

G. DALÉN.
LIGHT SIGNAL APPARATUS.
APPLICATION FILED JAN. 4, 1910.

952,420.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

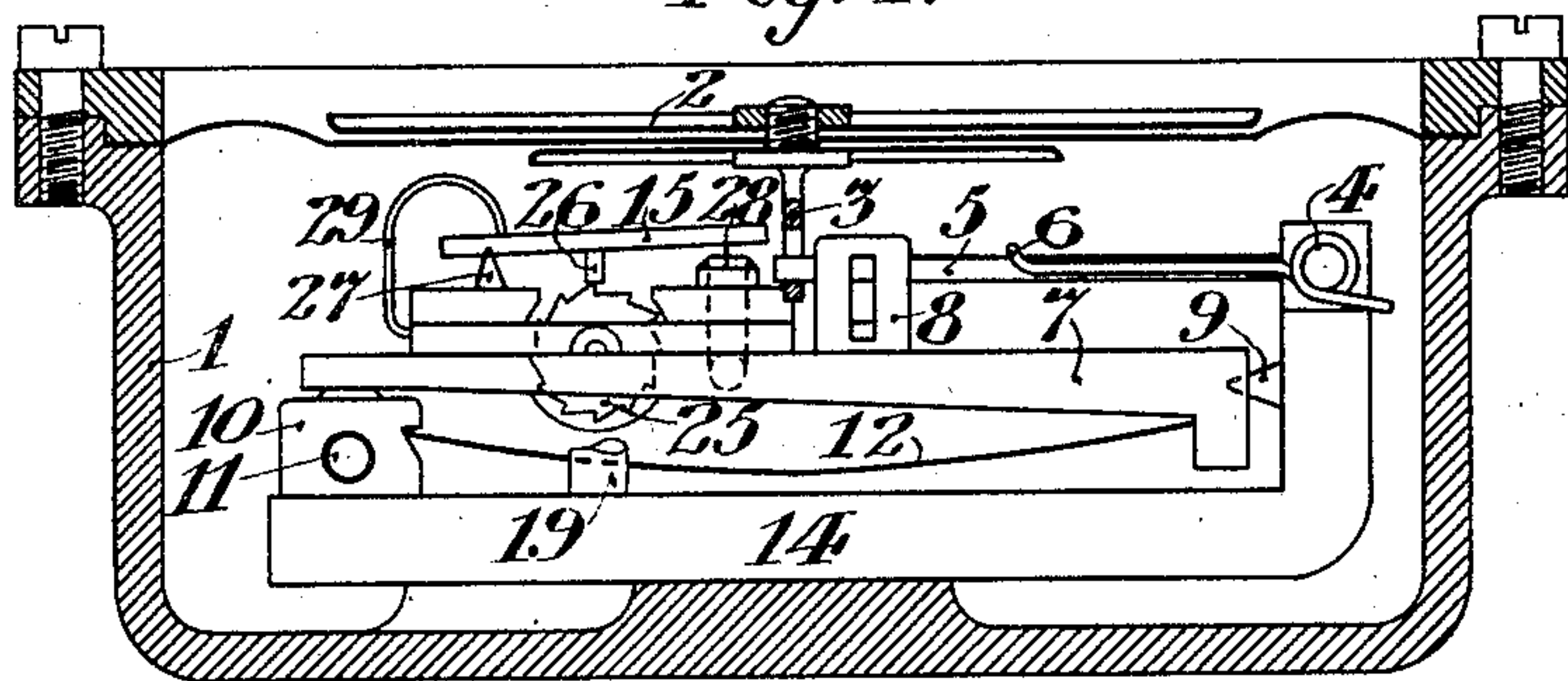
