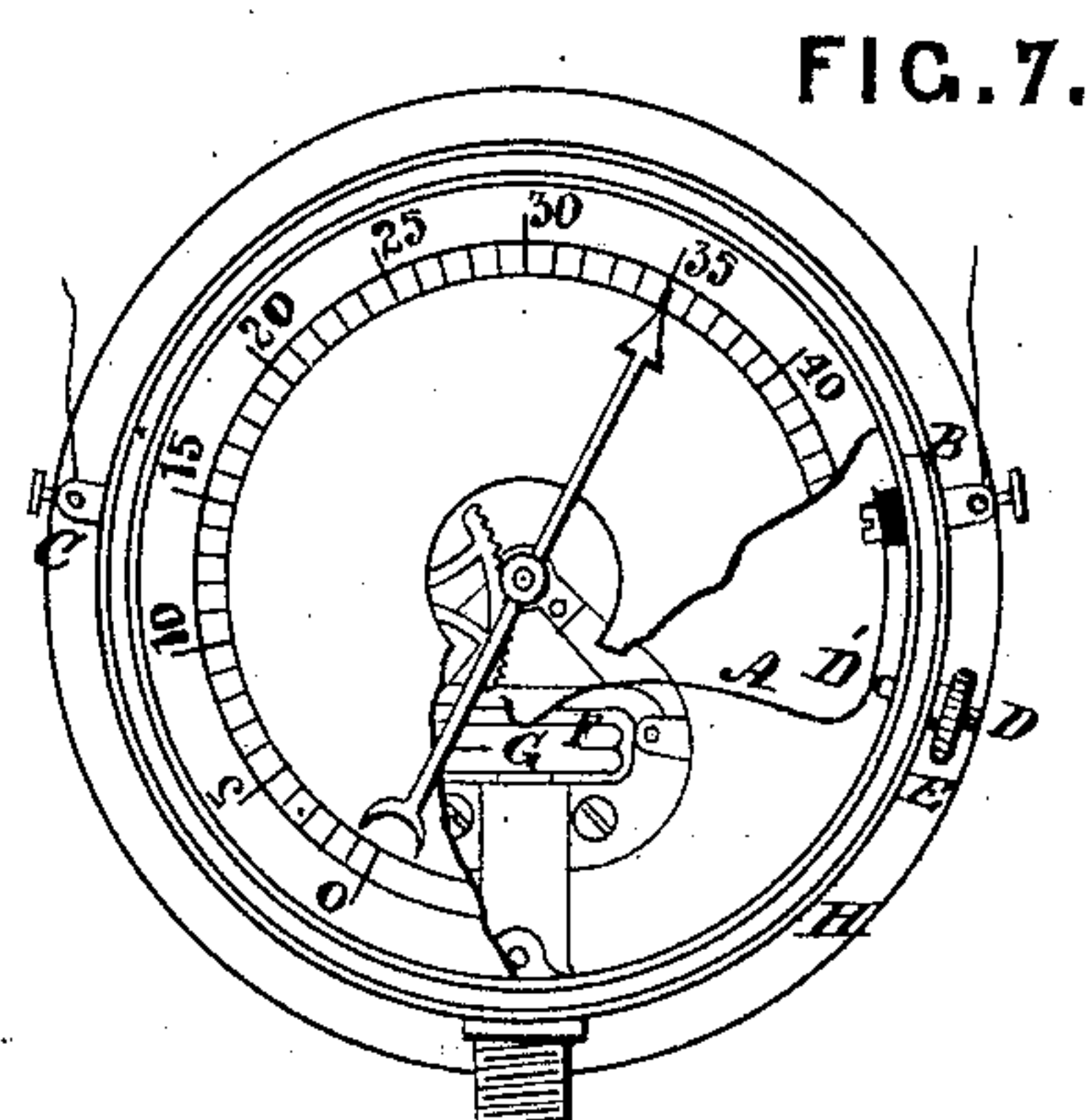
