No. 702,846. Patented June 17, 1902.

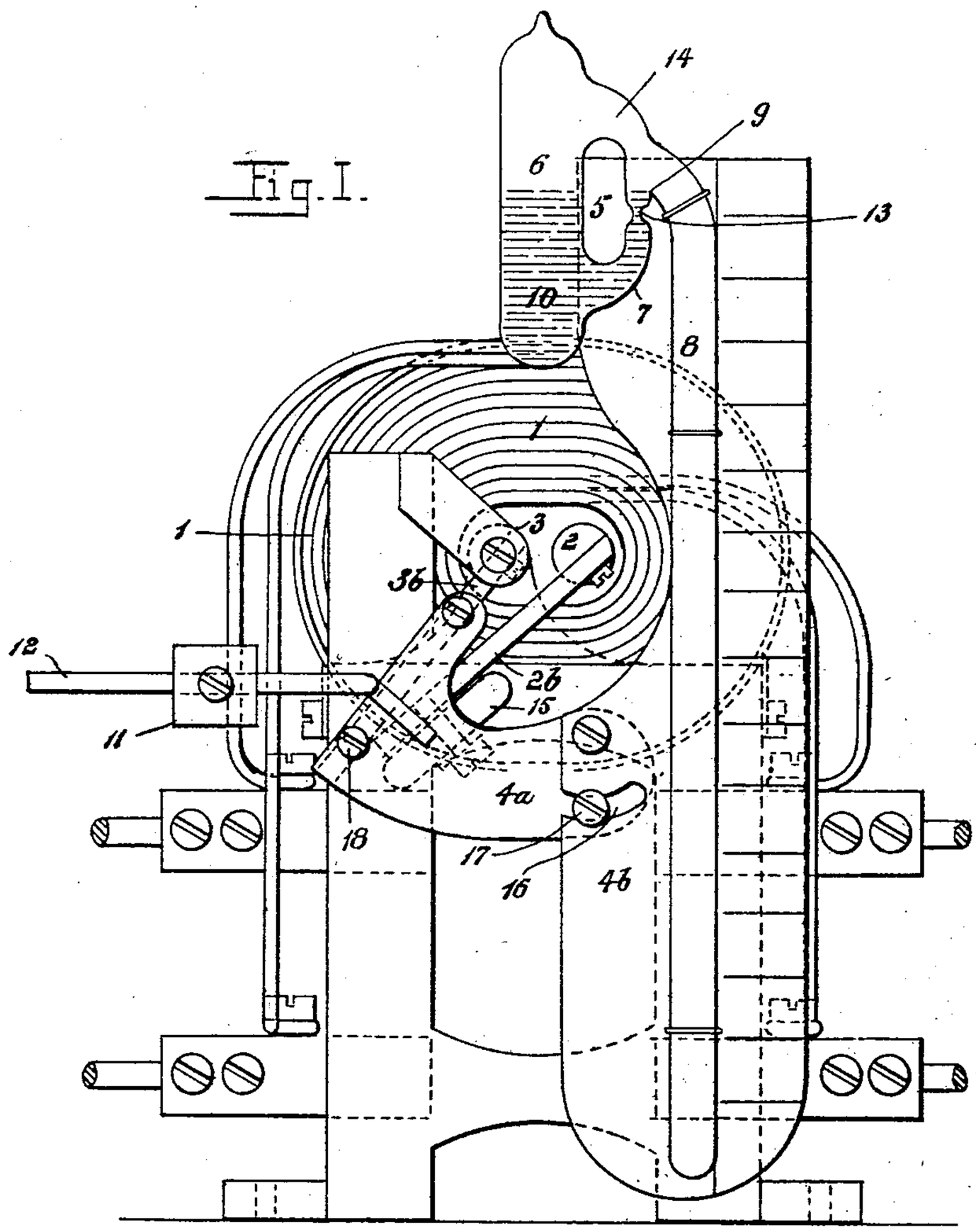
A. WRIGHT.

ELECTRIC MAXIMUM DEMAND INDICATOR.

(Application filed June 26, 1900.)

(No Model.) 5 Sheets—Sheet 1.

Fig. I.



WITNESSES.

Alexander Wright.

Louis N. Kittman.

