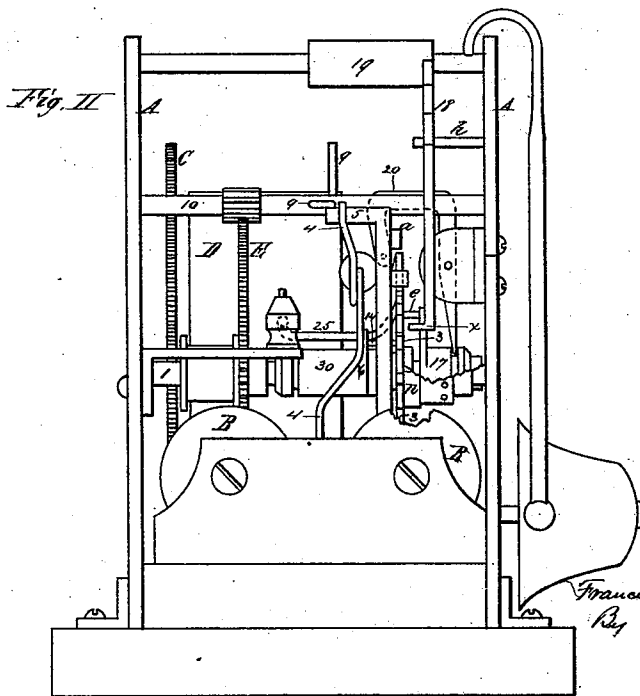
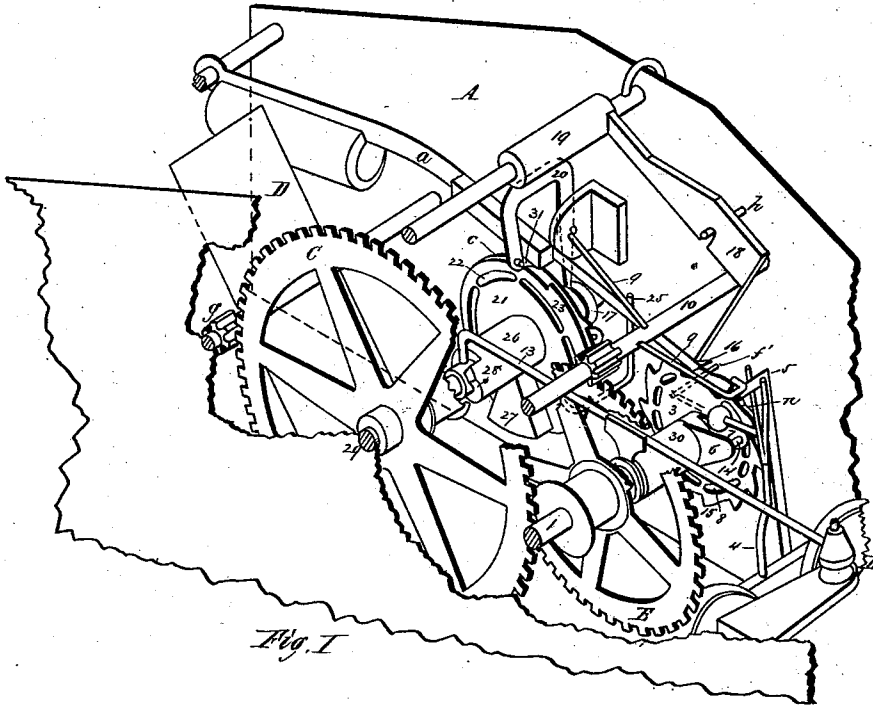