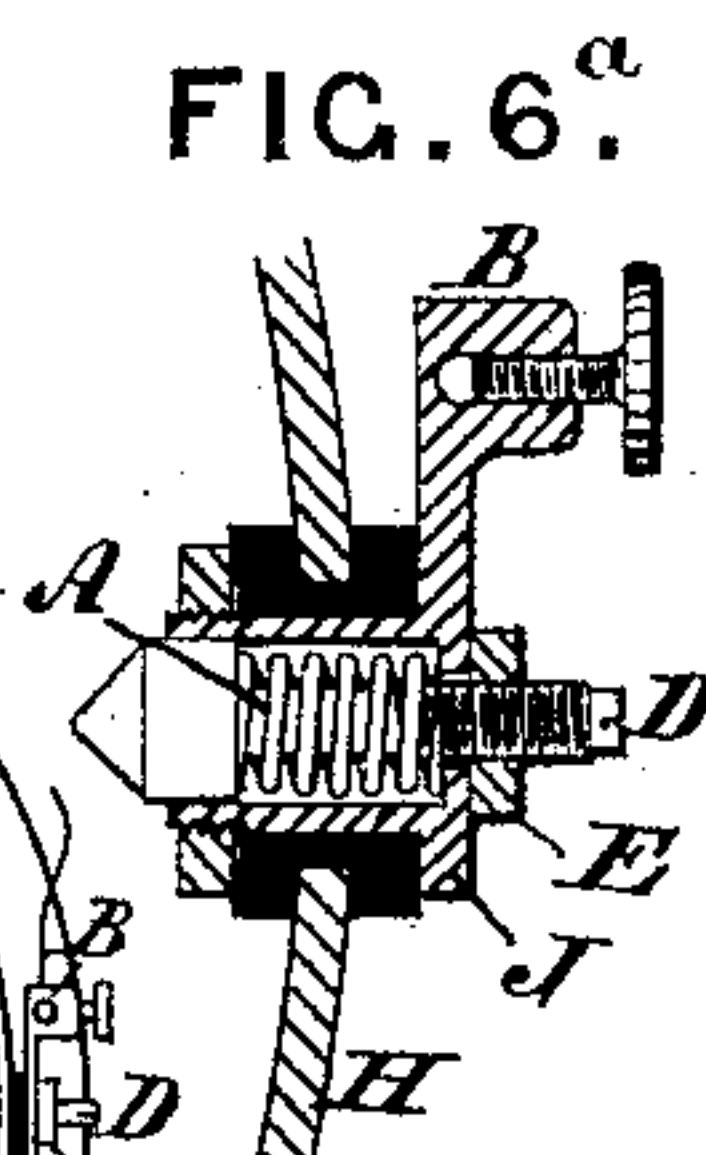