INVENTOR.

Arthur Wright

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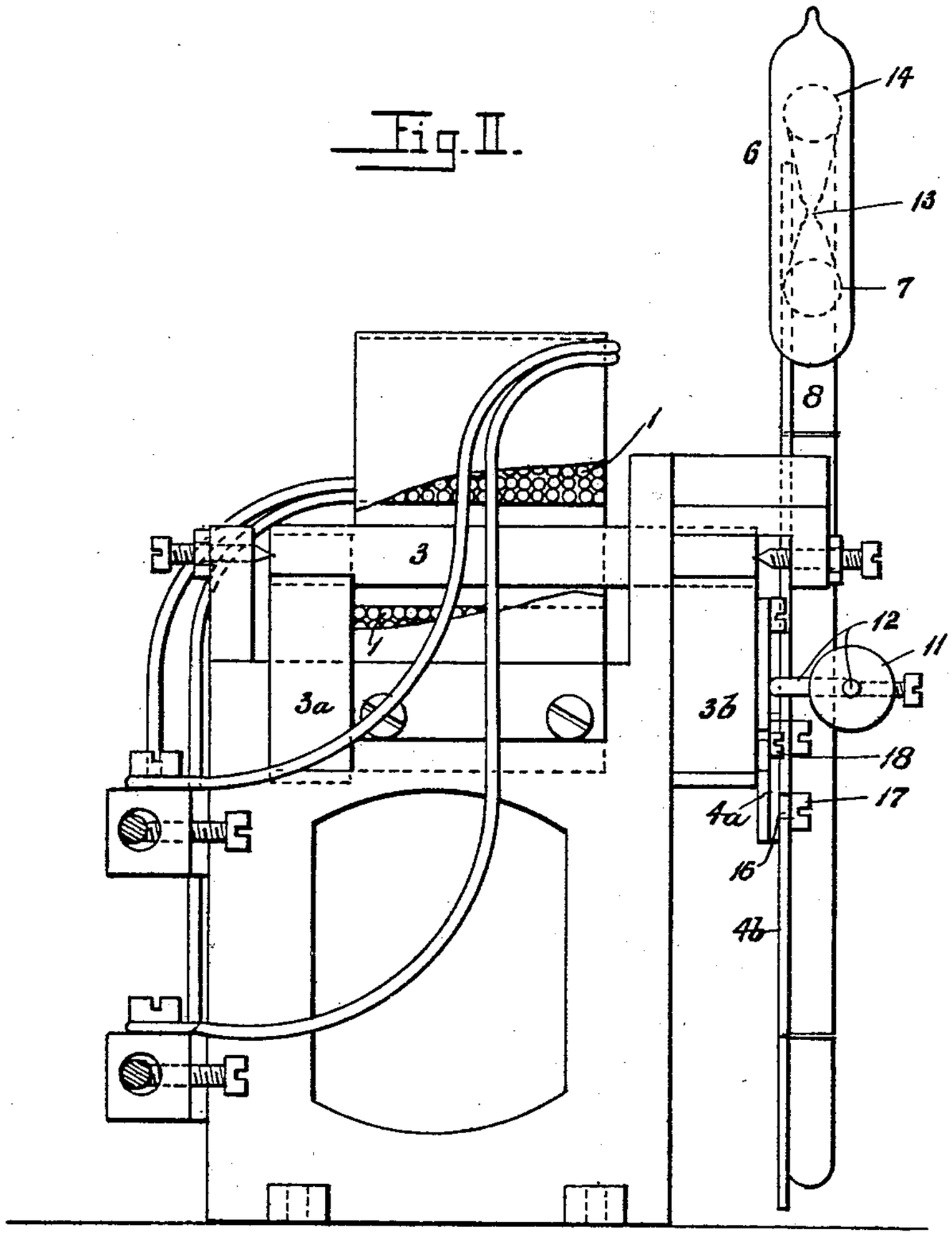
(No Model.) 5 Sheets—Sheet 2.

Fig. II.



WITNESSES.

Alexander Wright.

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(No Model.) 5 Sheets—Sheet 3.