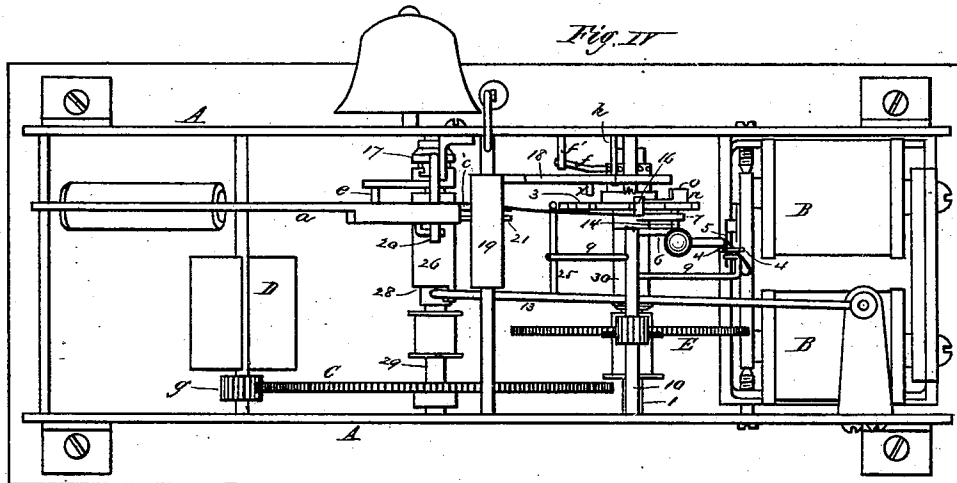
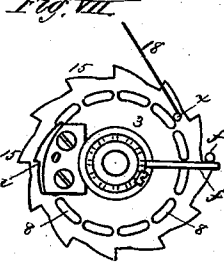
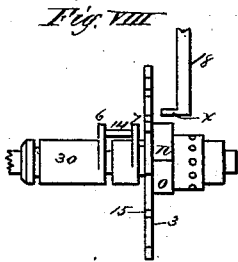
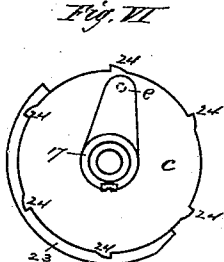
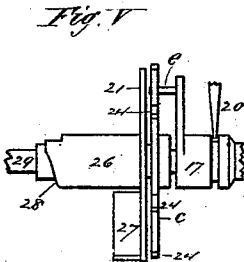
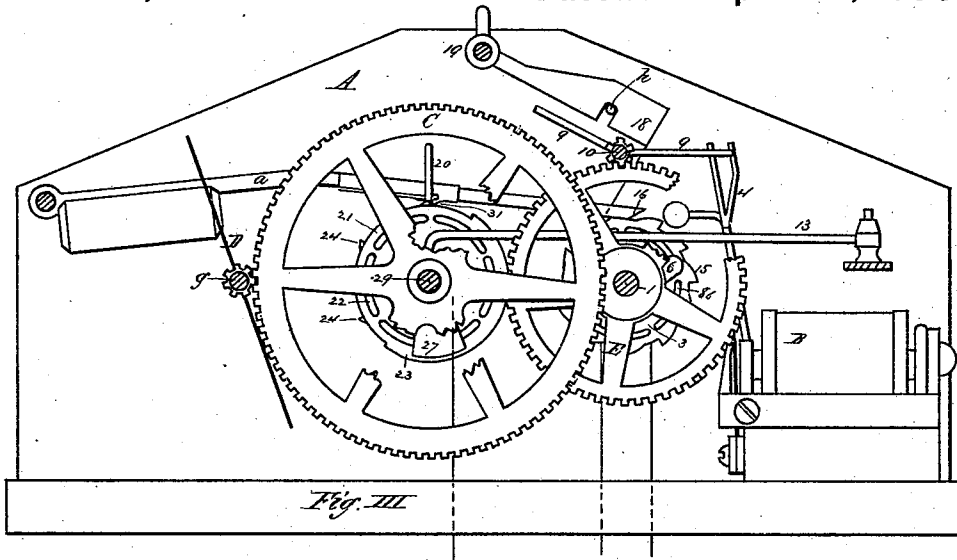
F. R. RICHMOND.
 Call-Signal for Telephone-Lines.
 No. 227,056. Patented April 27, 1880.



Witnesses.
 E. C. Curtis
 J. E. Hall

Inventor.
 Francis R. Richmond.
 By T. A. Curtis,
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UNITED STATES PATENT OFFICE.

FRANCIS R. RICHMOND, OF SPRINGFIELD, MASSACHUSETTS.

CALL-SIGNAL FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 227,056, dated April 27, 1880.

Application filed November 13, 1879.

To all whom it may concern:

Be it known that I, FRANCIS R. RICHMOND, of Springfield, in the State of Massachusetts, have invented a new and useful Call-Signal for Telephones; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon.