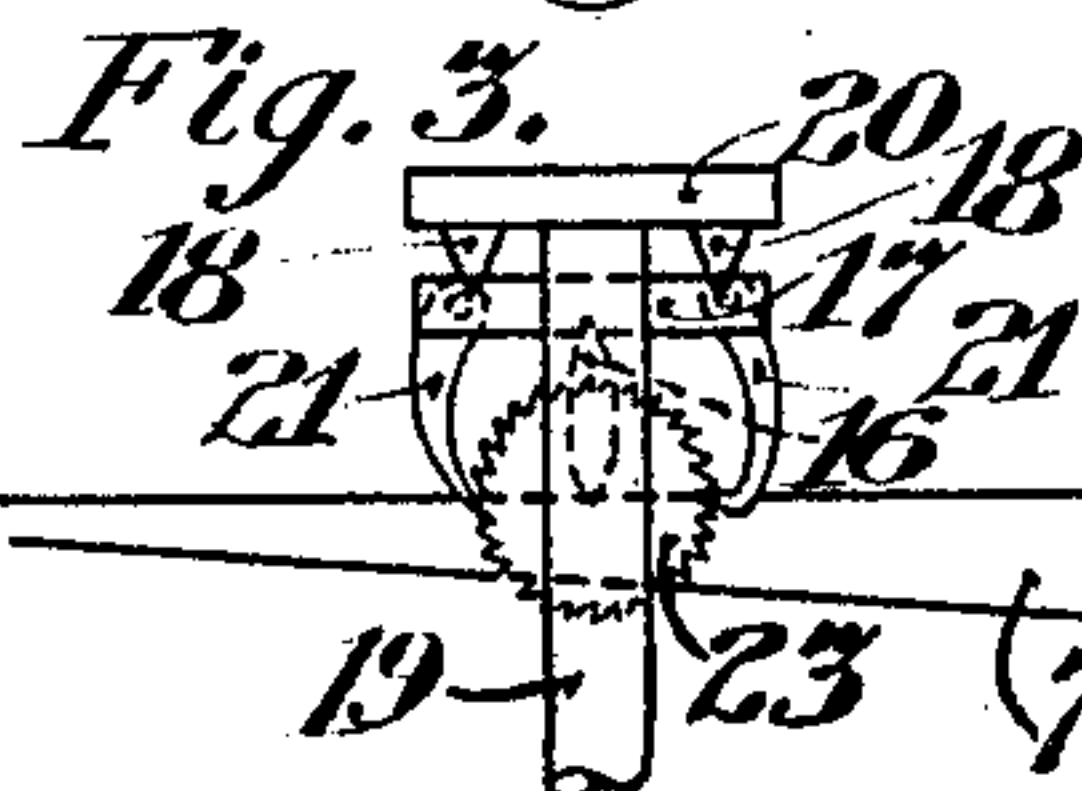
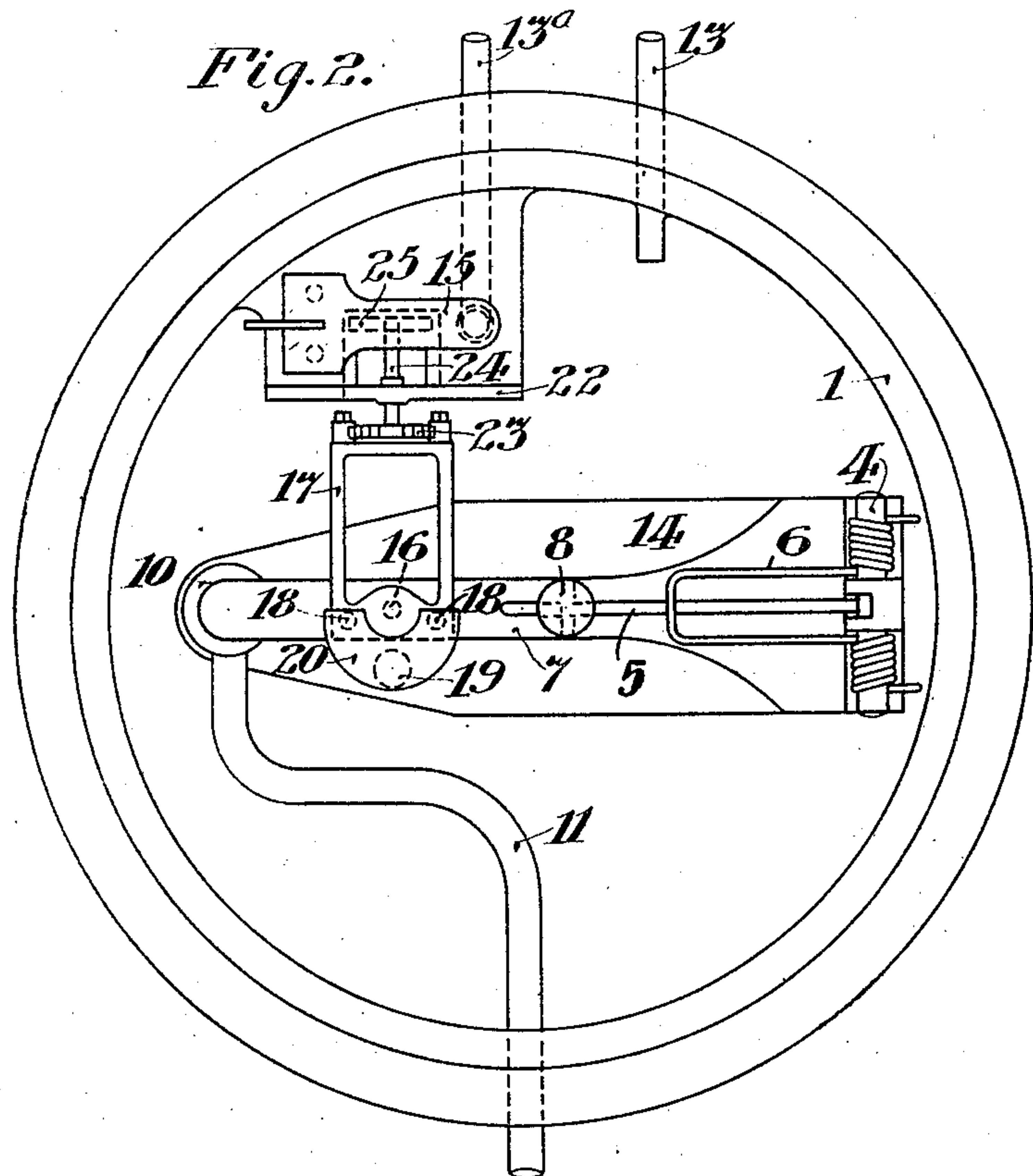