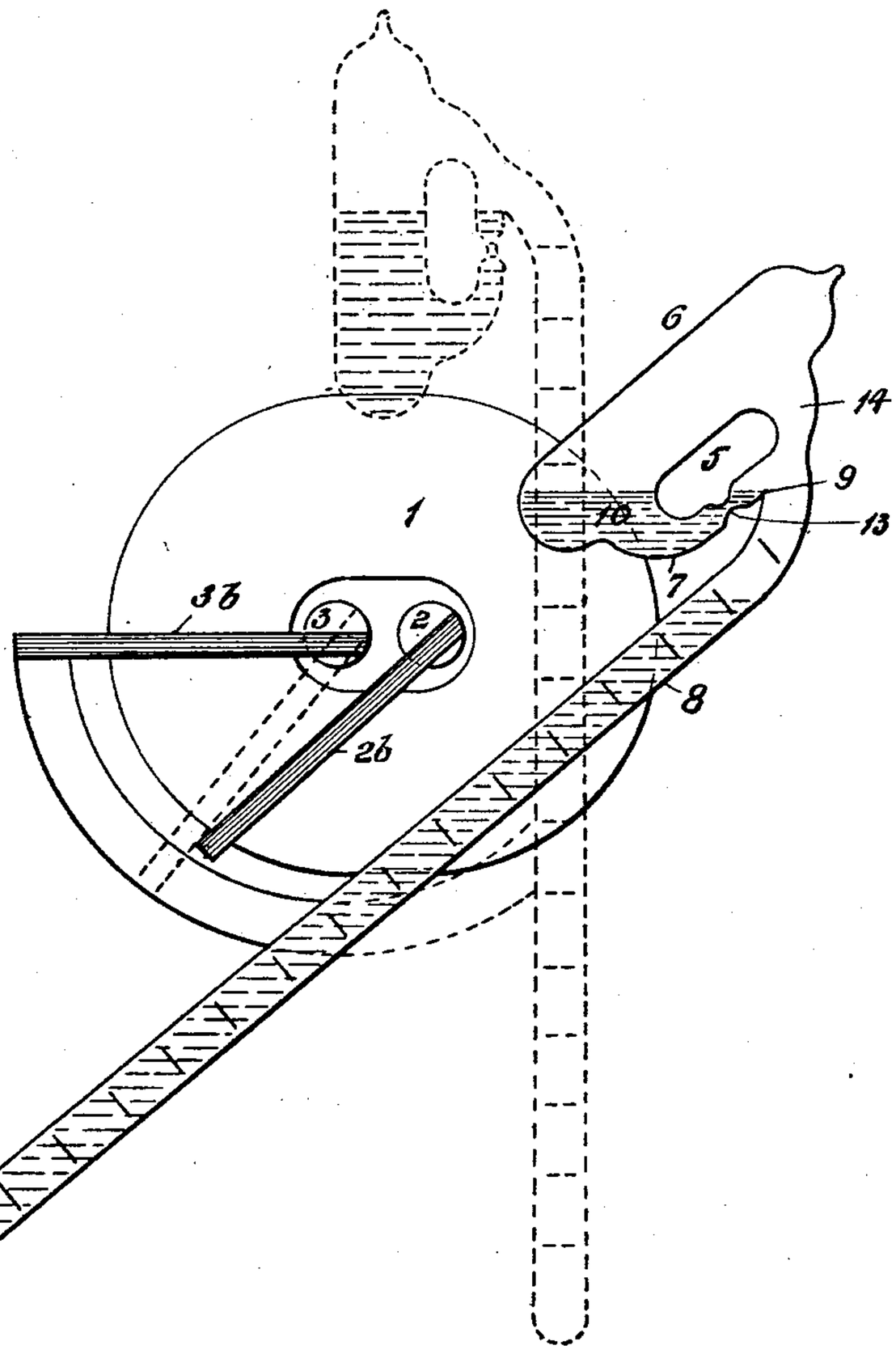

Fig. III.

WITNESSES.

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A. WRIGHT.

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(Application filed June 26, 1900.)

(No Model.) 5 Sheets—Sheet 4.

Fig. IV.