My invention relates to a signal designed to be used in connection with telephones, its object being to call the attention of a person with whom it is desired to converse through a telephone without calling the attention of others on the same circuit.

To this end my invention consists of an actuating-rod connected with the armature of an electro-magnet, operating, in connection with a movable support and an escapement, to give a movement to a registering device provided with cams and a key, and operating in connection with a set pin-and stop, whereby the number of counts or blows on a press-button to break the connection of the current are registered, and the signal given when the desired number of blows are given, and when the registering device is released it is automatically set for the next signal; and my invention also consists of two wheels placed on a shaft side by side, one weighted and provided with releasing-cams, and the other fixed to said shaft and arranged to be clutched to the weighted wheel, and move with it, the said wheels being connected with the registering device and with clutches operating in connection therewith, all which will be more fully hereinafter described.

Figure I is a perspective view of my invention with one of the side plates removed and parts of the toothed wheels broken away to show the mechanism. Fig. II is an end view of the same. Fig. III is a side elevation of the same with one of the side bearing-plates removed. Fig. IV is a plan view of the same. Fig. V is a front view of the weighted wheel and the loose wheel and clutch arranged by its side. Fig. VI is a side view of the same. Fig. VII is a side view of the registering device and the key and set-pin connected therewith. Fig. VIII is a front view of the registering device with its set-pin.

In the drawings, A represents the plates in which the shafts of the machine have their bearings, and to which some of the other portions of the mechanism are secured.

B is the ordinary small electro-magnet used with the telephone, in front of which is a movable support or stop, 5, with its upper end in a position between the forks at the upper end of the actuating-rod 4, attached to the armature of the magnet.

A shaft, 10, having its bearings in the frame A, is provided with two arms, 9, one bent at the end, so as to rest upon the support 5 when the armature is held in against the magnet, and the other straight and shorter, to rest on said support when the armature is released from the magnet and the rod 4 falls against the movable support 5 and moves it outward, this shaft 10 being caused to make an intermittent rotary movement of about one-half a revolution at a time by means of a weight or spring applied to the shaft of the toothed wheel E, which gears into a pinion on the shaft 10 whenever the support 5 is thrown out from beneath one or the other of the wires 9.

Upon the shaft 1, to which the wheel E is fixed, is a registering device, 3, arranged to turn loosely on said shaft and having a series of inclined cams, 15, on its periphery, a corresponding number of slots or recesses, 8, therein, and a shouldered key, *o*, fixed to its side. A stop, *f'*, is arranged in any convenient part of the machine, against which a set-pin, *f*, attached to the registering device, may strike, and this set-pin may be attached permanently to the registering device, and the key made movable, or the key may be permanently attached and the set-pin made movable, as will be further described. A clutch, 30, is arranged to slide to and fro on the shaft 1, with a dog-pin, 14, projecting through a dog, 7, fixed to the shaft, so that when the clutch is forced toward the registering device 3 the dog-pin 14 may project through the dog 7 and into one of the slots or recesses 8, when, if the shaft 1 revolves, the pin 14 will cause the registering device to revolve also.

An arm or lever, 13, is pivoted at one end to any desired part of the machine, and projects forward just over the shaft 1, and engages with an annular groove in the clutch 30, which is secured upon said shaft so as to slide freely; and

said lever also extends forward to the shaft 29, with its end bearing against the cam 28, on the end of the hub of the wheel 21, which turns loosely on said shaft.

5 The wheel *c* is located close beside the wheel 21, but is attached firmly to said shaft 29, so as to turn with said shaft, and this wheel *c* is provided with any desired number of teeth, 24, on its periphery.

10 The wheel 21 is provided with a series of slots or recesses, 22, preferably corresponding in number with the teeth on the periphery of the wheel *c*, although the particular number of both is immaterial; and the wheel 21 is provided with a weight, 27, on one side, to cause 15 the wheel to always stand in the same position when not in use; and this wheel is also provided with a cam, 23, which extends around about one-half the circumference or periphery 20 of the wheel.

