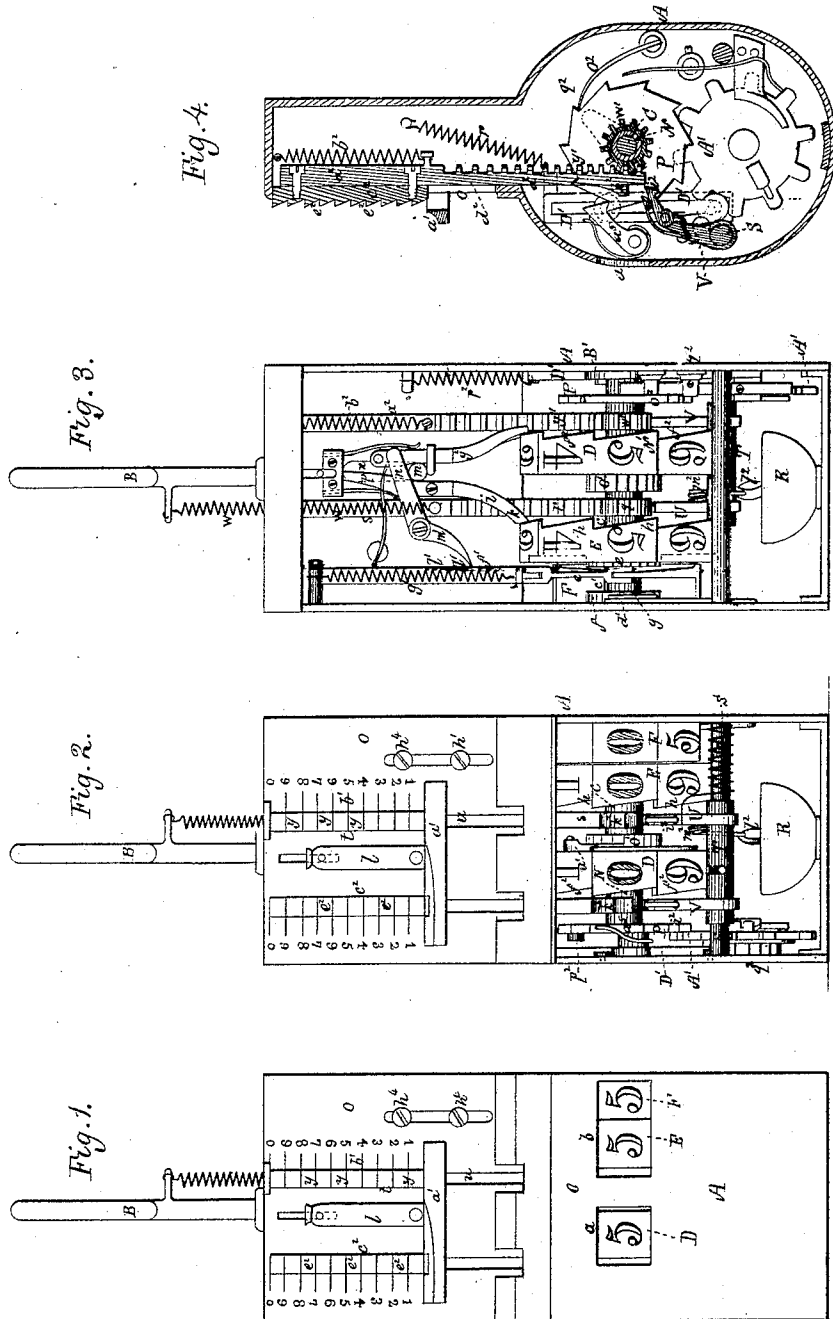


W. S. WATSON & A. KNOWLTON.

FARE-REGISTER.

No. 170,318.

Patented Nov. 23, 1875.