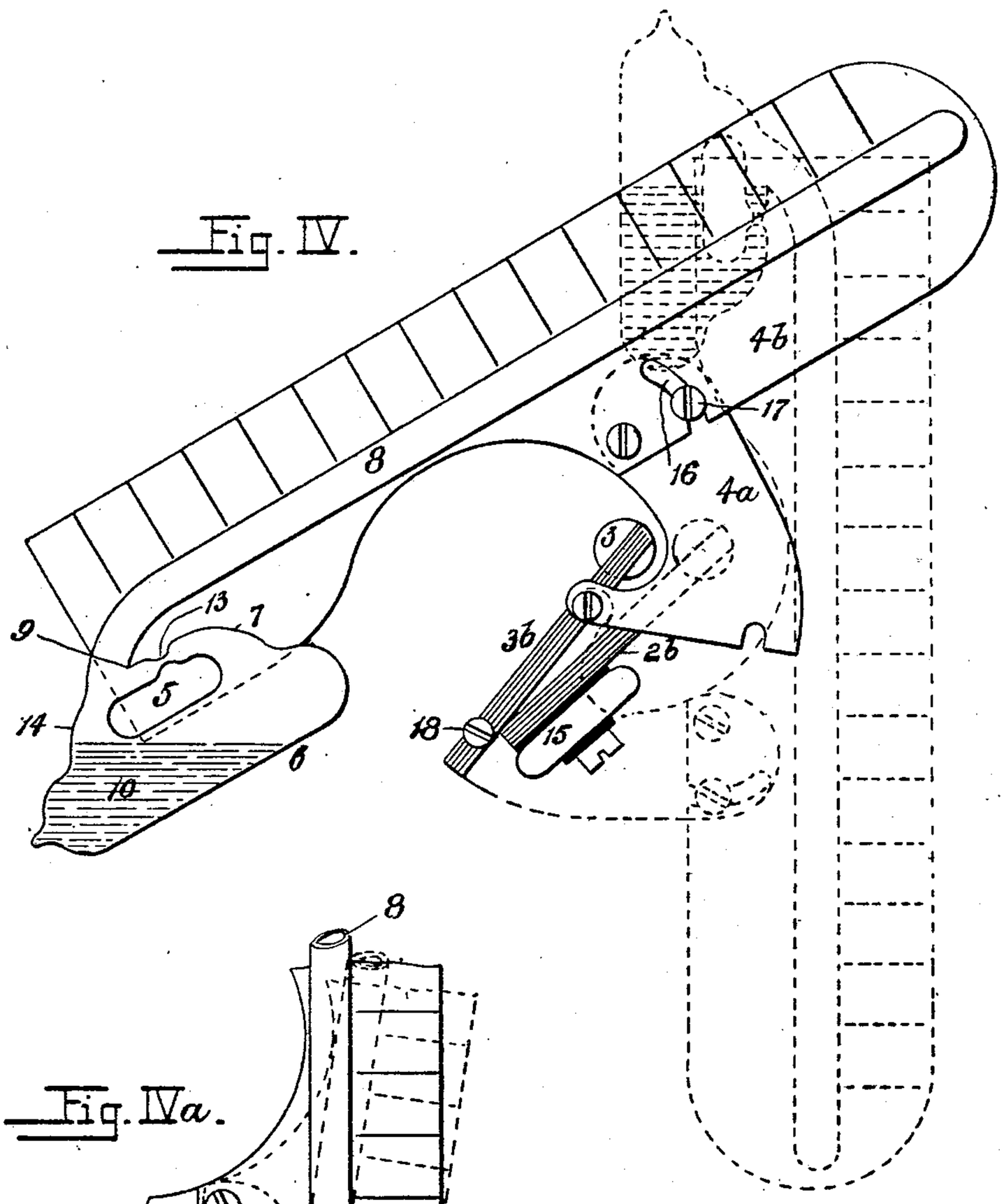

Fig. IVa.

WITNESSES.

Alexander Wright.