Fig. 2.



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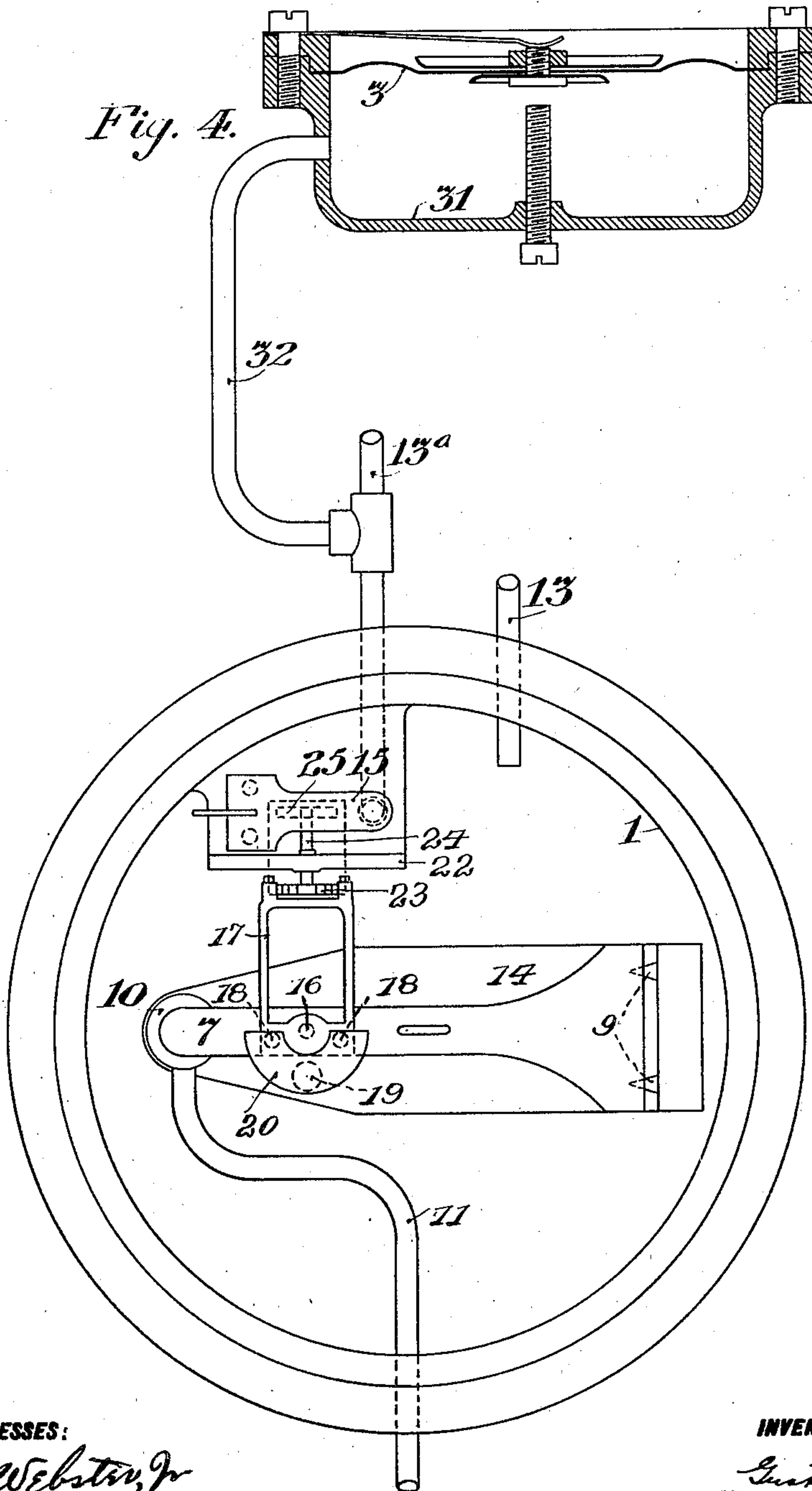
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UNITED STATES PATENT OFFICE.

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LIGHT-SIGNAL APPARATUS.

952,420.

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To all whom it may concern:

Be it known that I, GUSTAF DALÉN, a subject of the King of Sweden, residing in Stockholm, Sweden, have invented certain new and useful Improvements in Light-Signal Apparatus, of which the following is a specification.

This invention refers to improvements in light signal apparatus for light buoys and the like of the kind in which a controlling device or valve, which is inserted in a conduit leading gas to a gas burner having a pilot flame, is opened and closed at certain intervals of time, being actuated on the one hand by the pressure in a casing closed by a diaphragm or the like, and on the other hand by a spring or a magnet tending to hold the device or valve closed against the action of the gas pressure on the diaphragm. Apparatus of this type works in such manner that when the pressure of the gas against a diaphragm closing the casing containing the gas (and in which casing the controlling device or valve in question is inclosed and from which casing the gas conduit leading to the burner extends) has reached a point at which it exerts sufficient force to overcome the strength of a spring or magnet acting upon a controlling device or valve to open the same, the said device or valve is opened so that gas is permitted to flow out through the said conduit to the burner and the flame is lighted. Thereafter as soon as the pressure in the casing has again diminished, owing to the escape of gas through said conduit, the controlling device or valve is again closed and the burner flame is extinguished.