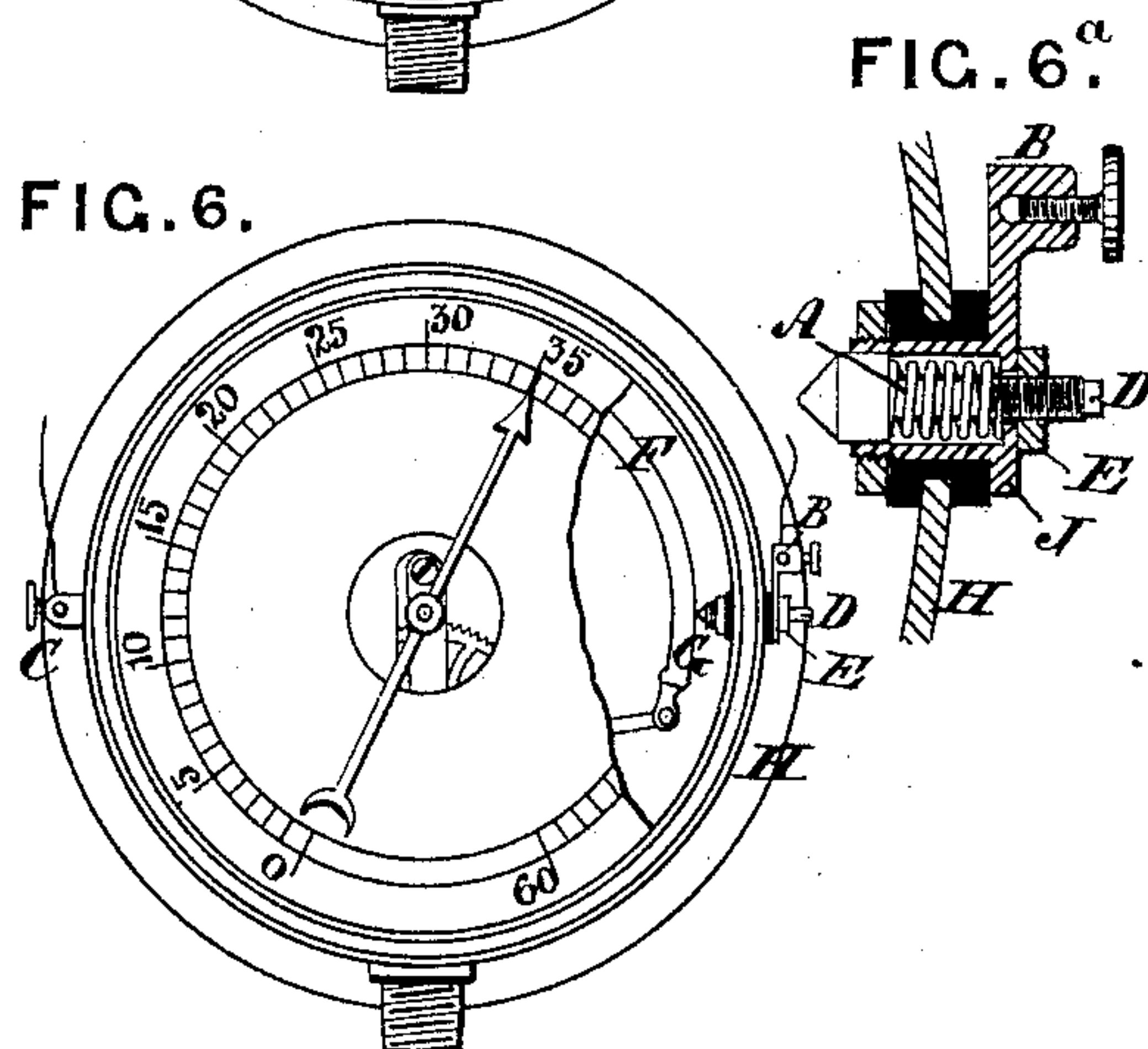
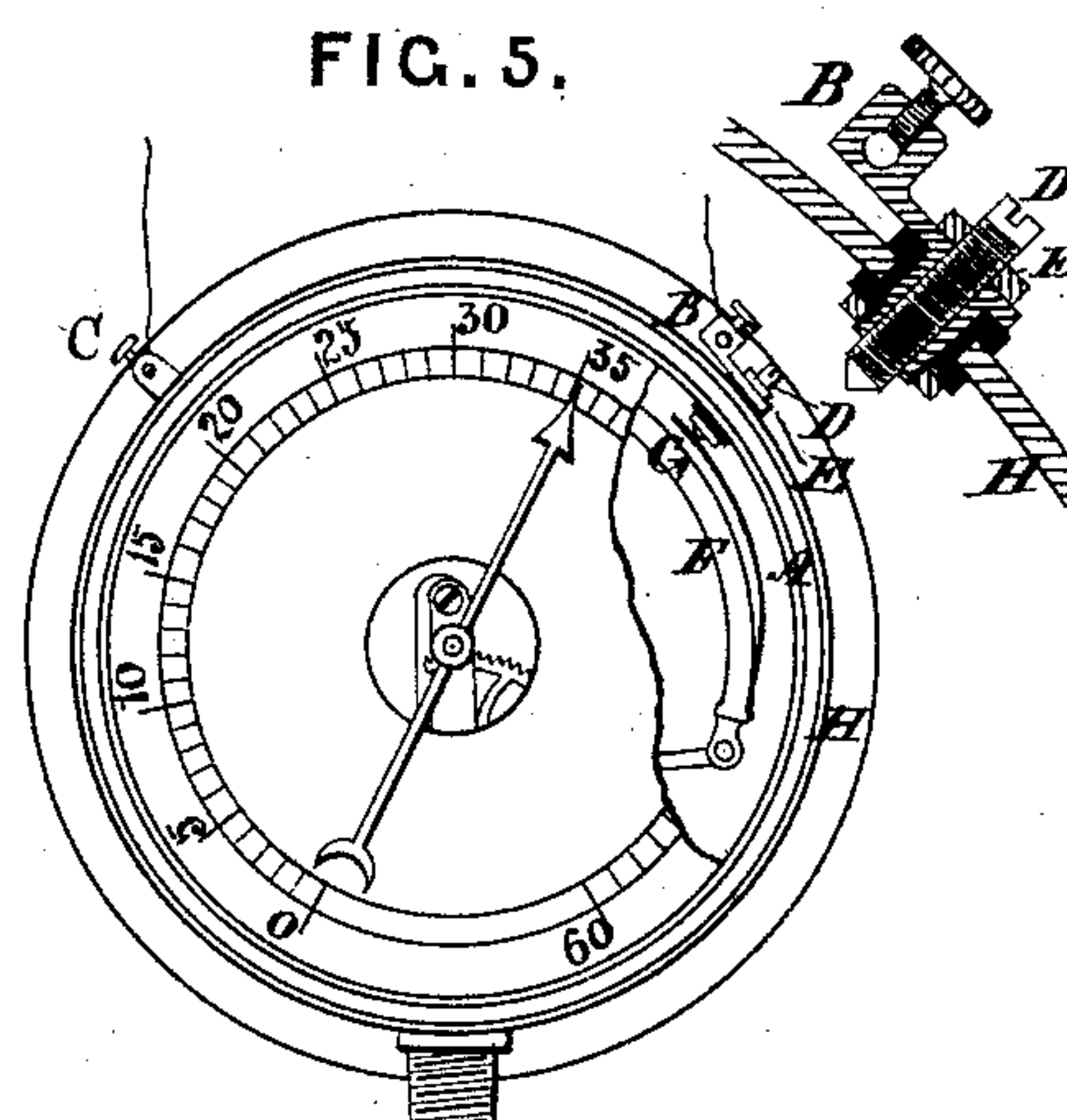