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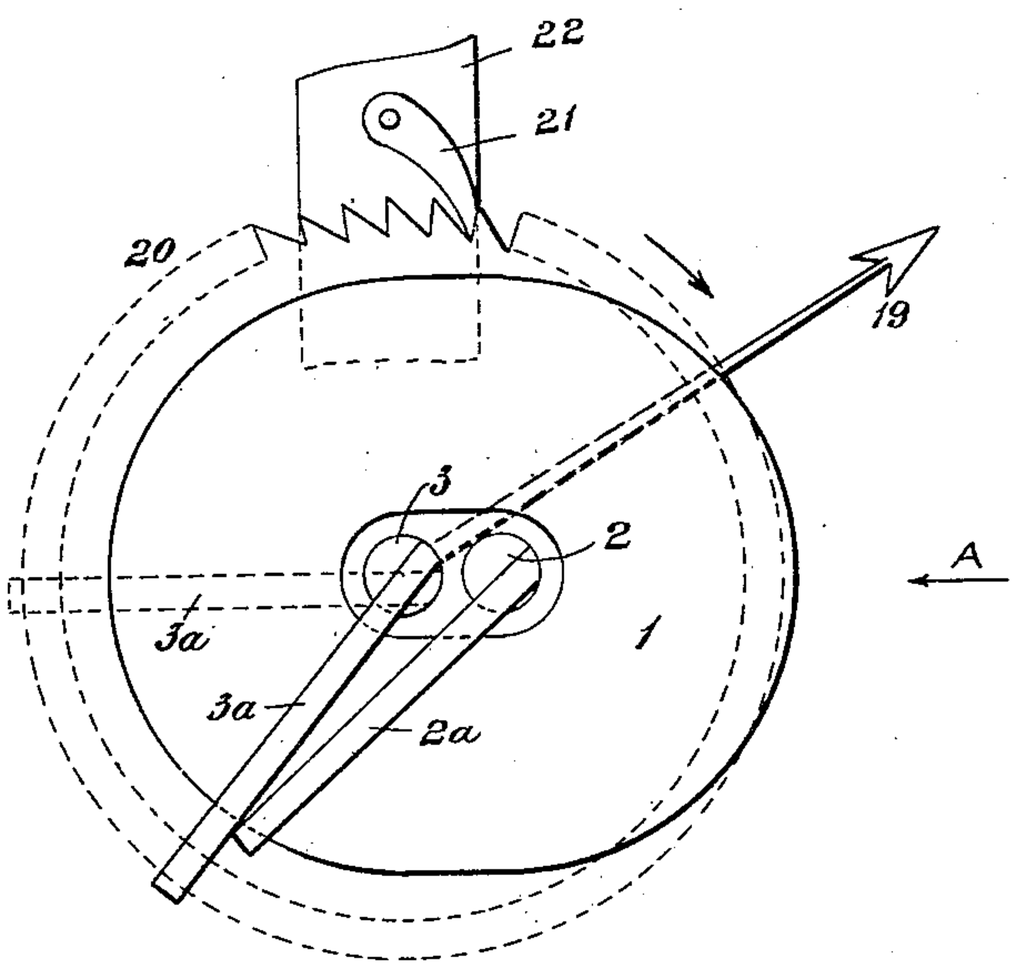
(Application filed June 26, 1900.)

(No Model.) 5 Sheets—Sheet 5.

Fig. V.