A weighted arm, *a*, is hung at one end to a shaft, or to any convenient part of the frame, and extends along, just above the two wheels 21 and *c*, to a point just over the registering device 3, this end of the arm preferably being 25 bent to form a hook or catch, 16, and a small point or catch, 31, extends down from this arm to a point in front of the teeth 24 on the wheel *c*, and nearly or quite touching the edge of said 30 wheel. To this arm is attached one end of a bent lever, 20, pivoted at any convenient point on the frame, the other end of the lever engaging in an annular groove in the clutch 17, from which projects a dog-pin, *e*, extending 35 through a hole in the wheel *c*, so that when the lower end of the bent lever 20 moves said clutch in toward the wheel *c* the dog-pin *e* projects through the wheel *c* into one of the slots 22 in the wheel 21.

40 The arm 13 is arranged, either by a spring or a weight connected therewith, to force said arm toward the registering device 3, and also against the cam 28 on the hub of the wheel 21; and for convenience, in this case I have 45 made the free end of the arm *a* in the form of a spring, and have connected it with the arm 13 by a small bent rod, so that the spring operates to hold the arm in against the cam 28, and also holds the clutch in to clutch the 50 registering device 3 fast to the shaft 1, except when the arm 13 is forced outward by the rotation of the cam 28.

A small weight or spring is attached to the registering device, or to its hub, to cause it to 55 turn back to its starting place, with the set-pin *f* against the stop *f'* when released by the arm 13 and clutch 30; and a weight or spring is attached to the shaft 1, to actuate the escapement-shaft; and a weight or spring is 60 attached to the shaft 29, or to the wheel C, which actuates a fan, D, or regulating device, which regulates the speed of the wheel C, and also the wheels *c* and 21.

A rock-shaft, 19, is provided with a weighted 65 arm, 18, the lower end of which terminates in a spring hanging down by the side of the

registering device 3, with a small projection, *x*, on the end extending in toward and quite near to the registering device and on a line 70 of the rotation of the shoulder *n* on the key *o*, so that the registering device may be stopped at any desired point in its movement in making the counts with the shoulder *n* of the key just in front of the projection *x*, and, 75 when in this position, and the registering device is caused by its weight or spring to move back, the shoulder *n* comes in contact with the projection *x*, and throws up the arm 18 with a quick movement, rocking the shaft 19 and causing a hammer attached thereto to strike a 80 bell and give an alarm or signal.

The magnet, which may be located in any desired position in the room, either at the telephone or elsewhere, is connected by wires to 85 the circuit-wire, and with the ordinary press-button arrangement for breaking the connection.

When the machine is not in use the armature stands against the magnet, and in this position the rod 9 of the escapement, having 90 the end bent, rests upon the upper end of the movable support 5, and by pressing on the press-button the connection is broken and the armature and the actuating-rod 4 fall away from the magnet, one portion of the fork of 95 the actuating-rod striking against the support 5, and knocking it or moving it from beneath that end of the escapement, and the latter, actuated by the weight or spring on its shaft, makes about one-half a revolution, the other 100 straight rod of the escapement coming over and striking upon the support 5, and is stopped. Upon removing the pressure upon the press-button the connection in circuit is again 105 made, and the armature is drawn in against the magnet, the rod 4, as the armature approaches the magnet, striking a blow against the support 5, and forcing it from beneath the straight arm of the escapement 9, and allowing the escapement-shaft to complete its revolution, the latter being stopped by the bent 110 arm of the escapement striking and resting upon the top of the support 5 as the armature reaches the magnet. When this is done (if the button is not pressed again) the rotation 115 of the escapement-shaft, being geared to the wheel E, has caused the registering device 3 to make two intermittent movements, so that the free end of the arm *a* rests upon the highest part and near the point of one of the cams 120 15 on the registering device, which so raises the arm *a* that the point 31 thereon is raised away from in front of one of the teeth 24 on the wheel *c*, and at the same time said arm is raised the pivoted lever attached to said 125 arm moves the clutch 17 in toward the wheel *c*, the dog-pin *e* moving through its hole in the wheel *c*, and into and engaging with one of the slots 22 in the wheel 21, and the weight or spring attached to the shaft 29, which revolves 130 the wheel *c*, then revolves the weighted wheel 21, and as the latter revolves the cam 23 on its

