

(No Model.)

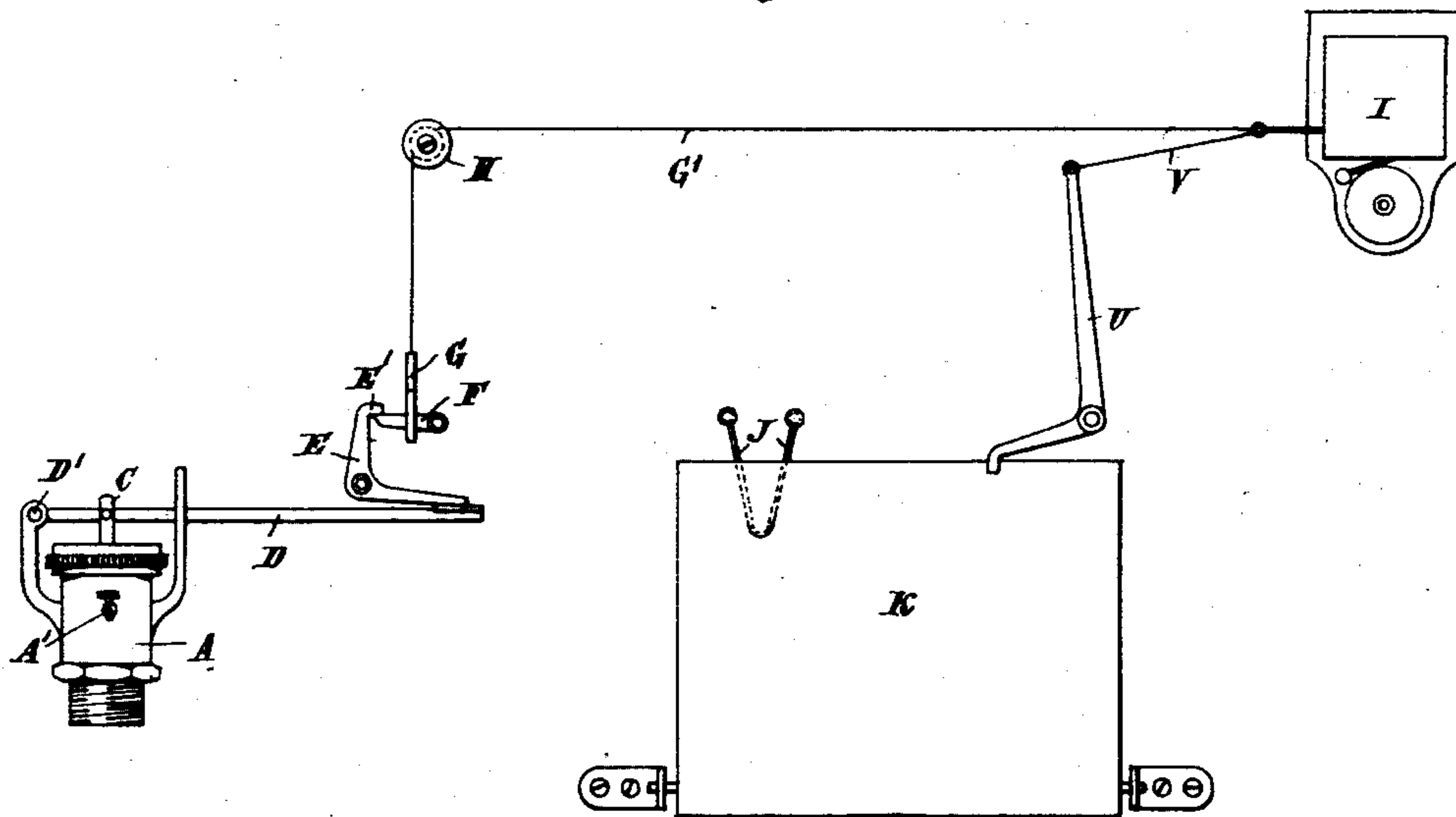
2 Sheets—Sheet 1.