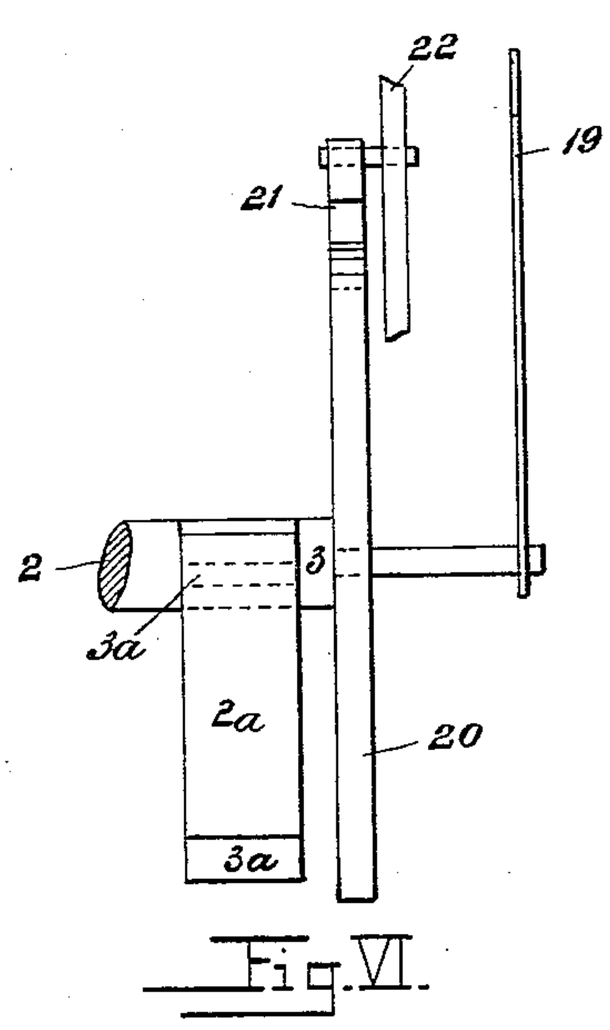


Fig. VI.

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C. E. Marshall.

Inventor:
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By Lyons & Bissing.
Attorneys.

UNITED STATES PATENT OFFICE.

ARTHUR WRIGHT, OF BRIGHTON, ENGLAND, ASSIGNOR TO THE MUTUAL ELECTRIC TRUST, LIMITED, OF BRIGHTON, ENGLAND.

ELECTRIC MAXIMUM-DEMAND INDICATOR.

SPECIFICATION forming part of Letters Patent No. 702,846, dated June 17, 1902.

Application filed June 26, 1900. Serial No. 21,638. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR WRIGHT, a subject of the Queen of Great Britain, and a resident of Brighton, in the county of Sussex, England, have invented certain new and useful Improvements in Electric Maximum-Demand Indicators, of which the following is a specification.

My invention relates to maximum-demand indicators, by means of which certain advantages are obtained.

My invention consists, essentially, of two integers, which for the purposes of this specification I shall term, respectively, the "indicator" and the "tilter."

The indicator may take one of two forms, and I shall hereinafter differentiate these two forms from one another by the terms "liquid-indicator" and "click-indicator."

The liquid-indicator consists of a vessel of such form that liquid is cut off from one part, hereinafter termed the "reservoir," and is transferred by decantation to another part, hereinafter termed the "receiver," in proportion to the angular movement or tilting of the said vessel.

The click-indicator consists, essentially, of the combination of a detaining device and a detainable device. The position at which the detainable device is detained by the detaining device is determined by the amount of angular movement or tilting of the detainable device. The said tilting or angular movement is produced by the integer hereinbefore termed the "tilter" and which consists of an electromagnetic device capable of tilting the indicator (whether liquid or click) through an angle which will vary with the current passing through its coil or coils.

In order that my invention may be more readily understood, I have appended hereto certain sheets of drawings, in which—

Figure I is a front elevation of a combined tilter and liquid-indicator; Fig. II, a side elevation of the same; Fig. III, a view of certain parts of the same during deflection; Fig. IV, a view of certain parts of the same when turned over for the purpose of restoring the liquid to the reservoir. Fig. IV^a is a detail of the adjustable support for the liquid-tube. Fig. V is an end elevation of a click-indicator, and Fig. VI a side elevation of the same.

In the said figures similar numerals of reference indicate similar parts.

Referring now to the figures, it will be seen that the tilter consists of a coil or coils 1, having two armatures 2 3, one of which, 2, is fixed and the other, 3, movable. These armature-cores lie side by side within the coil, and being similarly magnetized by the current in the coil they tend to repel one another; but as one is fixed the other alone will move, and the amount of its movement will vary with the current traversing the coil. In order that such relative movement of the cores may take place in a convenient manner, they are made of the shape shown in Fig. VI, so as to obtain a strong repellent action between the wings 2^a 2^b of the core 2 and the wings 3^a 3^b of the core 3. The core 2 is held in a fixed position by means of the block 15. To the said movable core 3 is affixed a board or frame made in two parts 4^a 4^b, carrying the liquid-container 5. This liquid-container in the form of my invention illustrated consists of a short tube 6 or other conveniently-shaped vessel serving as a reservoir for the liquid. From the lower part of the said reservoir a tube or passage 7 (hereinafter termed the "feed-pipe") passes to the upper part of a downwardly-projecting tube 8, (hereinafter termed the "receiver.") At the point where the feed-pipe joins the receiver is a lip 9, and the liquid-container contains a liquid 10, which fills the reservoir and feed-pipe up to the level of the said lip.