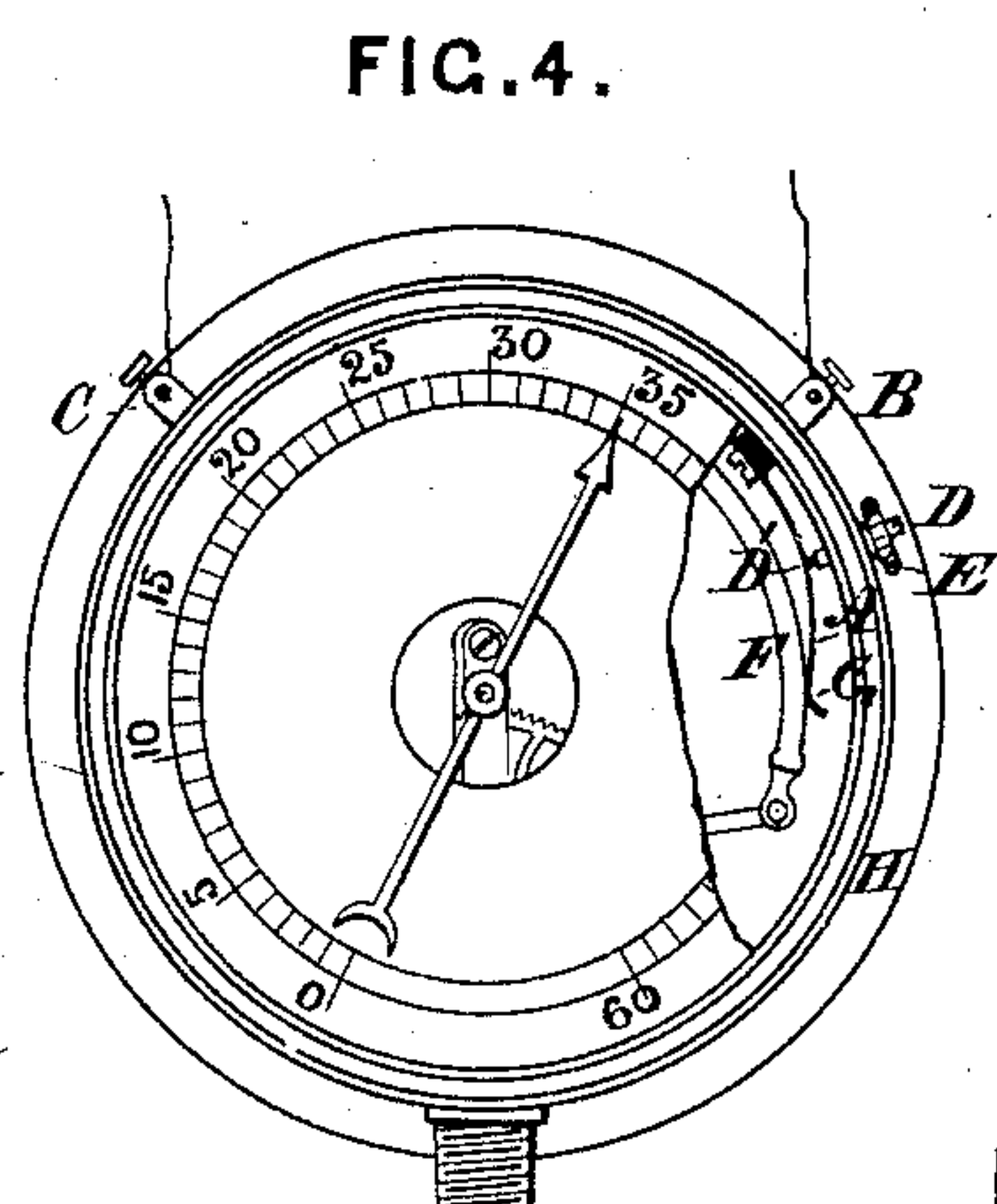
