

F. FORNAROLI.
PNEUMATICALLY OPERATED CALLING APPARATUS.
APPLICATION FILED DEC. 14, 1909.

1,051,096.

Patented Jan. 21, 1913.

4 SHEETS—SHEET 1.

Fig. 1

Fig. 3

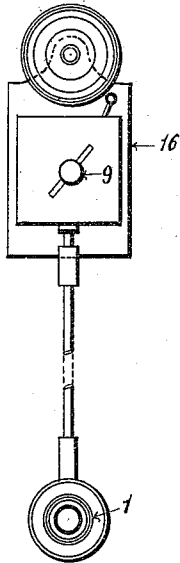
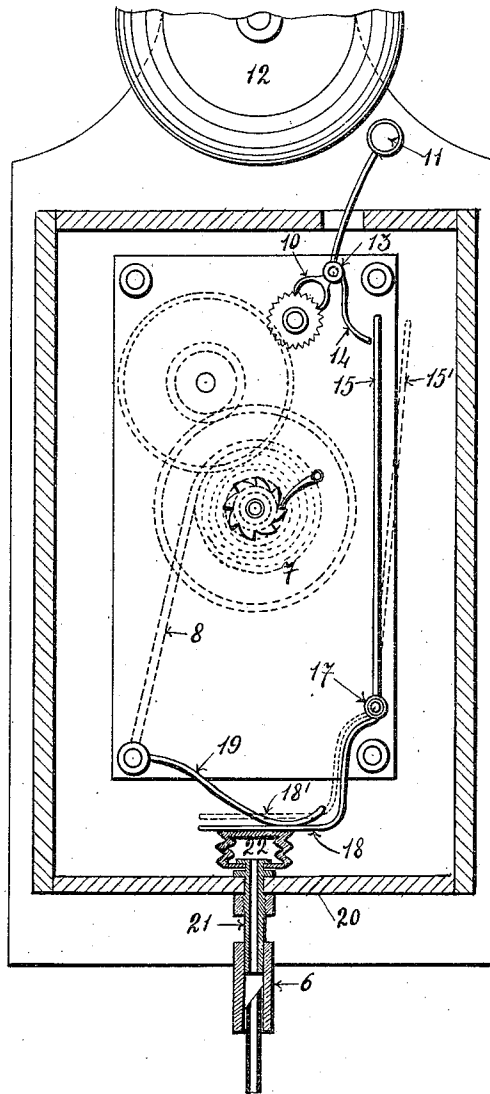
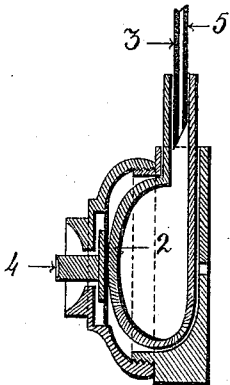


Fig. 2



WITNESSES:

H. H. Derrigan.
John A. Hovis.

INVENTOR.
FRANCESCO FORNAROLI.

by *Frank O. Russell*
Attorney.

