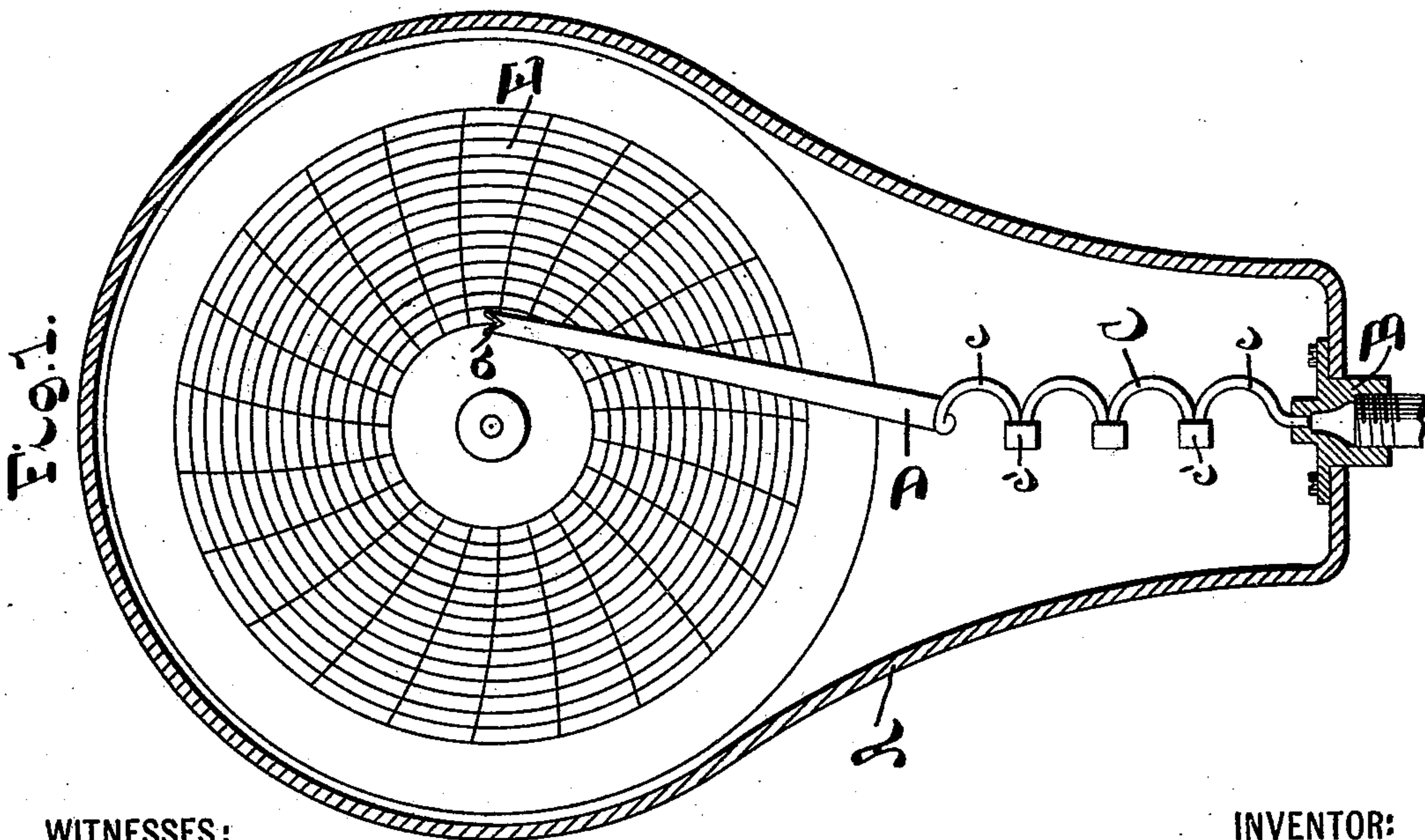