The liquid-container when the instrument is first put in position has no liquid in the receiver 8, but only in the reservoir 6 and in the feed-pipe 7, such liquid extending up to the level of the lip 9, as aforesaid. When now a current is passed through the coil 1, angular movement of the free armature-core 3 takes place, and the container 5 is tilted to such an angle that some of the liquid flows over the lip and into the receiver 8, and the amount of liquid so transferred to the receiver is a measure of the current passed through the coil. If the current is cut off, the parts will be returned to their normal position by

virtue of the weight 11, whose position is adjustable upon the bent rod 12, attached to the part 4^a of the frame, but the liquid in the receiver will remain there. If now the current be switched on again and be a smaller current than that previously passed, tilting will again take place, but no more liquid will pass from the reservoir 6, as the angular movement will not be so great as on the previous passage of the current. If, however, a current be passed through the coil greater than that previously passed, a greater amount of tilting or of angular movement will take place than was formerly the case and more liquid will be transferred to the receiver. Hence the amount of liquid found in the receiver after a definite period of time will give an indication of the maximum current which has passed through the coil during that period.

To prevent spill from a sudden "kick" produced by a momentary current, a constriction 13 is made in the feed-pipe, so that a lag in the flow of the liquid (which liquid is by hoice one of inferior mobility) is produced.

To enable the liquid to be returned to the reservoir and feed-pipe after the maximum current—say at the quarterly reading of the meter—has been taken, the upper part of the receiver may be connected to the upper part of the reservoir by a tube 14, (hereinafter termed the "replacing-tube,") so that on turning the container upside down the liquid will flow from the receiver into the reservoir.

The two parts 4^a 4^b of the board or frame are capable of adjustment by the curved slot 16 and binding-screw 17. By this means the parts can be adjusted so as to make the tube 8 vertical or to bring the level of the liquid up to the lip 9. 18 is another binding-screw, by means of which the part 4^a of the frame or board can be detached from the armature 3. When so detached, the liquid-indicator can be tilted around to the position shown in Fig. IV for the purpose of resetting—that is to say, for the purpose of restoring the liquid from the tube 8 back into its original position.

Fig. III shows the liquid-indicator when tilted to an extreme or nearly extreme position.

It is obvious that the strength of the field and the repulsion between the armature-cores will vary with the ampere-turns, so that the field may have two windings and may be adapted for a three or more wire circuit.

The magnetic tilter hereinbefore described may be used not only with a liquid-indicator, but with any other form of indicator—such, for example, as the click-indicator hereinafter to be described. I desire it to be understood, however, that I do not lay any claim in my present application for Letters Patent to the specific construction of said click-indicator. The said click-indicator is shown in Figs. V and VI, in which it will be seen that 19 is the pointer and 3 the angularly-moving axis or core on which it is mounted. If now a ratchet-wheel 20 be attached to the said axis 3, so as to move angularly with the pointer or needle 19, and if a click or pawl 21 be attached to any convenient fixed part, as 22, of the instrument in such a manner that when deflection in the normal direction, as shown by the arrow, takes place the click will ride over the teeth of the ratchet-wheel, but will lock between two of the said teeth when backward movement takes place, then it will be clear that the detaining and the detainable devices will be locked together at the point of maximum deflection and that backward movement will be prevented. Further deflection on increase of demand will not, however, be prevented, as the end of the click will upon such further deflection simply ride over the teeth of the ratchet-wheel. The parts will always be locked, therefore, at the point of maximum deflection—that is to say, at the position of greatest deflection which has taken place during the period of time for which the demand-reading is required. To express this in another way and with reference to the specific form of instrument mentioned, the needle while free to be deflected in the direction shown by the arrow cannot retrace its path, but will remain at its position of maximum deflection, and thus indicate the maximum demand which has been thrown upon the supply-circuit during the given period of time.

In connection with the click-indicator I may employ a dash-pot or retarding device of any convenient form for the purpose of obviating (or minimizing the chance of) any record being given of a mere kick or accidental or short-lived deflection or a prolongation of deflection due to momentum or the like. The said dash-pot is the equivalent of the restriction 13 of the liquid-indicator. Each is a retarding device.