W. HUMBERSTONE.  
FROZEN WATER ALARM.

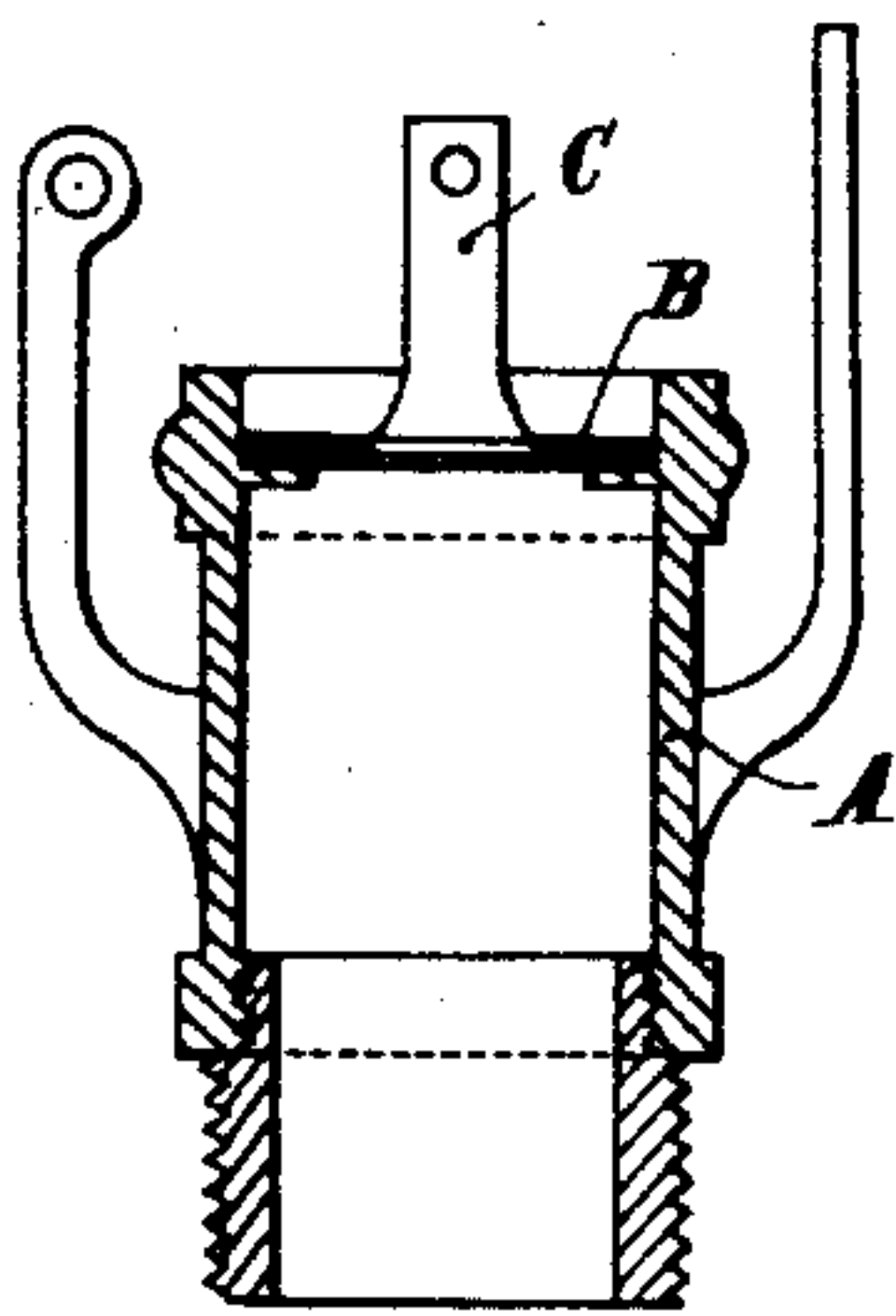
No. 525,548.

Patented Sept. 4, 1894.

*Fig. 1.*



*Fig. 3.*



Witnesses:

*J. T. Lebert.*  
*O. Block.*

Inventor:

Walter Humberstone.

By *A. A. de Vos.*

Attorney.

(No Model.)