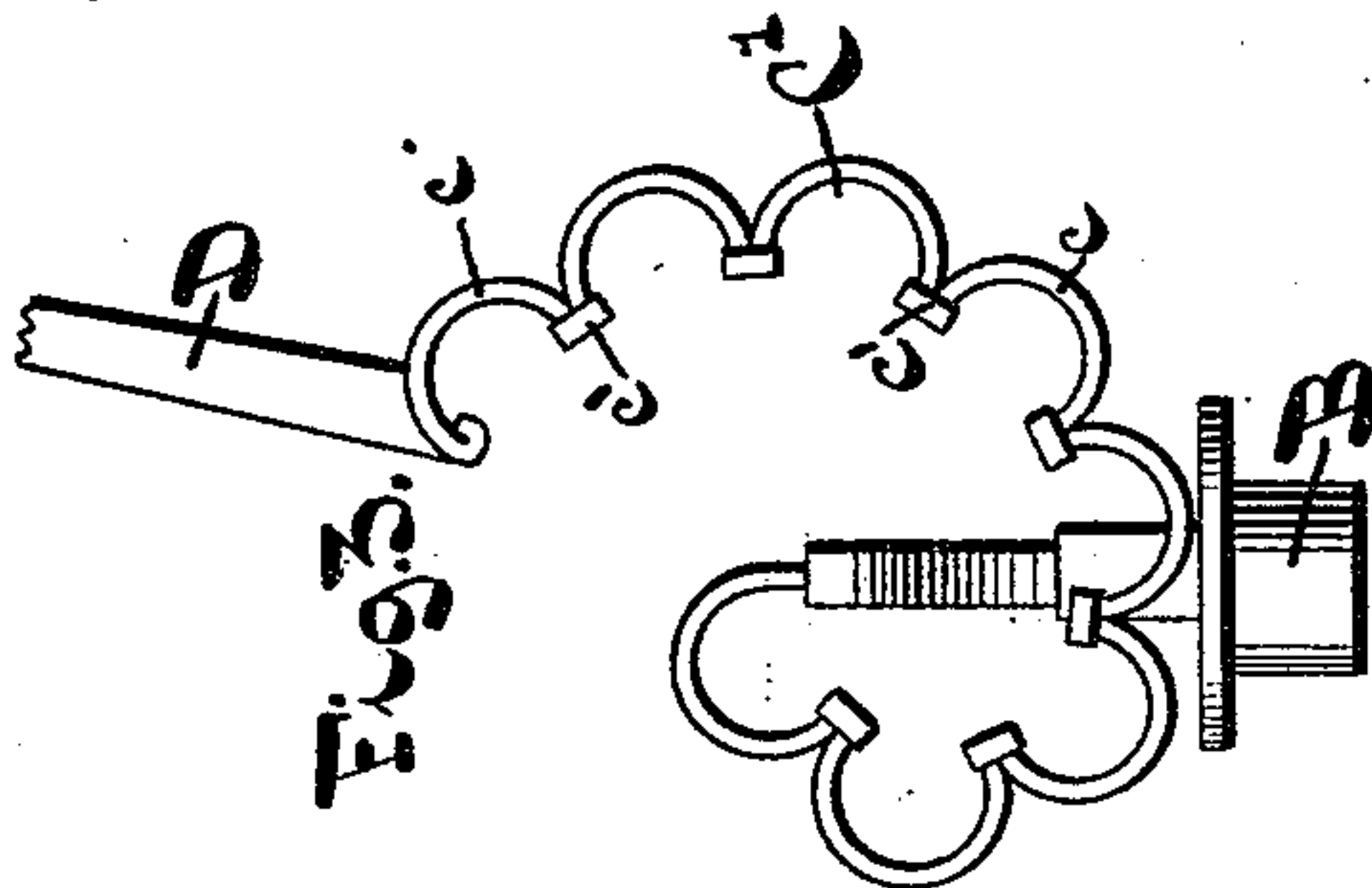
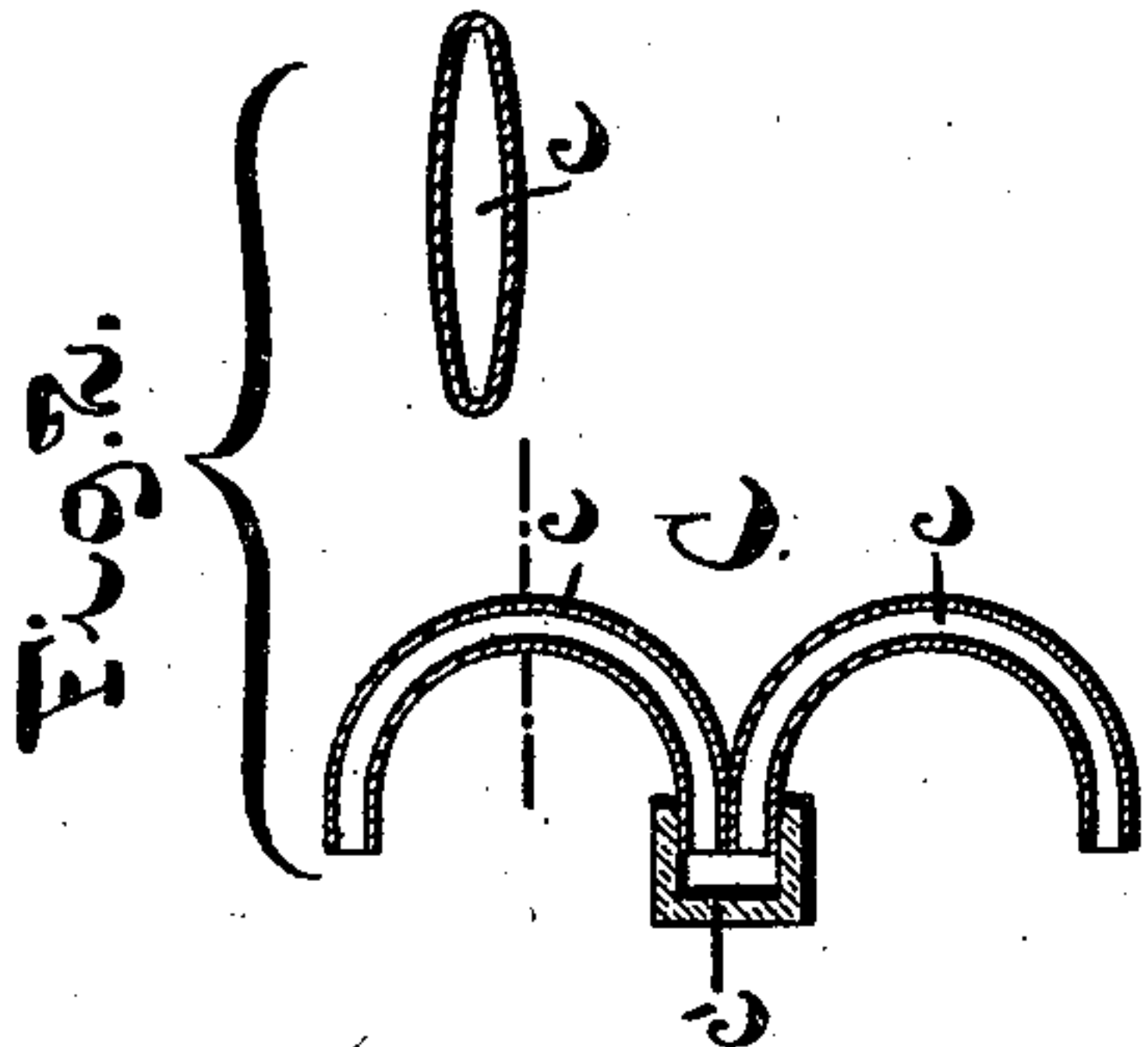