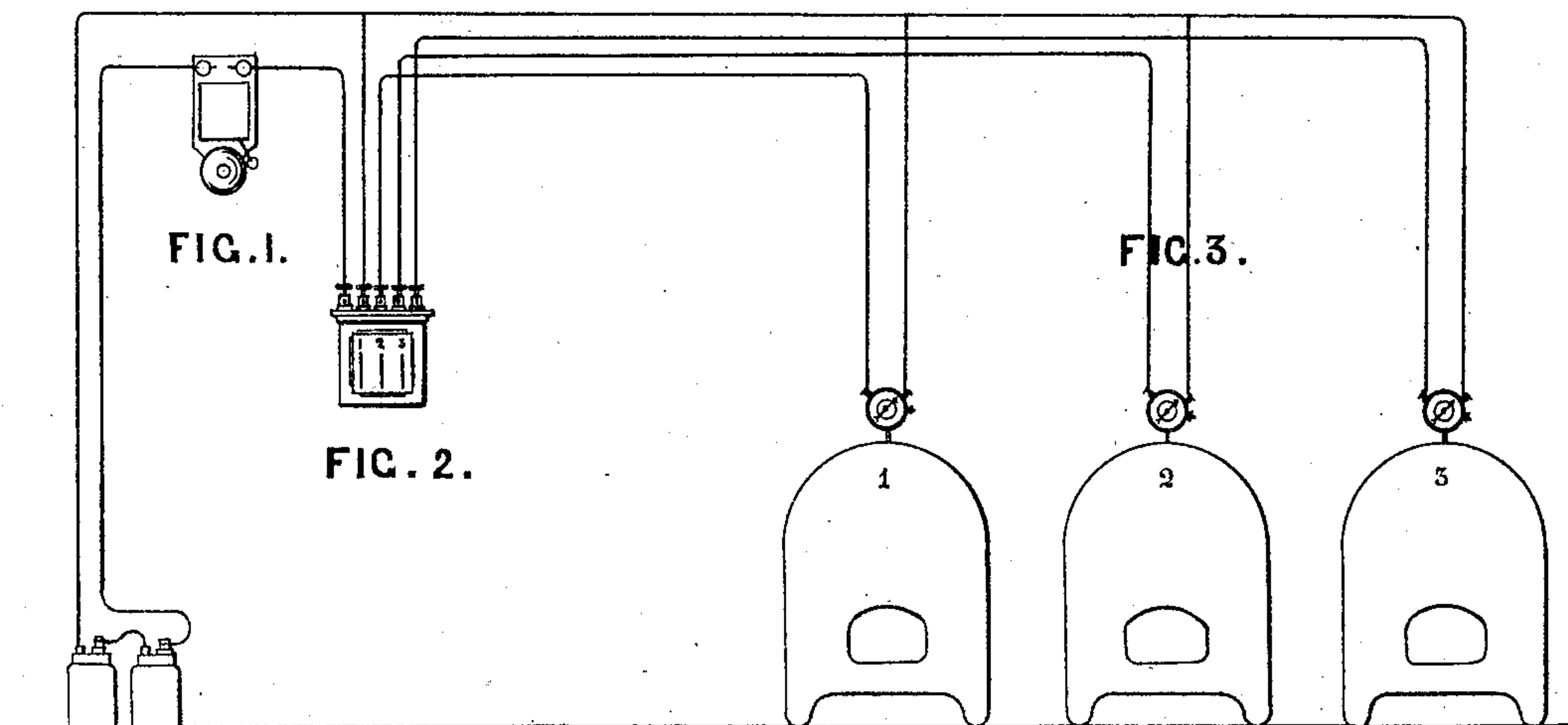