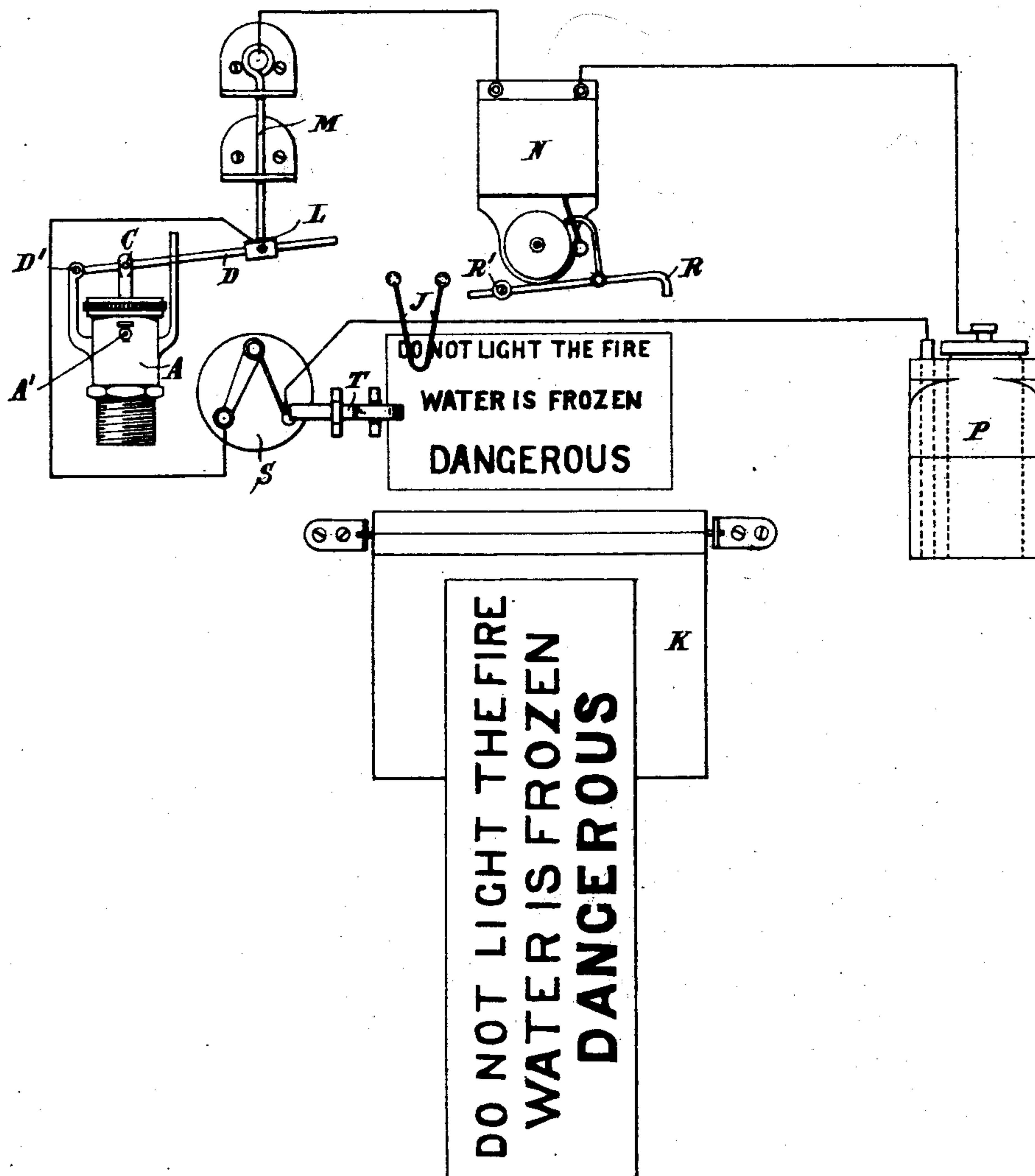
2 Sheets—Sheet 2.

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Fig. 2.



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# UNITED STATES PATENT OFFICE.

WALTER HUMBERSTONE, OF LONDON, ENGLAND.