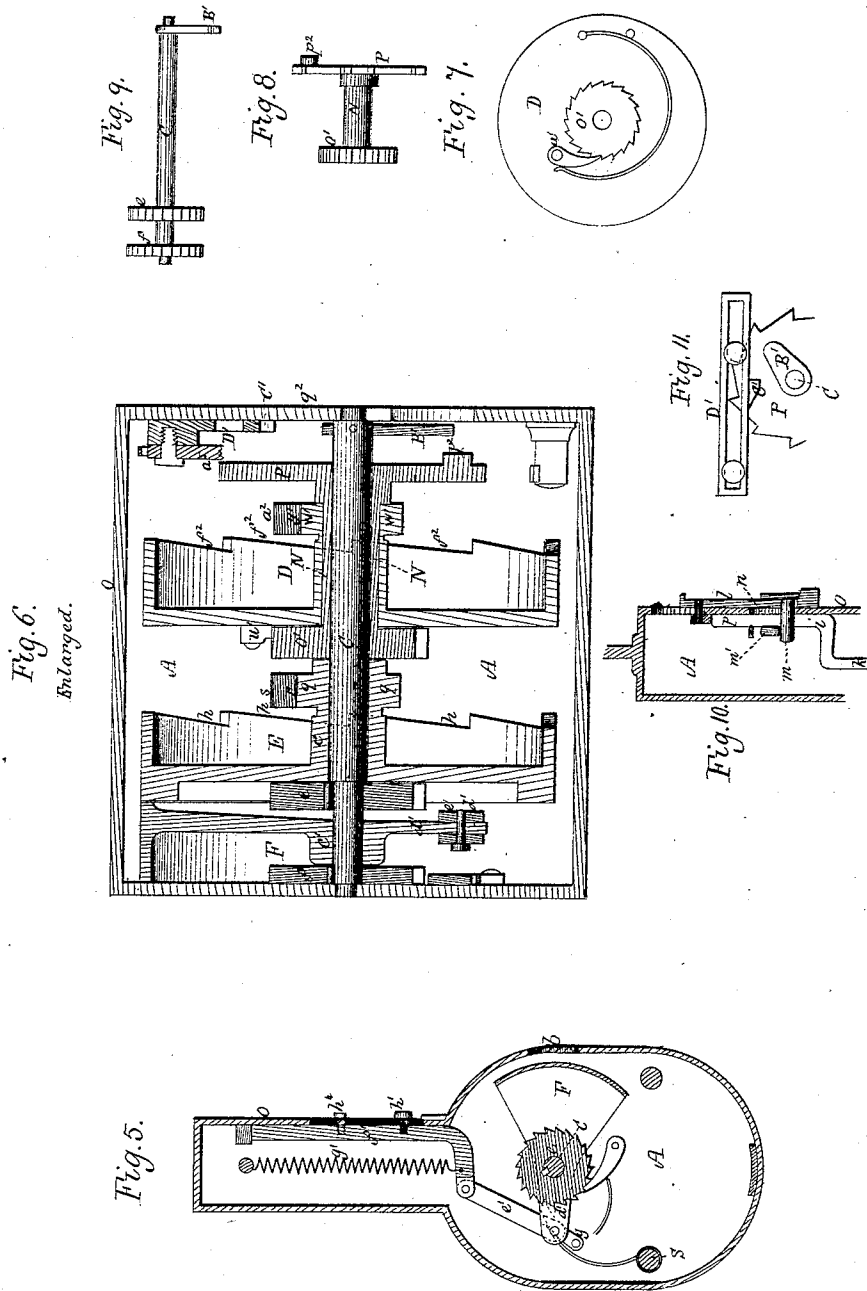
WITNESSES,  
*Henry M. Puckham*  
*Waldo E. Boardman*  
*Albion Knowlton, & Walter S. Watson,*  
*H. Curtis, Atty.*

W. S. WATSON & A. KNOWLTON.

FARE-REGISTER.

No. 170,318.

Patented Nov. 23, 1875.



WITNESSES.  
*Henry M. Pinkham*  
*Waldo C. Boardman*

*Albion Knowlton and Walter S. Watson,*  
*Attys.*

# UNITED STATES PATENT OFFICE

WALTER S. WATSON AND ALBION KNOWLTON, OF BOSTON, MASSACHUSETTS.

## IMPROVEMENT IN FARE-REGISTERS.

Specification forming part of Letters Patent No. 170,318, dated November 23, 1875; application filed November 11, 1874.

*To all whom it may concern:*

Be it known that we, WALTER S. WATSON and ALBION KNOWLTON, of Boston, Suffolk county, Massachusetts, have invented a Device for Registering Car-Fares, of which the following is a specification:

This invention relates to means whereby the receipts of conductors of railway-cars, coaches, and other public conveyances, are recorded by a suitable indicator, which is to be opened to the hands only of the proper officer, the purpose of the invention being to put a positive check upon the dishonest appropriation of money or tickets on the part of such conductors.