periphery moves around into a position beneath the point 31 on the arm *a*, and prevents the latter from dropping again. As the wheel 21 is thus revolved by the dog-pin *e* the cam 28, on the end of the hub of said wheel, moves against the end of the arm 13, forcing that and the clutch 30, with which it engages, farther away from the registering device 3, and thereby drawing the dog-pin 14 out from the slot 8 in the registering device, with which it has engaged. The latter thus released flies quickly back to the position from which it started, with the set-pin *f* against the stop *f'*. If the key *o* is attached to the registering device in such a position that when the pressure is removed from the press-button the shoulder *n* of the key is just past the projection *x* on the spring end of the arm 18, thus counting one pressure or blow of the button, then said shoulder *n* will raise the arm 18 as the registering device moves back, and give a movement to the rock-shaft, and when the arm falls again the hammer on the rock-shaft is made to strike a bell or give the alarm.

It will be seen that there are two separate intermittent movements of the registering device 3 to each blow struck or to each count made on the press-button. In the first part of the count, or when the pressure is made on the button, the counting device moves, by the action of the escapement, just far enough to let the extreme free end of the arm *a* drop from the highest point of one cam, 15, down to the lowest point of the next cam on the registering device 3, which movement of the arm *a* places the point or catch 31 thereon down in front of one of the teeth 24 on the wheel *c*, and at the same time withdraws the dog-pin *e* on the clutch 17 from the slot 22 in the wheel 21, when the latter is rotated back again by the weight 27, secured thereto.

When the pressure is released from the press-button the half-revolution of the escapement moves the registering device just far enough to cause the free end of the arm *a* to ride up onto the highest part of the cam 15, upon which it is then resting. In this manner, by setting the key *o* at any desired number of cams on the registering device from that which is opposite the projection *x*, on the spring end of the arm 18, (the starting-point of the registering device,) and striking a corresponding number of blows or counts on the press-button, an alarm may be struck or a signal given. Suppose, for example, there are ten stations on any given circuit, each provided with one of these machines. If only at station 1 the key *o* is set one cam away from the projection *x*, then if one pressure or count is made on the press-button at the central office and the pressure released the machine at station 1 will strike the bell at that station only, the registering device at all the other stations not moving far enough to bring the shoulder *n* on the key *o* in front of the projection *x* on the spring end of the arm 18, and therefore no alarm or sig-

nal will be struck at any of the other stations, the registering devices at all the other stations simply moving back and being automatically set again for another signal. If at station 2 the key *o* is set on the registering device two cams away from the projection *x*, then two blows struck on the press-button or two counts made thereon at the central office will cause the machine at station 2 to strike an alarm. In striking for this signal the key *o* on the registering device at station 1 passes entirely by the projection *x* on the spring end of the arm 18, the keys being so shaped and attached to the registering devices on all the machines that the keys pass inside the projections *x*, the latter riding over the outside of the keys and dropping behind the shoulders *n* as the registering devices move forward in counting; but when the latter fly back to set themselves for a new signal, moving in the other direction, the keys pass outside the projections, the forward end of the key, as the registering device moves forward in counting, being in a line of movement just inside the projection *x*, and the opposite end of the key being in a line of movement just outside the projection *x*. In striking a signal, therefore, for station 5, the key *o* on the machine at that station being set five cams from the projection *x*, five blows or counts are made on the button at the central office, which brings the shoulder *n* on the key *o* at station 5, just in front of the projection *x* on the spring end of the arm 18, and the registering device then moving back quickly to set itself with the set-pin *f* against the stop *f'*, the alarm or call is struck, those keys on the machines at stations 1, 2, 3, and 4 moving past the projections *x* without giving an alarm.

It will be seen that all the machines at the different stations are made exactly alike and move exactly alike and at the same time, the only difference being the relative position to the projection *x* of the different keys *o*, each key in the whole series of machines in the circuit occupying a different position relatively to the projection from any of the others.

Inasmuch, however, as the keys might require to be changed from time to time, as the number of stations in the circuit might change, which would be more or less difficult, I obtain the same result by changing the position of the set-pin *f*, instead of changing the key in each machine, the stop *f'* retaining its position, and this may be done by making a series of holes in the hub of the registering device, corresponding in number with the cams 15 thereon, so that the key *o* may be permanently fixed on the counting device and the set-pin *f* removed from one hole and put into another, if a change is desired. For example, if the machine at station 5 has the set-pin *f* in a position five cams from the projection *x*, and it is desired to remove this machine to station 3 or to change the station from 5 to 3 on the same circuit, the set-pin *f* is removed

from the fifth hole from the projection *x* and put into the third hole, and three blows or counts on the press-button at the central office will then strike the alarm on that machine.