## FROZEN-WATER ALARM.

SPECIFICATION forming part of Letters Patent No. 525,548, dated September 4, 1894.

Application filed May 14, 1894. Serial No. 511,140. (No model.) Patented in England January 12, 1894, No. 676.

*To all whom it may concern:*

Be it known that I, WALTER HUMBERSTONE, mechanical engineer, a subject of the Queen of Great Britain and Ireland, residing at Boldrewood, Montem Road, New Malden, London, Surrey, England, have invented certain new Frozen-Water Alarms, (for which Letters Patent have been granted in Great Britain, No. 676, of January 12, 1894,) of which the following is a specification.

According to my invention, I fix on any suitable part of the boiler, or of the water pipes but preferably on the part of the pipes most exposed to cold, or in any other position as found most convenient, a small cylinder or short tube in which the water is usually free to enter. When the water freezes it expands and in so doing, causes a flexible disk (forming the upper or outer end of the cylinder) which is generally concave or bulged inward, to become flat, or, under a greater pressure, to bulge outward, and in so doing, the disk pushes a rod which rests loosely upon it; this rod being pushed by the disk in a direction away from the pipe or boiler, acts upon a lever suitably connected in such a manner as to cause the free end of the said lever either to complete an electric circuit and cause an electric alarm bell to ring and continue ringing until switched off, or else to release a catch, which sets free a spring and causes a mechanical alarm bell to ring. The aforesaid lever, when operated by the rod from the disk, also sets free a hinged board which covers a notice bearing the words:—"Do not light the fire," or "Water is frozen," or "Dangerous," or other suitable words for warning any person who comes to light the fire not to do so; the hinged board dropping down exposes the said notice board to view. A long strip of linen, cotton, or other fabric may be rolled up behind the said hinged board, and unroll or hang down when the hinged board is released, so as to be more noticeable than the board itself.

Where the alarm bell used is an electrical one, the handle for switching it off may be so placed that on the hinged board being raised to again cover up the notice board, the electric circuit may be re-formed, so that the bell will ring unless the water has ceased to be frozen, in which case the circuit will be broken

at the point where it depends on the lever operated by the rod from the disk.

I will now proceed to describe two modes in which my invention may be carried into effect, and will for that purpose refer to the accompanying drawings, wherein—

Figure 1 is a general view of the arrangement of my apparatus where a mechanical alarm is used. Fig. 2 is a general view of the arrangement where the alarm is given by electrical means; and Fig. 3 is a vertical section on a larger scale through the cylinder A.

Referring to Fig. 1, A, is the cylinder, which is screwed into or otherwise attached to any suitable part of the boiler or pipes. Placed inside the said cylinder A, is the disk (B, Fig. 3) of flexible metal or other material, which disk bulges upward or outward when the water expands in freezing. C, is a rod on said disk.

D, is a lever, pivoted at D', for multiplying the motion imparted to it by rod C.

E, is a bell-crank lever, having at its upper end a projection E', for retaining the swinging arm F, around which arm F, passes a loop or hook G at the end of a cord or wire G' passing over a pulley H, the other end of said cord G', being attached to the spring of a mechanical alarm apparatus I, (of any suitable kind) so that when said cord is held fast by swinging arm F, the spring is in tension.

J, is a spring pressing the plate K, outward, so as to insure its falling down when released.

K, is the plate or board which normally covers up the notice of danger; this plate or board K is hinged at its lower end, as shown. U, is a bell crank lever which normally retains the board or plate K, in position, but is connected to the spring of the alarm bell I, by cord or wire V, and thereby operated to release board or plate K, when required. All the parts in this figure are shown in the positions they normally occupy, when the water is not frozen.

When the water freezes, the rod C, is forced up, operating lever D, which in turn actuates bell crank lever E, until the catch or projection E', leaves the swinging arm F, free. The arm F, is pulled up by the loop or hook G, until the said loop G, slips off said arm F, and the spring of the alarm I, is released, and



rings the bell. At the same time the bell crank lever U, is pulled by the spring of the alarm I, clear of the plate K, which plate K, being pushed outward by spring J, then falls  
 5 down by its own weight and displays the danger-signal, which remains conspicuously in view until it is restored to its place; and even then, unless the water has ceased to be  
 10 tied up, because the spring J, pushes it outward, and the bell-crank lever U, is held clear and cannot act to keep it in position.