The drawings accompanying this specification represent, in Figure 1, an outer face view of an instrument embodying our improvements; in Fig. 2, a similar view, with a portion of the front plate of its case removed. Fig. 3 is a rear elevation of the instrument with the plate of the case removed. Fig. 4 is a longitudinal and vertical section of the instrument, taken through the rack-bar and pinion which actuate the "dollar-wheel," to be hereinafter explained. Fig. 5 is a longitudinal section through the ratchet-pawl by which the "cents-wheel" actuates the recording mechanism. Fig. 6 is a horizontal section of the instrument. Fig. 7 is an end view of the dollar-wheel and the ratchet and pawl by which such wheel actuates the recording mechanism. Fig. 8 is a side elevation of the wheel last named and the first wheel of the recording mechanism. Fig. 9 is a view of the main shaft of the instrument with the two ratchet-wheels affixed immovably to it, the first of which wheels is a hold-fast to the shaft, and the second the wheel by which the cents-wheel rotates the shaft and actuates the first recording-wheel by means of a rigid arm on the opposite extremity of said shaft, and which is shown in said Fig. 9. Fig. 10 is a section of the upper part of the case of the instrument, and a portion of the mechanism therein contained. Fig. 11 is a view of the primary register-wheel, to be explained.

In these drawings, A represents a hollow box or case, of a size and shape to contain the operative mechanism hereinafter explained, this case being provided with a ring or handle,

B, at top, by which it is to be suspended from the finger of the conductor, and held in view of the passenger who may be paying a fare, whether in money or the equivalent in tickets, the front of the case being provided with windows *a b*, through which the number-wheels, hereinafter explained, are visible. C in the drawings represents a horizontal shaft or rod, extending across the lower part of the case A, and centrally thereof, this shaft supporting the operating or number wheels D, E, and F, the first of which is the dollar-wheel, the second the tenths or fractions of a dollar, and the third the units. The hub *c* of the tens or fractional wheel E is mounted loosely upon the shaft C, and is provided upon its outer surface with a spring-pawl, *d*, which engages with a ratchet-wheel, *e*, fixed to the shaft alongside of it, a second ratchet-wheel, *f*, being fixed to the outer end of the shaft and operating in connection with a pawl, *g*, pivoted to the inner end of the case, to permit the shaft to rotate with the wheel E when the latter is advanced, but to prevent the shaft from turning with such wheel when the latter returns. The display-wheel E is formed upon its inner edge with a series of saw or ratchet teeth, *h h*, &c., these teeth being ten in number and of equal distance asunder, while upon the periphery of the wheel, and coinciding with these teeth I engrave or engross the numerals 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, in regular succession, which denote fractions of a dollar, or tenths.

We prefer that as the wheel is advanced to the extent of one or more of these numerals, according to the amount paid the conductor, it shall remain stationary at this point, in order to afford the passenger ample time to assure himself that his fare has been duly recognized and recorded; and to insure the stoppage of the wheel we have provided the teeth *h*, while operating with these teeth is a dog, *i*, pivoted at about its center to the inner face of the front of the case A, and with its lower end *k* engaging the teeth *h*.

To release the hold of the dog upon the teeth *h* we dispose upon the front of the case a slider, *l*, which carries a horizontal stud, *m*, extending into the interior of the case through a slot, *n*, created in its front plate *o*, the upper arm *p* of

the dog *i* being carried inward and over the stud *m* to such a degree that, as the slider is pushed upward, the stud wipes against such arm, and the lower end of the dog is released from contact with the wheel, and the latter permitted to return to its normal or idle position when the conductor sees fit to allow it to do so.