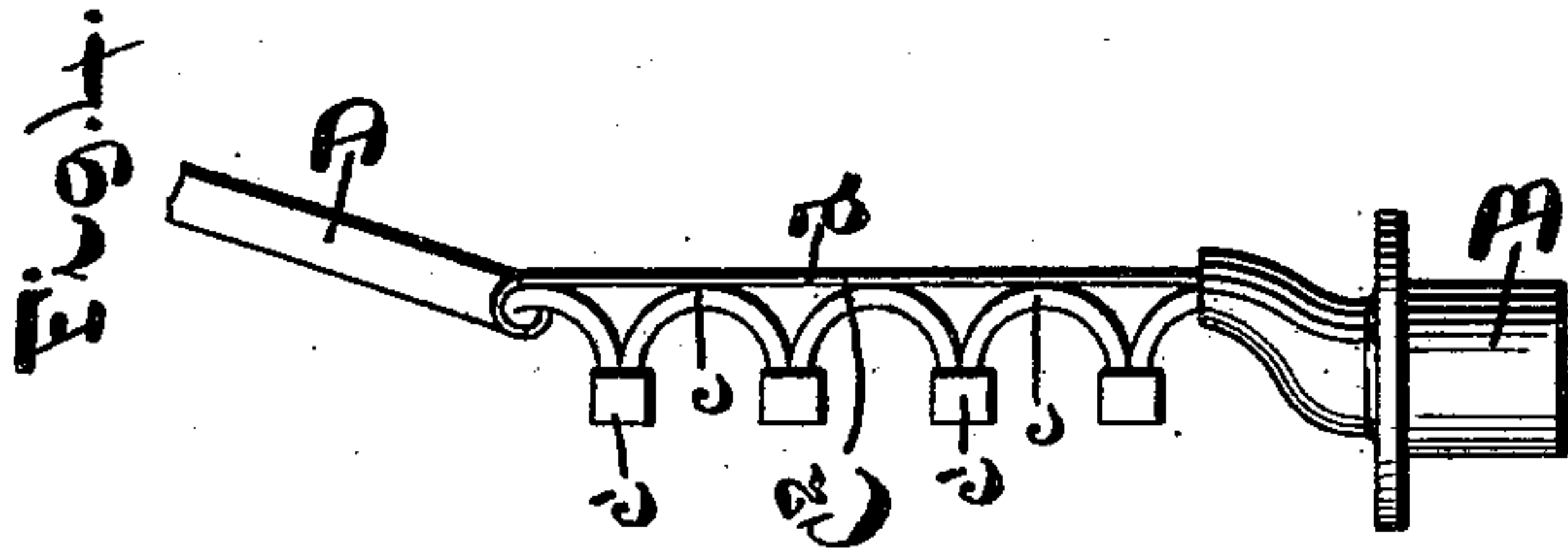