The magnetic tilter hereinbefore described resembles an ammeter; but there is this important distinction—namely, that it would be useless for the purpose to which an ammeter is put on account of the residual magnetism which would remain in such large masses of iron as I employ. If I constructed my tilter like an ordinary ammeter, there would be no time lag and the instrument would be altogether too delicate for my purpose. In my tilter I must have sufficient iron to do a definite and a considerable amount of work, and I therefore have to employ what I have herein shown to be a heavily-ironed instrument.

It is evident that I may use my construction of tilting liquid-indicators with other forms of electrical actuating devices than the electromagnetic actuators herein shown. I also desire to emphasize the fact that I use the term "liquid" herein in its broad sense, meaning a mass composed of particles that move freely among each other upon the application of pressure. Thus water, mercury, a mass of

powder, sand, small shot, or rolling bodies would be covered by the term "liquid" as I use the term.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A meter for indicating the maximum electric demand in a period of time, comprising an angularly-movable vessel containing a material to be decanted and including a reservoir and receiver, the angular movement of the vessel decanting a portion of the material from the reservoir to the receiver, which varies with the extent of the maximum movement, substantially as described.

2. A meter for indicating the maximum electric demand in a period of time comprising an angularly-movable vessel, containing a material to be decanted, and including a reservoir and a receiver, and an electrical actuating device for angularly moving the vessel, substantially as described.

3. A meter for indicating the maximum electric demand in a period of time comprising an angularly-movable vessel, containing a material to be decanted, and including a reservoir and a receiver, and an electromagnetic actuating device for angularly moving the vessel, substantially as described.

4. A meter for indicating the maximum electric demand in a period of time comprising an angularly-movable vessel, containing a material to be decanted, and including a reservoir and a receiver, and an ammeter for angularly moving the vessel, substantially as described.

5. A meter for indicating the maximum electric demand in a period of time comprising an electric actuating device, and a liquid-indicator having a constricted passage operated thereby, substantially as described.

6. A liquid-indicator for indicating the maximum electric demand in a given time, comprising a tilting vessel including a reservoir, a feed-pipe, and a receiver fed therefrom with an amount of liquid which varies with the maximum tilt of the vessel, substantially as described.

7. A tilting liquid-indicator for indicating the maximum electric demand in a period of time comprising a reservoir, a feed-pipe having a constricted passage and a receiver fed therefrom by an amount of liquid varying with the maximum tilt of the indicator; substantially as described.

8. A tilting liquid-indicator for indicating the maximum electric demand in a period of time comprising a reservoir, a feed-pipe, a receiver fed therefrom by an amount of liquid varying with the maximum tilt of the indicator, and a replacing-tube, substantially as described.

9. A meter for indicating the maximum electric demand in a period of time, comprising an armature, a heavily-ironed coil actuating it, and a liquid-indicator consisting of a tilting vessel including a reservoir and a receiver fed therefrom by decantation, substantially as described.

10. A meter for indicating the maximum electric demand in a given limit of time comprising an armature, a heavily-ironed coil actuating it, and a tilting liquid-indicator with a constricted feed-aperture operated by the armature, substantially as described.

11. A meter for indicating the maximum electric demand in a given limit of time comprising an armature, a heavily-ironed coil actuating it, and a tilting liquid-indicator with a constricted feed-aperture and return-pipe operated by the armature, substantially as described.

12. A meter for indicating the maximum electric demand in a given limit of time comprising a stationary axial armature provided with a wing or wings at each end, a movable axial armature provided with a wing or wings at each end actuated by the wings of the stationary armature and an indicator actuated by the movable armature, substantially as described.

13. A meter for indicating the maximum electric demand in a given limit of time comprising an electric actuating device and a tilting liquid-indicator adjustably connected to its movable part, substantially as described.

14. A meter for indicating the maximum electric demand, in a given limit of time comprising an electric actuating device and a tilting liquid-indicator connected to its movable part by a pivot upon which it may turn for resetting, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ARTHUR WRIGHT.

Witnesses:
JOHN REID DICK,
JAMES G. LORRAIN.