J. R. ARNOLDI.
Electrical Alarm Attachment for Pressure Gages.
No. 234,902. Patented Nov. 30, 1880.



Witnesses
William King
Ernest Clifton Arnoldi.

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UNITED STATES PATENT OFFICE.

JOHN R. ARNOLDI, OF OTTAWA, ONTARIO, CANADA.

ELECTRICAL ALARM ATTACHMENT FOR PRESSURE-GAGES.

SPECIFICATION forming part of Letters Patent No. 234,902, dated November 30, 1880.

Application filed August 9, 1879.

To all whom it may concern:

Be it known that I, JOHN R. ARNOLDI, of the city of Ottawa, county of Carleton and Dominion of Canada, have invented a new and useful Improvement in Electrical Alarm Attachments to Gages used for Indicating or Measuring Pressures, of which the following is a specification.

The object of this invention is to furnish a simple, cheap, convenient, and effective electrical alarm attachment to steam or other pressure-gages most generally manufactured, to sound instant warning of excessive pressure, and also to act as a check or tell-tale on attendants who are confined to limited pressures by instructions.

My invention consists in the combination of the expanding tube, diaphragm, or other moving part of an expanding tube or diaphragm pressure-gage, electrically connected with one pole of a battery, with an adjusting-screw working in the gage-case or in a fixed attachment thereto, and a spring arranged, as hereinafter described, to produce an electrical alarm; and I do hereby declare that the following is a full and exact description thereof, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 represents an ordinary electric gong. Fig. 2 represents an ordinary annunciator or indicator. Fig. 3 represents a nest of three steam-boilers electrically connected by their pressure-gages with Figs. 1 and 2. Figs. 4, 5, and 6 represent front views of an ordinary expanding-tube pressure-gage with a portion of the dial removed.

A is a light metallic spring, of a nearly straight form in Figs. 4 and 5 and spiral in Fig. 6, which, in Fig. 4, is attached to the binding-screw B, insulated from the gage-case by the collar of vulcanite or other suitable insulating substance, to which one of the electric wires (later described) is attached. C is a simple binding-screw, to which the other electric wire is attached. D is an adjusting-screw for regulating the spring A by the insulating-point D', formed of vulcanite or other suitable insulating substance. E is a jam-nut for keeping the screw D secured at any desired point. F is the ordinary expansion-tube in an expanding-tube pressure-gage, G being

point of contact for closing and opening the circuit.

In Fig. 5 the spring A is shown attached to the tube F and the adjusting-screw D insulated from the gage-case by the insulating-collar and without any insulating-point. D' is directly connected with the binding-screw B, (insulated from the gage-case by the insulating-collar.) In this case the circuit is broken or completed at the point G when the pressure to which the gage is adjusted by the set-screw D is reached.

In Fig. 6 the spring is shown, in a spiral form, attached to or working loose on a movable metallic adjustable screwed end and pointed pin or plunger D and arranged in a socket or box, J, which is insulated from the gage-case by the insulating-collar, (this socket or box J receives one of the electric wires at binding-screw B,) the pin or plunger D in the box J being adjusted by the jam-nut E sufficiently to make electric contact between its point and tube F at G when the tube, through pressure, reaches the point at which it is desired an alarm shall be given, and the spiral spring A will yield and allow the pin or plunger D to recede as the tube F expands, still maintaining the alarm. Fig. 6^a shows the construction of this form of attachment and spiral spring on a larger scale.

In Fig. 7 is represented one mode of applying to a diaphragm pressure-gage the same combination, and of obtaining similar results as have been described for Fig. 4.

Proper electrical conducting-wires from the points B and C on the gage-case H are carried in the usual electrical manner through an ordinary battery, in connection with one or more electric gongs or their equivalents, and also in cases where a number of boilers or machines are employed, and separate gages are used with an annunciator, the dials of which are to correspond with the gages of the respective boilers or machines, as Nos. 1, 2, and 3 in Figs. 2 and 3.

With the foregoing brief description of my invention, to which I have given the name of "Arnoldi's excessive pressure signal," I will now proceed to describe more particularly the mode in which it is employed.