To operate the wheel *E* we affix to or form upon its hub *c* a spur-gear, *g*, which engages a long rack or series of teeth, *r*, formed upon a bar, *s*, which plays against the inner face of the front plate *o* before named, a portion or projection, *t*, of this rack-bar extending through a slot, *u*, created in the front *o*, and alongside of and parallel with the slot *n* before named, the rack-bar *s* being retracted to its idle position by a coiled spring, *w*, attached to it and the case, as shown in the drawings. The outer or front edge of the projection *t* is divided into ten teeth or spurs, *y*, *y*, &c., while upon the front plate *o*, and alongside of these teeth, and coinciding with them, we engrave a scale, *b*<sup>1</sup>, of ten numbers, to correspond with the numbers upon the wheel *E*, the length of the teeth *y* being so calculated with respect to those of the wheel that as the rack-bar *s* is lowered to the extent of one tooth or more, the wheel shall be rotated upon the shaft to the extent of one or more of its numbers. Furthermore, the parts are so adjusted that when the wheel *E* is in its idle or normal position its unit is opposite the window *b*, and in full sight of the passengers, the bar *s* being also at its idle position, and with the outer or upper edge of its topmost tooth coinciding with the outermost score of the range of numerals adjacent to it. A finger stop or bar, *a*<sup>1</sup>, is applied to the outer face of the front plate *o*, and with its upper edge on a line with the bottom of the lower tooth *y*, the bar *s* passing through a notch created in the under side of the stop. When a fare is paid the conductor, whether in money or a ticket—for instance, to the amount of fifty cents—he places his thumb-nail in the tooth *y*, which coincides with the numeral 5 of the range *b*<sup>1</sup>, and lowers the rack-bar *s* until the tooth upon which his nail rests arrives at the stop *a*<sup>1</sup>, which determines the length of movement of the rack-bar, it being understood, and will be seen by referring to the drawings, that the numerals of the range *b*<sup>1</sup> begin at this rest *a*<sup>1</sup>. As the bar *s* is lowered to the extent of five of its teeth, as stated, its inner teeth or toothed rack *r*, through the agency of the gear *g*, has rotated the wheel *E* to the extent of five of its teeth, which brings the numeral 5 upon its periphery opposite the window *b*, and in full view of the passenger, who is thus enabled to see at a glance that his fare has been registered. As soon as the conductor perceives this he pushes upward the slider *l*, and with it the stud *m*, thus pushing outward the free arm *p* of the dog *i*, and removing the hold of the latter upon the wheel *E*, and permitting the spring *w* to retract the

said rack-bar *s*, and restore the latter and the wheel to their normal positions.

To adapt the instrument to recording fractions of a dollar below ten cents, we add the second character wheel or shield, *F*, before named, the hub *c*<sup>1</sup> of which, like the hub of the wheel *E*, is mounted loosely upon the shaft *C*, and, like the said wheel *E*, the wheel *F* is entirely independent of such shaft, and is not connected with the wheel *E*. Upon the periphery of the wheel or shield *F* we inscribe a series of numerals, beginning at 0, these numerals being of such amount as may be needed to make up the fractions of a dollar below ten cents—for instance, five cents. In practice, however, but two—viz., 0 5—will be probably necessary, as fares of horse-cars and stages, in which our instrument will, to a great extent, be employed, usually are five or ten cents, while on steam roads, in a majority of instances, the smallest numerals required would be 5. It will be evident, however, that we can add to the wheel *F* any number from 1 to 10.

If a passenger's fare exceeds five cents in amount, and is less than a dollar—say fifty-five cents—the conductor registers five on the wheel *E*, in manner as before stated, and then advances the wheel *F* until its numeral 5 is visible through the window *b*, and alongside of the 5 of the wheel *F*, thus recording fifty-five cents. If five cents alone is to be recorded, the conductor simply advances the wheel *F* till the numeral 5 appears, the 0 being at all other times in view to make up amounts divisible by ten.

This movement of the wheel or shield *F* is effected as follows: To the hub *c*<sup>1</sup> of such shield we secure an arm, *d*<sup>1</sup>, to the extremity of which we pivot the lower end of a link, *e*<sup>1</sup>, the upper end of such link being, in turn, pivoted to the lower extremity of a slider-bar, *f*<sup>1</sup>, which, like the rack-bar *s*, plays against the inner face of the front plate *o* of the case, and is retracted to its highest and idle position by a spring, *g*<sup>1</sup>. One or more spurs or knobs, *h*<sup>1</sup>, *h*<sup>2</sup>, extend from the bar *f*<sup>1</sup> through a slot in the front plate, and by means of such knobs the bar is actuated. To the outer face or end of the wheel *E* we pivot, as before stated, a pawl, *d*<sup>1</sup>, which engages the ratchet-wheel *e*, hereinbefore referred to as fixed to the shaft *C*, the pawl being so disposed that, as the wheel *E* is advanced, such pawl has no effect upon the ratchet; but when returning, by the stress of the spring *w*, the pawl engages the ratchet, and rotates it and the shaft. This reverse or return movement of the wheel *E* actuates the index or indicator wheel, to be hereinafter explained.