In the arrangement shown in Fig. 2, the cylinder and parts in connection are the same  
 15 as in Fig. 1, but the parts E, F, G, H, and I, of Fig. 1 may be dispensed with.

On the lever D, is a contact piece L, which is fixed just under the pin M. This pin M, is connected to a wire passing to an electric  
 20 alarm bell N. Another wire passes from the contact piece L, to a Leclanché cell or other form of electric battery P, which is also in connection with the alarm N. A balanced catch R, may retain the plate K, in position  
 25 until released by the hammer of the electric bell disengaging the catch R, from said plate, a counterweight R', being attached to the catch R, so as to enable it to be easily moved by the hammer, which can only exert a small  
 30 amount of force, even when the full current is passing; but by means of the counterweight, the catch R, can be so delicately adjusted that the slightest trembling of the hammer suffices to disengage said catch; and thus, if  
 35 the current be too weak to ring the bell, still the plate K, will fall. In the latter arrangement (Fig. 2.) on the rod C, raising the lever D, the piece L, comes in contact with pin M, and completes the electric circuit; the bell  
 40 will ring, and unless attended to, continue ringing until the water ceases to be frozen, or the battery is exhausted; and at the same time the plate K, falls down and exposes the notice to view. In order to stop the ringing  
 45 of the bell after it has given the alarm, a switch is provided, as shown in Fig. 2 at S, whereby the circuit may be broken and remade as desired; but in this case a sliding piece T, is employed, which prevents the current being switched off so long as the plate  
 50 K, is folded up, and allows it to be switched off only when the plate K, is hanging down; so that when the water is frozen, there must necessarily be either the danger-signal exhibited, or the bell ringing.

In Fig. 2, all the parts are shown in the positions they assume when the water is frozen.

Fig. 3, shows more clearly the cylinder A, disk B, and rod C, which form an essential  
 60 part of my invention. When filling the boiler and pipes with water the air in the cylinder A, is allowed to escape by opening the tap A'.

It must be understood that the cylinder and parts in connection therewith may either be as close to the bell and plate K, as shown  
 65 in the drawings, or may be in an entirely different part of the building, being connected by wires; while the alarm and plate K, must be in the room where the fire is, so that the danger signal cannot fail to be seen. 70

The special advantage of my invention is that it does not depend entirely upon the bell, but also gives a very obvious and distinct signal, consisting of the presence of the board and linen cloth, which cannot fail to be  
 75 seen, whether the bell rings or not.

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

1. The combination with the cylinder containing the flexible diaphragm or disk, of the lever pivoted above said disk, means connecting said lever with said disk, a pivoted plate, a catch adapted to hold said plate in a position to conceal a warning notice, and  
 85 means intermediate said lever, and catch whereby when the lever is raised the catch is moved so as to release said plate and disclose a warning notice, substantially as described.
2. The combination of the cylinder provided with the flexible disk, of the lever pivoted above said cylinder and connected with said disk, the catch adapted to hold an alarm mechanism against operation, the pivoted plate, the catch adapted to hold said plate in  
 95 a position to conceal a warning notice, an alarm mechanism, means extending from said alarm mechanism to said first mentioned catch, and means connecting said plate holding catch with the alarm mechanism, whereby  
 100 when the lever is raised the catch is released from the means which hold the alarm mechanism in inoperative position and the plate retaining catch is moved so as to release the plate and disclose the warning notice, substantially as described. 105
3. In a device of the class described the cylinder A provided with a flexible disk B, rod C, lever D connected therewith, bell crank lever E, swinging arm F adapted to be held  
 110 by said lever, loop or hook G, the cord or wire G' extending from said loop to the alarm, alarm I, the plate K, spring J, bell crank lever U for holding said plate against the tension of said spring, and the cord or wire V, substantially as and for the purpose set forth. 115

Signed at London, England, this 9th day of April, A. D. 1894.

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