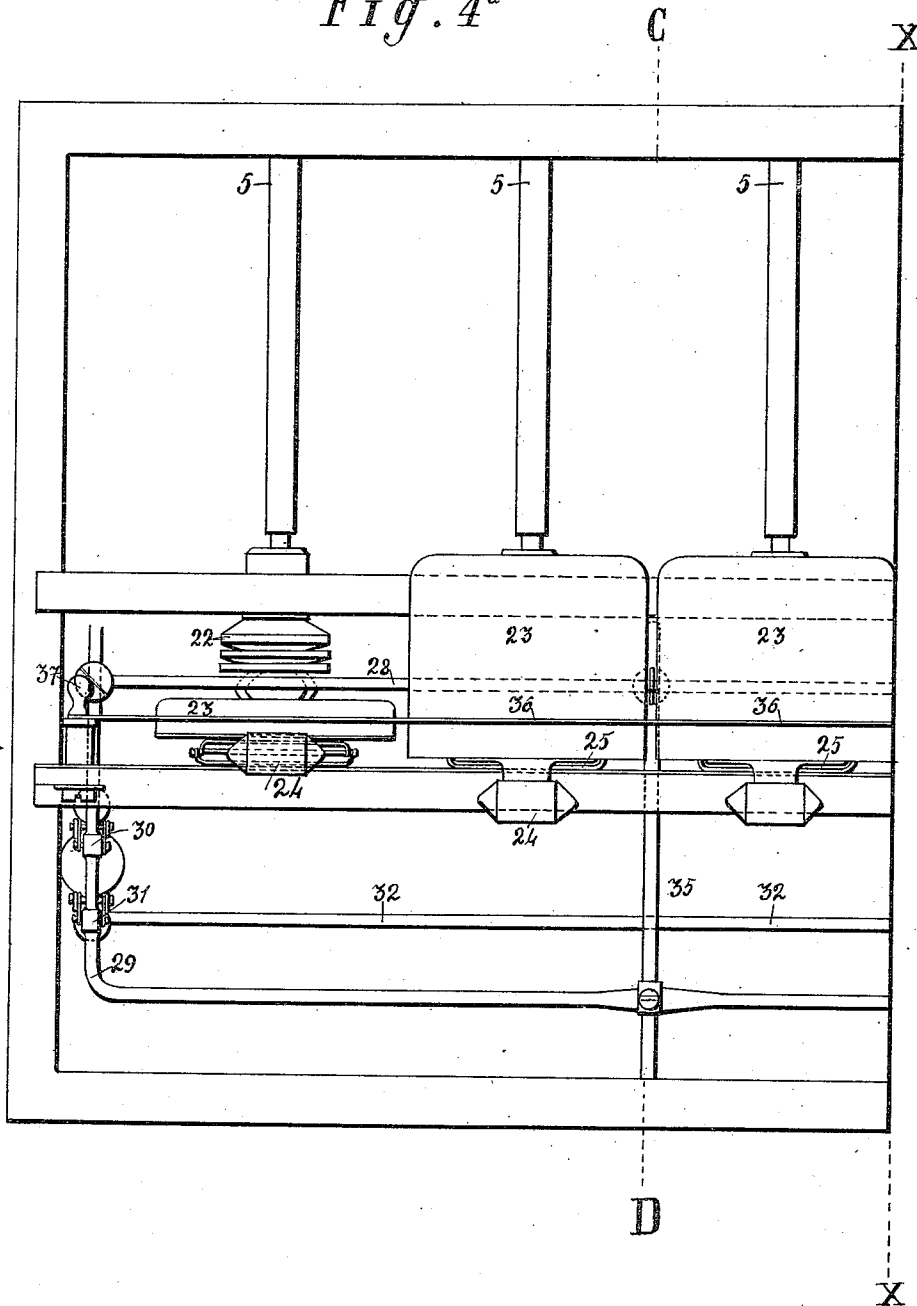
F. FORNAROLI.
PNEUMATICALLY OPERATED CALLING APPARATUS.
APPLICATION FILED DEC. 14, 1909.

1,051,096.

Patented Jan. 21, 1913.

4 SHEETS—SHEET 2.

Fig. 4^a



WITNESSES:
W. H. Berrigan.
John N. Howing.

INVENTOR,
FRANCESCO FORNAROLI.
by *Ivan Desmuel*
Attorney.