The object of the present invention is to produce such light signals or so called flashes at required different intervals of time so that two or more flashes having short intervals between themselves are produced and after a longer interval the same or another number of flashes are produced with short intervals between them. For this purpose according to this invention any one of the movable parts of the apparatus is connected with a controlling device or valve in the conduit supplying gas to the casing or in an extra gas supply conduit, and causes the opening of said device or valve a desirable number of times in succession, whereby an extra quantity of gas is supplied to the casing which at each time causes the opening of the burner controlling device or valve

at a shorter interval of time, than when no extra gas supply is provided.

In order to illustrate the invention reference will now be made to the accompanying drawings which show as an example apparatus according to this invention adapted to a light signal apparatus of previously known construction and in which the valve controlling the burner conduit is operated by a magnet.

Figure 1 is a vertical section of one form of the apparatus; Fig. 2 is a plan; Fig. 3 illustrates a detail; and Fig. 4 is a view partly in plan and partly in section showing a modified construction of apparatus embodying my invention.

1 indicates a casing closed by a diaphragm 2 which is provided with an eye 3 engaged by the end of a bar 5 that is mounted to turn on a stud 4 and is acted upon by a spring 6. The bar 5 extends through a block 8 secured to a valve plate 7 which is arranged to rock on knife edges 9 in a known manner and the end of which is located above the valve body 10 from which the conduit 11 leading to the burner in question extends. A spring 12 tends to move the valve in an opposite direction to the movement caused by the pressure of the gas on the diaphragm 2 which gas enters the casing through the conduit 13. The valve body 10 is made of soft iron and constitutes one pole of a permanent magnet 14 to which it is fixed.

When the pressure in the casing 1 reaches such an amount that it overcomes the pressure of the spring 12 and the magnet attraction between the parts 10 and 7, the part 7 is suddenly pulled away from the part 10 and gas escapes from the casing 1 through the conduit 11 to the burner so that the flame is lighted by the pilot flame. When the pressure owing to the escape of gas from the casing diminishes so as to balance the pressure of the spring 12 on the valve plate 7 the magnet again attracts the valve plate and the spring 12 bears thereon so that the gas escape ceases and the flame is extinguished.

By means of the apparatus described the flame is lighted and extinguished at determined intervals of time and thus regularly repeated light signals are obtained.

In order to obtain light signals consisting of series of flashes repeated at certain intervals of time and having shorter intervals between the flashes in each series than be-

tween the series of flashes, the valve plate 7 is according to this invention, connected with a valve 15 controlling an extra gas supply conduit 13^a in such a manner that the valve plate 7 when being closed opens the valve 15 or keeps it closed, according to the circumstances. If it opens the valve 15 gas is supplied to the casing 1 simultaneously through the supply conduits 13 and 13^a which results in the pressure augmenting more rapidly in the casing and thus the valve plate 7 is opened at a shorter interval of time than when gas is supplied through the conduit 13 alone.

In the constructional form of the connection between the valve plates 7 and 15 shown in the drawings, which however is only an example for illustrating the invention and the invention is not limited thereto, one end portion of a frame 17 rests upon a post or bar 16 pointed at both ends, as shown in the drawings, particularly Fig. 3. At the same end portion slightly nearer to its end the frame 17 is fulcrumed upon the points or edges 18 projecting downwardly from a block 20 supported upon a post or stud 19. The opposite end of the frame 17 carries two pawls 21 which engage a ratchet wheel 23 which is mounted on the shaft 24 journaled in a bracket 22 in the casing 1 and on which shaft a cam disk 25 is secured. Bearing against this cam disk, by means of a pin 26 or the like, is the valve plate 15 which is mounted to rock on knife edges 27 in the same manner as the valve plate 7 and is pressed toward the seat of the valve 28 by a spring 29. The valve seat 28 communicates with an extra supply conduit 13^a.