5 It is very annoying to many people using telephones to hear the ringing of the call-bell so constantly, as at present every bell in the whole circuit rings, although the attention of only one person is wanted, and the attention of
10 all in the circuit is being constantly distracted from other important matters to ascertain, when the bell rings, if it is their number; or else the different persons get so accustomed to their call that they soon learn to disregard it
15 altogether unless the call is repeated many times. This invention entirely obviates that objection, as the bell is struck or the call is made only at that station in the whole circuit where the attention is wanted, and only when
20 wanted, and the bell may then only strike one blow at all the stations, or the same number of blows, instead of striking a certain number for each station, thus doing away with the necessity of the person at each station knowing
25 the number of his own or any other station, or knowing who else or whether any one else is being called.

As the power available for drawing the armature in against the magnet is much the
30 weakest when the armature is farthest from the magnet, I arrange my machine so that the electric force will have the minimum amount of work to do when the armature is in that position; and with especial reference to this fea-
35 ture I arrange the movable support 5 so that its upper end stands a little distance inside of the outer fork of the actuating-rod 4, so that when the armature stands away from the mag-
40 net the rod only starts to move in when the armature is drawn to the magnet, and when the armature nearly reaches the magnet the rod strikes a blow against the support and forces it from beneath the escapement, and
45 when the armature starts to move away from the magnet the rod, after moving a little distance, strikes a blow against the support, forcing it from beneath the other arm of the escapement.

It will thus be seen that the escapement is
50 operated by the cumulative force of the armature-actuating rod, the latter striking a blow against the support while the said rod is fully in motion and well under way, a portion of its momentum being made available to operate
55 the escapement.

Instead of making the support single and the actuating-rod bifurcated, I may just as well reverse the construction, and make the support forked and the actuating-rod single,
60 and obtain the same result.

It is evident that instead of applying the weight or spring directly to the shafts 1 and 29, a train of wheels may be geared to each

shaft, and the weight or spring be applied to actuate the train, in which case the machine 65 would run much longer before it would again require to be wound up, which would be done preferably by a key similar to that used in winding a clock.

Having thus described my invention, what 70 I claim as new is—

1. In an electro-magnetic call for telephones, the combination, with the magnet, of an actu-
ating-rod attached to its armature, a movable support operated by a blow struck by said 75 rod, and the escapement, as a means of imparting the blows or counts of the signal to a registering device, substantially as set forth.

2. In an electro-magnetic call for telephones, the combination, with the magnet, of the vi-
brating armature-actuating rod, the escape- 80 ment and its movable support, and a registering device for registering the vibrations of the armature, substantially as described.

3. In an electro-magnetic call for telephones, 85 the combination, with the magnet, of the vibrating armature-actuating rod, the escapement and its movable support, a registering device, and the key attached thereto, as a means
90 of striking the alarm or call when the number of vibrations of the armature have been registered, substantially as described.

4. In an electro-magnetic call for telephones, the combination, with the magnet, of the vi-
brating armature-actuating rod, the escape- 95 ment and its movable support, the registering device, and the key and set-pin attached thereto, both changeable with reference to their position relative to each other, whereby
100 the same machine may be changed to give a signal by any desired number of counts, substantially as described.

5. In an electro-magnetic call for telephones, the combination, with a magnet and vibrat-
ing armature-actuating rod, of the escape- 105 ment and its movable support, the registering device actuated in a reverse movement to be automatically set for a new signal after a signal has been given, a clutch arranged to en-
110 gage therewith, and a set-pin and stop for the same, as a means of registering the counts and of automatically setting the registering device for a new call, substantially as described.

6. In an electro-magnetic call for telephones, the combination, with the magnet and vibrat-
ing armature-actuating rod, of the escapement, 115 with its movable support, the registering device provided with lifting-cams, the arm *a*, the wheel *c*, with its clutch 17 and operating-arm, the wheel 21, cam 28, and the arm 13, sub-
120 stantially as and for the purpose set forth.

FRANCIS R. RICHMOND.

Witnesses:

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