(No Model.)

W. H. BRISTOL.
PRESSURE GAGE.

No. 514,255.

Patented Feb. 6, 1894.



WITNESSES:

Klas H. Pernstich
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UNITED STATES PATENT OFFICE.

WILLIAM H. BRISTOL, OF HOBOKEN, NEW JERSEY.

PRESSURE-GAGE.

SPECIFICATION forming part of Letters Patent No. 514,255, dated February 6, 1894

Application filed June 7, 1893. Serial No. 476,816. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BRISTOL, a citizen of the United States, and a resident of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Pressure-Gages, of which the following is a specification.

My invention has reference to improvements in springs for pressure gages and especially to springs of the character described in Letters Patent No. 389,653, dated September 18, 1888; the nature of which springs is such that the deflections due to variations in pressure are of such range or extent that the usual, or all devices for multiplying the movement can be dispensed with.

The object of my present invention is to still further increase the range of such springs under variations in pressure by causing all the component parts to deflect in the same direction, that is to say, to concur in action. This object I accomplished by avoiding the use of negative bends in the construction of the springs,—as hereinafter pointed out with reference to the annexed drawings, in which—

Figure 1 represents a sectional elevation of a pressure gage embodying a spring constructed according to my invention. Fig. 2 illustrates a sectional elevation and cross section, on an enlarged scale, of a portion of the spring. Fig. 3 is a side elevation of a modified form. Fig. 4 is a similar view of a second modified form.

Similar letters of reference designate corresponding parts throughout the several views of the drawings.

In the drawings, referring at present to Fig. 1, the letter A designates a suitable casing for containing the operative parts of a recording pressure gage, and B is the inlet nipple.

C is the spring closed at its upper end and secured at its lower end to the nipple B. To the free end or terminal of the spring is directly attached by soldering, or otherwise, a recording arm D, the upper end of which is provided with a suitable marking device, such as an ink style *a*, arranged to bear upon the rotating chart E.

The spring, as shown in Figs. 1 and 2, is built up of a series (two or more) of bent or curved tubes *c* of flattened cross-section having their ends placed laterally adjacent, or

tangential, and united by short couplings *c'* soldered to said ends, thus permitting free passage of the fluid under pressure from one tube to the other. By this construction negative bends are avoided, that is to say, bends having a tendency to deflect or spread in a direction opposed to the bends *c*, and consequently a maximum deflection is obtained with variation in pressure.

Instead of arranging the bent tubes *c* to form a rectilinear structure, they may be arranged to form a structure extending in a curved line, for instance, as shown in Fig. 3, the bent tubes may be arranged into a spring *C'* of spiral form; or, in a similar manner, into a helical, volute or other curved form.

While as before stated the tubes are joined with their ends laterally adjacent or tangential, I do not wish to restrict myself to the exact meaning of these terms, since the ends could be placed at some distance apart and enter the coupling from opposite ends.

In general the spring constructed as herein described may be considered as composed of a series of Bourdon springs connected together end to end with the bends all in the same direction, so as to act in conjunction,—consequently the combined movements of the component parts will be communicated to the terminal of the structure and impart to the same a deflection sufficient to permit all multiplying devices to be dispensed with.

While the structures hereinbefore described form in themselves complete and operative devices, they may be rendered more steady and an increased deflection obtained by uniting the several bent tubes *c* by a flexible strip of metal. Such a construction I have shown in Fig. 4, where the spring *C*² has attached thereto a flexible strip of metal *d*, soldered or otherwise secured at intervals to said spring. The increased deflection obtained is due to the conversion of the elongation of the spring into a multiplied lateral deflection coincident with the deflection of the spring due to variations in pressure.

Of course it is to be understood that my invention may be equally well embodied in barometers, thermometers, or other analogous instruments in which either the direct influence of a pressure, such as that of the atmosphere, or that of an expansible body when ex-

posed to varying temperatures, is the cause of operation.

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

- 5 1. A spring for pressure gages consisting of a series of separate, curved tubes of flattened cross-section and couplings unitingsaid tubes, substantially as described.
2. A spring for pressure gages consisting of
10 a series of separate, curved tubes of flattened cross-section having their ends placed laterally adjacent, and couplings uniting said tubes, substantially as described.
3. A spring for pressure gages, consisting of
15 a series of separate, curved tubes of flattened

cross section having their ends placed laterally adjacent, couplings uniting the same, and a flexible strip secured to the bends, substantially as described.

4. A spring for pressure gages consisting of 20 a series of separate curved tubes united longitudinally, substantially as described.

Signed at New York, in the county of New York and State of New York, this 2d day of June, A. D. 1893.

WILLIAM H. BRISTOL.

Witnesses:

KLAS H. TERNSTEDT,
J. J. MALLE.