The apparatus works in the following manner. When the valve 7 is opened and closed the pawls 21 engage the ratchet wheel 23 and turn it simultaneously with the cam disk 25. If a raised part of this disk occupies such a position in relation to the pin 26 that it strikes the pin 26, the valve plate 15 will be lifted from the seat 28 against the action of the spring 29, whereby gas enters the casing 1 through the conduit 13^a. The pressure in the casing 1 thus will be rapidly augmented whereby the valve 7, if closed as in Fig. 1, is again opened and the flame is lighted. When the valve 7 thereafter is again closed the ratchet wheel 23 and the cam disk 25 are turned farther on. It will be evident that owing to the position of the raised parts on the cam disk 25 or owing to the form of their surfaces abutting against the pin 26, the valve plate 15 for each time the valve 7 is opened and shut can be kept open during one, two, or more successive movements of the valve 7, and thereafter be kept closed during a required time while the valve 7 is opened and shut one, two or more times successively so that a series of flashes can be obtained with shorter

or longer intervals of time between the series and with a required number of flashes in each series with short intervals between the flashes.

It will be understood that I am not limited to the structure illustrated, since the invention may obviously be embodied in a variety of other constructions. It will likewise be evident, that the controlling device or valve need not be of the precise nature illustrated and that it need not be inserted in an extra supply conduit 13^a, but may be inserted with the same result in the supply pipe 13, which in such case is chosen of correspondingly larger area, whereby the controlling device or valve conveniently opens the conduit completely each time, when flashes with short intervals are to be obtained, but throttles the conduit somewhat each time when flashes with longer intervals are to be obtained. In other words the valve need not completely close the supply pipe.

The valve plate 15 evidently can be held closed by the cam disk 25 abutting directly or indirectly against the same and be opened by the action of the spring 29. The cam disk 25 and the ratchet wheel 23 can also be made in one piece and be placed horizontally above the valve plate 7 and receive motion by transmission mechanism from this latter.

Fig. 4 shows apparatus such as described connected, by means of a branch conduit 32 leading from the extra conduit 13^a or from the conduit 13 when the valve 15 is controlling said latter conduit, to a casing 31 which is closed by a diaphragm 30. The arrangement is such that gas flows into the casing 31 through the conduits 13^a and 32 when the valve 15 is closed, said gas flowing over to the casing 1 when the valve 15 is opened. The raised parts of the cam disk 25 are so placed that the valve 15 is closed simultaneously with the valve 7. When now the valve 7 is thereafter opened after a sufficient quantity of gas is supplied through the conduit 13 the valve 15 is still closed. But the next time the valve 7 is opened the valve 15 is also opened and gas now enters through the two conduits 13 and 13^a, as well as from the casing 31 with the result that the valve 7 is held open a longer time than when gas enters only through the conduit 13. In this way it is possible to vary the length of the light periods by means of this arrangement.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, an outlet valve for controlling the delivery of gas to

a burner, a conduit for supplying gas to the chamber, an inlet valve for controlling the supply conduit and means operatively connected to said diaphragm and to said valves for operating one of them more rapidly than the other.

2. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, a gas delivery conduit extending from said casing to a burner, an outlet valve for opening and closing said conduit, a conduit for supplying gas to said chamber, an inlet valve for controlling the supply of gas through the supply conduit, operative connections between the diaphragm and one of said valves, and means carried by that valve and working against a stationary part of the casing for varying the connections between the diaphragm and the other valve to change the relative operation of the valves.

3. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, a conduit for conducting gas from said chamber to a burner, an outlet valve controlling said conduit, a conduit for supplying gas to the said chamber, an inlet valve controlling said supply conduit, operative connections between said diaphragm and said outlet valve, and operative connections between said diaphragm and said inlet valve whereby the operation of the apparatus is automatically and regularly varied.

4. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, a gas delivering conduit extending from said casing to a burner, an outlet valve controlling said conduit, a conduit for supplying gas to said chamber, an inlet valve for controlling the supply of gas through the supply conduit, operative connections between said diaphragm and said inlet valve, operative connections between said diaphragm and said outlet valve, and means controlled by the movement of the outlet valve to vary the connections between the diaphragm and the inlet valve.

5. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, a gas delivery conduit extending from said casing to a burner, an outlet valve for opening and closing said conduit, a conduit for supplying gas to said chamber, an inlet valve for controlling the supply of gas through the supply conduit, operative connections between said diaphragm and said outlet valve, and automatically variable connections between said valves.

6. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, a gas delivery conduit extending from said casing to

a burner, an outlet valve for opening and closing said conduit, operative connections between said diaphragm and outlet valve, a conduit for supplying gas to said chamber, an inlet valve for controlling the supply of gas through the supply conduit, and operative connections between said diaphragm and said inlet valve comprising an actuating member constituting a part of said connections working against a stationary part of the casing and carried by said outlet valve to vary said connections.

7. In light signal apparatus, the combination of a valve for controlling the delivery of gas to a burner, a device for controlling the gas supply, means actuated by said valve for causing movement of said device, the said means comprising a rotatable cam disk contacting with the said device, and means operable by the movement of said valve for causing rotation of said disk.

8. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said casing, a gas delivery conduit extending from said casing to a burner, an outlet valve for opening and closing said conduit, a conduit for supplying gas to said chamber, an inlet valve for controlling the supply of gas through the supply conduit, and means actuated by the outlet valve for controlling the action of the inlet valve whereby the supply of gas to the said chamber may be varied.

9. In light signal apparatus, the combination of a casing for a chamber, a diaphragm closing said casing, a gas delivery conduit extending from said casing to a burner, a valve for opening and closing said conduit, a conduit for supplying gas to said chamber, a device for controlling the supply of gas through the said supply conduit, a rotatable shaft carrying means which is adapted to actuate the said device, a ratchet upon the said shaft, a lever fulcrumed at one end adjacent to said valve, the said lever carrying pawls which are adapted to engage the said ratchet, whereby movements of the said lever may occasion rotation of the said shaft, and means interposed between the said lever and the said valve whereby movement of the latter causes movement of the said lever.

10. In light signal apparatus, the combination of a casing having a chamber, means for conducting gas from the said chamber to a burner, mechanism for controlling the passage of gas through the said means, a conduit supplying gas to the said chamber, an auxiliary conduit for supplying gas to the said chamber, a valve for controlling the passage of gas through the said auxiliary supply conduit, and a rotatable cam disk acting upon the said valve to open and close the same periodically, and operative connections between said mechanism and cam disk.

11. In light signal apparatus, the combination of a casing having a chamber, a conduit leading from the said chamber to a burner, an outlet valve for opening and closing the said conduit, a conduit for supplying gas to the said chamber, an inlet valve for controlling the passage of gas through the said conduit, mechanism interposed between the said valves for periodically opening and closing the said inlet valve, the said mechanism comprising a rotatable member contacting with the said inlet valve and adapted to hold it open during certain periods of time and to permit it to close during alternate periods of time, a ratchet operatively connected to the said rotatable member, a lever carrying pawls which are adapted to engage the said ratchet and cause rotation of the same, a fulcrum about which the said lever turns, and a pointed pin or bar having one end resting upon the first named valve and its opposite end in contact with the said

lever, whereby movement of the said valve causes movement of the said lever.

12. In light signal apparatus, the combination of a casing having a chamber, a diaphragm closing said chamber, a conduit leading from said chamber to a burner for delivering gas to said burner, an outlet valve controlling said conduit, a conduit for supplying gas to said chamber, an inlet valve controlling said conduit, operative connections between said diaphragm and outlet valve, and means for holding the inlet valve in one position during several openings and closings of said outlet valve and for periodically opening and closing the inlet valve.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

GUSTAF DALÉN.

Witnesses:

WALDEMAR BOMAN,
A. SÖDERSTRÖM.