F. FORNAROLI.
PNEUMATICALLY OPERATED CALLING APPARATUS.
APPLICATION FILED DEC. 14, 1909.

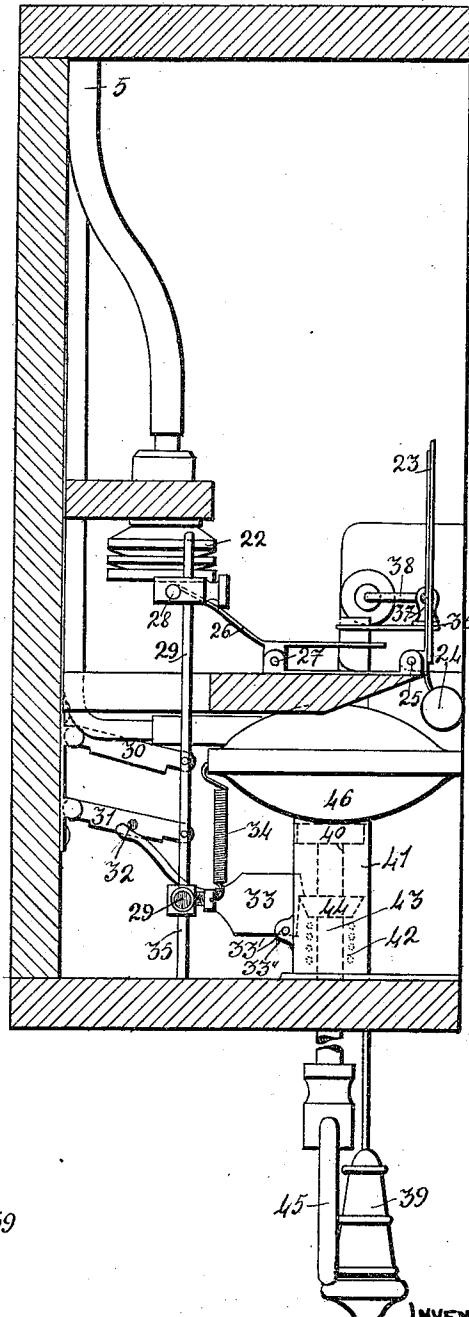
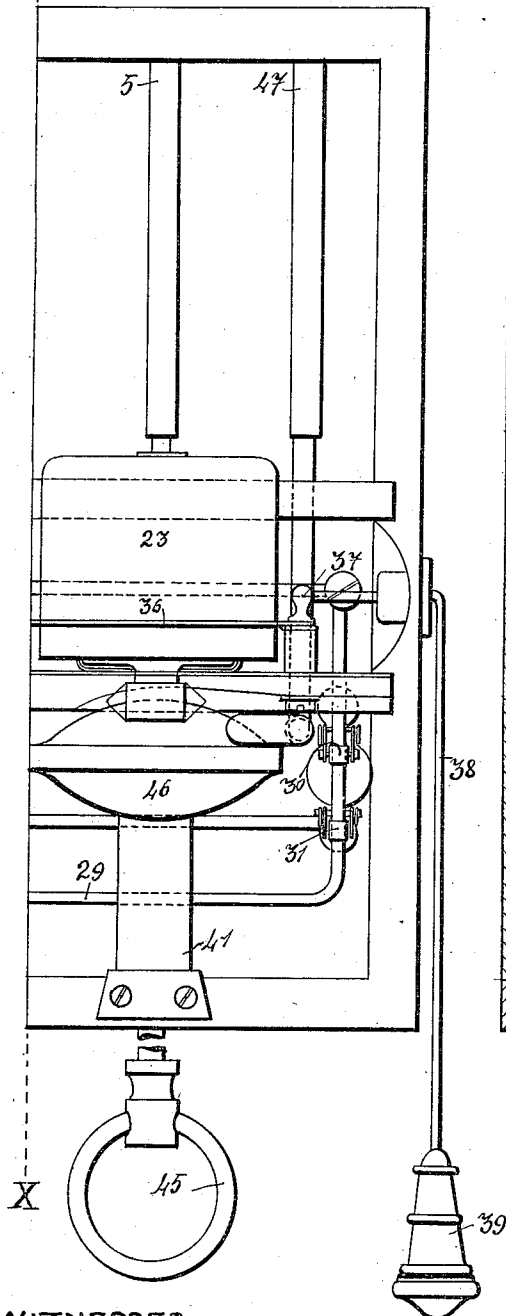
Patented Jan. 21, 1913.

1,051,096.

X

Fig. 4^b

Fig. 5⁴ SHEETS-SHEET 3.



WITNESSES:

H. H. Berrigan
John W. Houding

FRANCESCO FORNAROLI

by *Franco Desseimul*
ATTORNEY.

F. FORNAROLI.
PNEUMATICALLY OPERATED CALLING APPARATUS.
APPLICATION FILED DEC. 14, 1909.

1,051,096.

Patented Jan. 21, 1913.