Assuming either of the gages, Fig. 4 or 7,

to be attached to a steam-boiler, heating apparatus, hydraulic, or other pressure system where a maximum pressure is allowed of, say, thirty-five pounds, the adjusting-screw D is set up against the spring A until the latter, or the pointed pin or plunger D connected therewith, as in Fig. 6, comes in contact with the gage-tube or diaphragm F while the gage indicates thirty-five pounds. By this arrangement, assuming the boiler or other vessel to be limited to thirty-five pounds pressure and set as above described, the electrical spring A and gage-tube F will connect when the pressure rises to thirty-five pounds, giving the alarm on the gong and operating the annunciator and keeping the gong sounding until the pressure is reduced.

The gong or gongs and annunciator may be placed in electric circuit at any distance from the vessel in which the pressure is generated, and in order that the party in charge may be always certain that the electric circuit is perfect a switch or its equivalent may be placed on the line of wires, by which the circuit can be tested at any moment, such as upon officers changing watch on a steamship or engineers in a factory, &c.

It is obvious that the spring A and adjustable screw D may be used on either open or closed circuit electrically for alarm; and it is obvious that the spring may be brought into contact with the needle, arbor or pinion, tooth-quadrant, or connecting-rod to expansion-tube of a pressure expanding-tube gage, instead of with the expanding tube, as described, and that in a diaphragm-gage it may be brought into contact with the diaphragm, or with the levers, rack, or connecting-rods of a diaphragm-gage.

I consider the direct application of the spring to the prime moving part of a gage, such as the tube or diaphragm, to be preferable; but I do not wish to be limited to the point at which the spring is to be applied to the gage-case, as it can perhaps equally well be permanently attached to the prime or other moving parts of the gage above mentioned, and from contact with an insulated set-screw, pin, or other suitable attachment to form the circuit.

I am aware that electric alarms have been employed on mercury-column gages, and I do not claim the application of electric alarms except in the modes above described and referred to.

I am also aware that electric alarms have already been applied to diaphragm recording-gages, and I do not claim, generally, the application to diaphragm or expanding-tube pressure-gages of an electric alarm, but only the

improved method by the direct and simple combination substantially as described.

The advantages of the above-described device over any existing application of electric alarms to diaphragm or expanding-tube pressure-gages are mainly the following:

First, the extreme simplicity, facility, and inexpensiveness of its application to all forms of diaphragm or expanding-tube pressure-gages already constructed.

Second, the extreme simplicity of the combination, dispensing with the intermediate parts which intervene in the forms hitherto applied to diaphragm recording-gages between the diaphragm and the point of electrical contact, this simplicity rendering the instrument not liable to get out of order and its operation certain.

Third, by the substitution of a delicate direct-acting spring, adjusted as described, for a set-screw working in a post or stand and set upon a pivoted or yielding base, (as heretofore applied to diaphragm recording-gages,) this part of the instrument is more reliable and rendered much less liable to get out of order. It can also be adjusted with greater precision, owing to there being no intermediate joints to produce backlash, and as long as the expanding pressure-tube or diaphragm alone retains its usefulness the alarm will be given at the set point.

Fourth, by the position of the spring in relation to the expansion-tube or other moving part the friction or disturbance to the action of the gage is reduced to a minimum. A continuous alarm is secured without danger of the electrical contact ceasing until the pressure has been reduced below the point to which the alarm is set.

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

In an expanding tube or diaphragm pressure-gage, the combination, with the diaphragm, expanding tube, or other moving part in electrical communication with one pole of a battery, of the adjusting-screw D and the spring A in electrical communication with the other pole of a battery, the spring A being the medium of electrical contact to open or close an electrical circuit for the purpose of an electrical continuous sounding-alarm by the action of any pressure produced on the gage in excess of that to which it has been set.

Ottawa, Ontario, June 9, 1879.

JOHN ROSSER ARNOLDI.

In presence of—

WILLIAM KING,
ERNEST CLIFTON ARNOLDI.

Correction for Letters Patent No. 234,902.

It is hereby certified that in Letters Patent No. 234,902, dated November 30, 1880, to John R. Arnoldi for Improvement in "Electrical Alarm Attachments for Pressure Gages," the signature of the patentee was erroneously printed "John Rosser Arnoldi," instead of *John Roger Arnoldi*; that the proper corrections have been made in the records of this Office, and that said correction is hereby made in said Letters Patent.

Signed, countersigned, and sealed this 6th day of January, A D. 1881.

[SEAL.]

A. BELL,
Acting Secretary of the Interior.

Countersigned:

E. M. MARBLE,
Commissioner of Patents.