To estop the wheel *F* in such a position that its numerals shall remain stationary, in sight through the window *b*, we create in the bar *f*<sup>1</sup> one or more notches, *l*<sup>1</sup>, which correspond to the said numerals, and operating with these notches we employ a dog, *m*<sup>1</sup>, which is pivoted to the front plate *o*, alongside of the bar *f*<sup>1</sup>, the in-

ner and free end  $n'$  of this dog extending over the stud  $m$  of the slide-bar  $l$  before named, the result of this arrangement being that, when the said stud is elevated in the act of releasing the wheel E, the wheel F is freed from the control of the dog  $m'$ , and returns to its normal position in company with said wheel E, or alone if it is used alone.

The dollar-character wheel, as before stated, is shown at D as mounted loosely upon a tubular shaft or sleeve, N, which encompasses and rotates freely upon the shaft C. To the inner end of the wheel D we pivot a pawl,  $w'$ , which engages a ratchet,  $o'$ , fixed to the inner end of the sleeve N, and alongside of said wheel D, the pawl being so disposed that, when the wheel is rotated by means hereinafter stated, the pawl engages the ratchet, and rotates the sleeve, and with the sleeve a toothed wheel, P, affixed to its outer end, the purpose of which will be hereinafter explained. To rotate the wheel D we affix to its hub a gear,  $w'$ , and we engage this gear with a toothed rack,  $y'$ , formed upon a slide-bar,  $a^2$ , playing against the inner face of the front plate  $o$ , and provided with a spring,  $b^2$ , for retracting it, such bar being formed with a projection or rib,  $c^2$ , which extends through a slot,  $d^2$ , in the front plate  $o$ , and the rib being divided into teeth  $e^2$ , &c., of a length, number, and disposition corresponding to those of the rack-bar  $s$ , hereinbefore alluded to as operating the wheel E.

A scale of numerals from 1 to 0 is engraved upon the outer face of the front plate  $o$ , and alongside of the teeth  $e^2$ , and the perimeter of the wheel D is divided into ten parts, and numbered with numerals, and formed with ten teeth,  $f^2$ , &c., upon its edge, similar to the wheel E. A dog,  $g^2$ , is pivoted at its upper end to the inner face of the front plate  $o$ , and its lower end engages the teeth  $f^2$ , the dog being disposed in the path of movement of the stud  $m$ , in manner similar to that of the dog  $m'$ , so that when the said stud is elevated it wipes against and passes outward the dog and releases the sleeve D. The arrangement and operation of the wheel D and its adjuncts are identical with those of the wheel E, and will be readily understood. If one dollar or more, say five dollars, is paid by a passenger, the conductor operates the slide-bar  $a^2$  and wheel D until the numeral 5 appears in view through the window  $a$ , and the passenger perceives that such an amount is registered. If the fare is five dollars and fifty-five cents, the conductor, in addition to advancing the dollar-wheel D, advances the wheels E and F, as before stated, until the numeral 5 upon each appears through the window  $b$ , thus announcing to the passenger that his fare of five dollars and fifty-five cents has been registered. We have added to this instrument a signal of some kind to denote to all the passengers within hearing that the conductor has registered a fare, and to accomplish this result we place within the lower part of the case A a gong or bell, R, and in front of and somewhat above

this gong we dispose a horizontal rod, S, which spans the case A, and has mounted upon it a sleeve, T, upon which sleeve we erect two arms or posts, U or V, and to the upper part of each post we pivot a tripper,  $l^2$ , in such manner that as the slide-bar  $s$  or  $a^2$  advances in the act of first rotating or feeding the character-wheel, the tripper shall yield and the arms remain stationary; but, upon the return of the bars  $s$  or  $a^2$  with the quick movement effected by the spring which retracts it, a stud,  $k^2$ , upon such bar wipes against the tripper, which is now rigid, the result being the arm is lowered, and when the bar leaves the tripper the arm suddenly assumes an upright attitude, and the hammer  $l^2$ , which is attached to the sleeve T and provided with a proper spring,  $m^2$ , strikes and sounds the gong.