4 SHEETS—SHEET 4.

Fig. 8

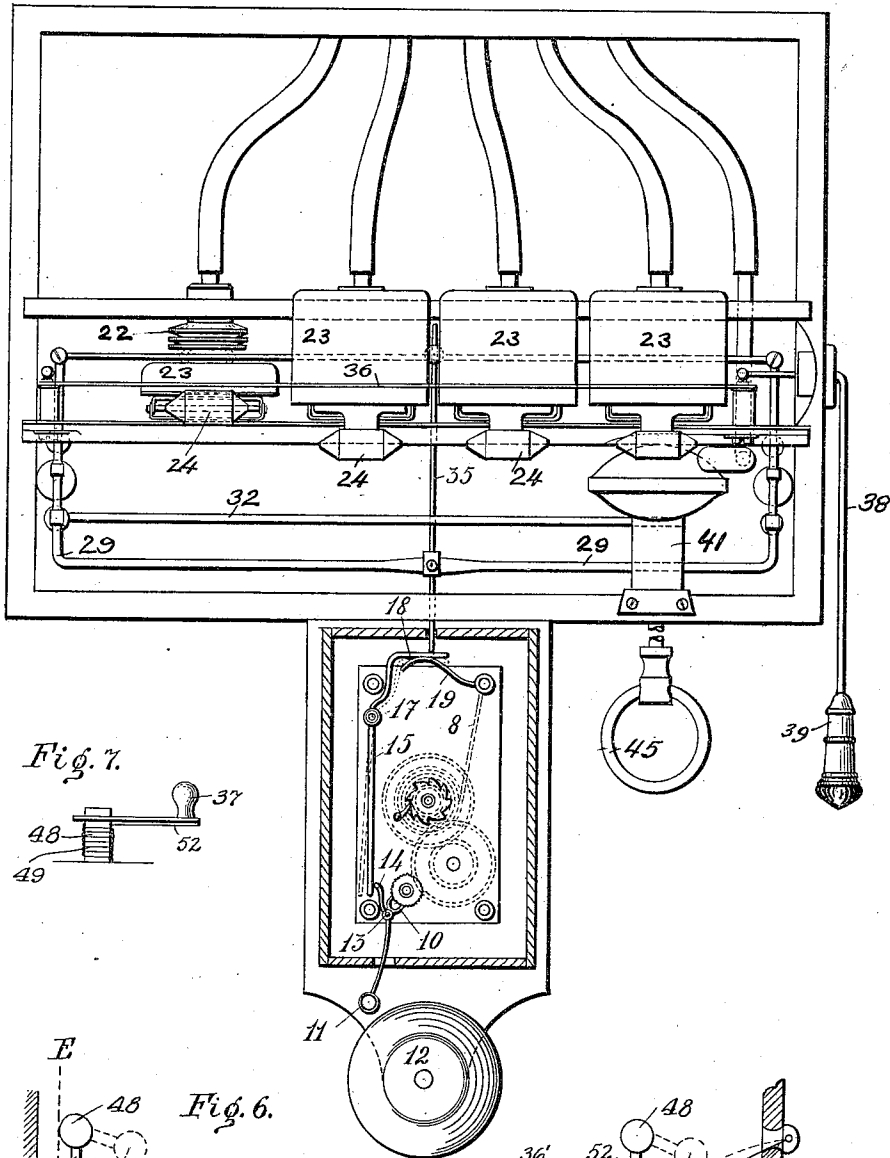


Fig. 7.

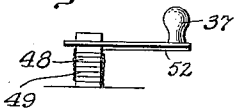
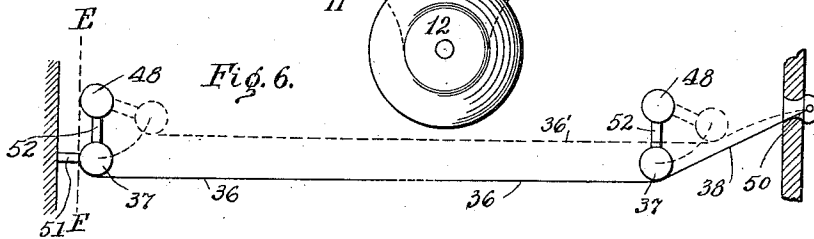


Fig. 6.



WITNESSES
Cornelius Spring
John H. Novinsky.

INVENTOR
FRANCESCO FORNAROLI
BY *Frank Deane*
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANCESCO FORNAROLI, OF MILAN, ITALY.

PNEUMATICALLY-OPERATED CALLING APPARATUS.

1,051,096.

Specification of Letters Patent.

Patented Jan. 21, 1913.

Application filed December 14, 1909. Serial No. 533,124.

To all whom it may concern:

Be it known that I, FRANCESCO FORNAROLI, a subject of the King of Italy, and resident of Milan, in the Kingdom of Italy, have
5 invented certain new and useful Improvements in Pneumatically-Operated Calling Apparatus, of which the following is a specification.

This invention relates to a pneumatically
10 operated calling apparatus consisting of air-tight pipe lines provided at one end with a pneumatic key and at the other end with an elastic bellows which transmits to an alarm-bell and to an annunciator the thrust im-
15 parted to it by the air compressed by means of the pneumatic key, the bell being actuated by some mechanical power, as for instance, by a spring clock-work.

In the annexed drawing an application of
20 this invention is shown, relating to a multiple alarm-bell connected with several keys and provided with an annunciator.