It now only remains for us to explain the manner in which we operate the indicator or register which counts up and records the number and extent of the movements of the character-wheels and the amount of fares paid.

It is evident that, as both the dollar-wheel D and the fractional wheel E operate the register or recording wheel or wheels, the wheel E must act upon such recording-wheels ten times to once of the dollar-wheel. In carrying out this feature of our invention we secure to the outer end of the tubular shaft or sleeve N the toothed wheel P, hereinbefore referred to, this wheel being formed upon its periphery with ten ratchet-teeth, and provided with a pawl,  $o^2$ , which permits it to rotate but in one direction—that is, in consonance with the first or primary movement of the wheels E and D. As the wheel D is rotated or advanced by its bar its pawl engages the ratchet-wheel  $o'$ , before named as affixed to the sleeve N, and, as a consequence, the indicator-wheel P is advanced intermittently. To the outer face or end of the wheel P we affix a stud,  $p^2$ , and as the said wheel moves with the dollar-wheel, it is evident that the said recording-wheel counts up and records as many numerals at any one time as the dollar-wheel is advanced—that is to say, if the dollar-wheel is pushed on to five numerals the recording-wheel rotates the same distance, or five of its teeth, but is prevented from returning by its pawl  $o^2$ .

Upon the end of the wheel P we engrave the numerals from 1 to 0, and when this wheel has completed a revolution it has, as a matter of course, registered the sum of ten dollars. To register a high number of figures and a large sum of money, we add to the wheel P one or more toothed wheels,  $A'$ , which may be provided with ten teeth, and operated each by a tooth from the preceding wheel, after the manner of indicators of gas and water meters and other instruments. To connect the fractional wheel E with the recording-wheel P we affix to the outer end of the shaft C an arm,  $B'$ , which operates in connection with a tooth or spur,  $C'$ , formed upon the inside of a slid-

ing plate or draw-bar,  $D'$ , which plays against the inner face of the end plate  $q^2$  of the case A, and is retracted by a spring,  $r^2$ . As the shaft C rotates with the wheel E when the latter is advanced, it follows that one complete revolution of such wheel and shaft will cause the arm  $B'$  to wipe against the spur  $C'$  and effect an endwise movement of the plate or draw-bar  $D'$ . As the said bolt or draw-bar  $D'$  carries a drag-pawl,  $a^5$ , which engages the periphery of the register-wheel P, it follows that one complete revolution of the wheel E effects a one-tooth movement of the register-wheel, and records the sum of one dollar.

The unit-wheel, on its retreat or retrograde movement, by means hereinbefore explained, acts upon the ratchet-wheel  $e$ , to advance the register-wheel one-twentieth the distance which the wheel E accomplishes, and therefore a one-tooth movement of such unit-wheel advances the register-wheel but one-twentieth the distance which the fractional wheel effects.

In lieu of the stud or knob  $h^4$ , we propose employing a bar which shall extend nearly up to the rack-bar  $s$ , in order that the conductor, when operating such bar, may at the same movement operate the bar  $f^1$ .

The instrument above explained affords a ready and accurate means of registering the amount of money or tickets collected by conductors, and prevents entirely any dishonest appropriation of either, as the conductor's returns must tally with the indicator:

We claim—

1. The combination, with the notched or toothed display or indicator wheel, of the sliding rack-bar for operating the same, the dog or detent which engages the notches or teeth on said wheel, and the slide-bar and stud for releasing the hold of the dog on the wheel, substantially as shown and set forth.

2. The wheels E D, mounted on their supporting-shaft, as explained, in combination with rack-bars  $s$   $a^2$  and their retracting-springs, dogs  $i$   $g^2$ , and the slide-bar and stud for actuating said dogs, arranged and operating substantially as shown and set forth.

3. The combination, with the independent wheels D E F, mounted on shaft C, and operated as herein described, of the register-wheel P, and mechanism by which the several wheels, when moved, are caused to operate the register-wheel to register the amounts displayed by the wheels, substantially as herein shown and set forth.

4. The bar  $a^1$ , in combination with the sliding bars  $s$  or  $a^2$ , to constitute a stop to the movement of such bars, substantially as and for the purposes stated.

WALTER S. WATSON.  
ALBION KNOWLTON.

Witnesses:

W. E. BOARDMAN,  
F. CURTIS.