Figure 1 shows a pneumatic key and a
25 single alarm-bell both adapted for use with this invention. Fig. 2 is a vertical-section through the pneumatic key. Fig. 3 shows partly in section the mechanism by which the bell is actuated, the front wall of the cover being removed; Figs. 4^a, and 4^b, taking
30 them together, show the front view of an annunciator operating in connection with the alarm-bell shown in Fig. 3, the front walls being removed so as to show the interior mechanism. Fig. 4^b is the continuation of Fig. 4^a to the right of line X X; Fig.
35 5 is a cross-section along the line C D of Fig. 4^a. Fig. 6 is a diagrammatic plan view showing the means for depressing the drops, and Fig. 7 is a sectional view, partly in elevation, taken on the line E F of Fig. 6. Fig.
40 8 is a front elevation of the device showing the alarm bell operated by a rod.

All figures are schematic and on an arbitrary
45 scale.

The pneumatic-key and the bell shown in
45 Figs. 1 to 3 are adapted for use with the annunciator illustrated in Figs. 4 to 7. The key 1 (Figs. 1 and 2), in its outward appearance similar to the keys used for electric
50 bells, contains a rubber bulb 2 with a small rubber tube 3, said bulb being in contact with a push-button 4, and adapted to be compressed thereby. The pipe 5 can be
55 made of any convenient material, provided only that it be air-tight; preference however being given to leaden pipes, not only

because this metal always keeps in good condition, but also because of its lack of rigidity, the pipes are easily bent to conform to all the windings and turns which may be
60 necessary in order to connect the key 1 with the annunciator or the annunciator with the alarm-bell 16. The pneumatic key 1 and the alarm-bell 16 may be used singly without connection with the annunciator, as indicated in Fig. 1, in which case, a coupling
65 box 6 connects the pipe 5 with this alarm bell. The alarm bell 16 is provided with a clock-work device 7 actuated by a strong spring 8 which is wound up by means of the
70 handle 9 (Fig. 3), the said device bearing on the escapement 10 which gives rise to the vibration of the hammer 11 on the bell. The shaft 13 carrying the escapement 10 and the handle of the hammer 11 also carries the
75 arm 14 against which, when the bell is not ringing, rests the lever 15 movable around the pivot 17 and ending in a disk 18, in the lower part of the box containing the clock-work. A spring 19 by bearing on the lever
80 15 presses the disk downward. On the lower wall 20 of the box containing the mechanism just described, and passing through it, is fixed a metallic tube 21, preferably of brass, connected, inside the said box
85 with a rubber container 22 which has the shape of a bellows with three or more folds and which is completely closed except toward the tube 21, its external upper wall touching the disk 18 with which it is constantly kept in contact by means of the
90 spring 19.

The operation of the pneumatic-key and the alarm bell 16 when connected as in Fig. 1 is described below to aid in the understanding of the operation of the annunciator. The bulb 2, the pipe 5 and the bellows-shaped container 22 are, as has been shown, in communication between each other forming thus an entirely closed mechanism in
100 which the air is completely shut up. The button 4 of the key when pushed by hand, squeezes the bulb 2 and the thus compressed air expands the container 22, making it thrust the disk 18 into the position 18'; the
105 lever 15 by turning on the pivot 17 and taking up the position 15', disengaging thus the arm 14, no longer impedes the clock-work device which, being now able to operate, actuates the vibrations of the hammer 11 on
110 the bell. The ringing continues until the pressure on the button ceases, at which

moment the spring 19 drives the disk 18 back into its normal position, the lever 15 holding up the escapement 10.

In Figs. 4 to 7 is illustrated the annunciator forming the subject of this invention, this annunciator being adapted to be used with several pneumatic-keys adapted to give rise to the operation of a general alarm-bell, connected with the annunciator, and of a supplementary bell also connected with the annunciator. The pipes 5 leading from the respective keys 1 to the annunciator end in the respective containers 22 to each of which corresponds an indicating target or drop 23 (Fig. 5) provided with a counterweight 24 and oscillating around a pivot 25. Each drop rests normally on one arm of a lever 26. Below the lever 26, having one end placed underneath the bellows-shaped container 22 and pivoted at 27, runs in a longitudinal direction along the whole length of the annunciator a rod 28 carried by the curved rod 29, which rod, though being able to swing up, and down, is always kept in the vertical position by means of the connecting links 30 and 31 pivoted at their opposite ends to said curved rod and the wall of the annunciator box respectively. The lower bars 31 are connected to each other by a rod 32 against which rests the end of the trip arm 33 yieldably drawn upwardly by the spring 34. The trip arm 33 is pivotally mounted on a pin 33' carried between ears 33'' fixed on the tube 41 which is fixed in any convenient way to the wall of the box, and is pulled upward by the spring 34 so that, when the lug 44 is pulled downward, the tooth of the trip arm will be brought to bear against it and prevent it from rising under the action of the spiral spring 42. It is only when the rod 32 is brought to bear against the end of the trip arm and—by overcoming the tension of the spring 34—removes for an instant the tooth of the trip arm out of the path of the lug, that the latter can rise. In a convenient point in the middle of the rod 29 is fixed a vertical rod 35 which bears on an escapement movement of an alarm-bell 16 such as illustrated in Fig. 3. The drops 23 on being raised, place themselves in a vertical plane and rest against a horizontally disposed wire 36 stretched between two crank-knobs 37 at the free end of crank arm 52 pivoted on posts 48 (see Fig. 6). Around one of these posts 48, for example the left hand one, is wound a spiral spring 49 (see Fig. 7), one of the ends of said spring being attached to the post 48 and the other to the arm 52. A flexible wire 38 (see Figs. 4^b, 5 and 6) is fixed to the right hand crank-knob 37, passes through the right hand side wall and ends at the outside of the box in a handle 39. On pulling the wire 38, the crank-arms 52 are caused to turn on the posts 48 and thus bring the wire 36 to po-

sition 36' as shown by the dotted lines of Fig. 6. This movement of the wire 36 forces the drops 23 which were raised down to their horizontal position. On releasing the wire 38, the spring 49 brings the crank-arms 52 back to their normal position, the left hand crank-arm being stopped by contact of the knob 37 with a stop-piece 51 projecting from the wall of the box.

The operation of the annunciator is as follows: By pushing one of the keys and by expanding in this way the corresponding container 22, one end of the lever 26 is thrust downward thus causing the opposite end of the lever to raise the corresponding drop 23. At the same time, the general bell is actuated by the bar 28 acting in connection with the curved rod 29 and the rod 35 on the escapement of the clock-work, illustrated in Fig. 3. As soon as the pressure on the key has ceased, all the various parts of the device take up their normal positions driven by the bellows; the drop alone remains raised until it is released by pulling the thread 38. As the ringing of the bell stops after a moment, it is true, that under certain circumstances the call, if it be not at once noticed, might remain unnoticed. Where such an inconvenience has to be considered, a supplementary alarm-bell is added which acts differently from the general bell, and keeps on ringing after the pressure on the key has ceased and until somebody comes to the annunciator and stops the bell. This auxiliary device consists in a piston 40 movable inside the tube 41 and pushed upward by means of a spiral spring 42, its rod 43 being provided with a small lug 44 adapted to engage with the tooth of the trip-arm 33 and ending outside the box in a ring 45. When, in consequence of a call, the curved arm 29 and with it the small rod 32 goes down, the latter, by bearing on the trip-arm 33, releases the piston 40 which, being now pushed upward by the spring 42, presses on a bulb which is inclosed in the box 46 and is in communication, by means of the tube 47, with an auxiliary alarm-bell such as that shown in Fig. 3 and which may be placed in any convenient place. This bell continues to ring, as is evident, after the pressure on the key ceases and until somebody has come to the annunciator, released the drop by operating the handles 39 and 45, taking at the same time notice of the number indicated by the drop and pulled down on the piston 40 engaging it with the trip arm 33, stopping in this way the ringing of the supplementary alarm-bell.

What I claim is:—

In a device of the kind described, the combination of a support, a plurality of distensible members carried thereon, a bar positioned for operation by any one of said

members, a curved rod having upright end portions supporting said bar, parallel links having their ends pivoted to said support and said upright end portions respectively, 5 a general alarm device, an upright rod carried by said curved rod and adapted to operate said alarm device, a supplementary alarm device, a movable means for actuating said supplementary alarm device, a spring 10 for moving said movable means, a trip arm engaging said movable means for holding the movable means against movement by said spring to actuate the supplementary alarm device and means operated by said curved rod for causing the trip arm to re- 15 lease the movable means.

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

FRANCESCO FORNAROLI.

Witnesses:

LYLE ROBB,

CHAS. H. FISCHER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
