(No Model.) 2 Sheets—Sheet 1.

W. H. LORD.

SPEED CLOCK FOR MACHINERY.

No. 300,491. Patented June 17, 1884.

Fig: 2.

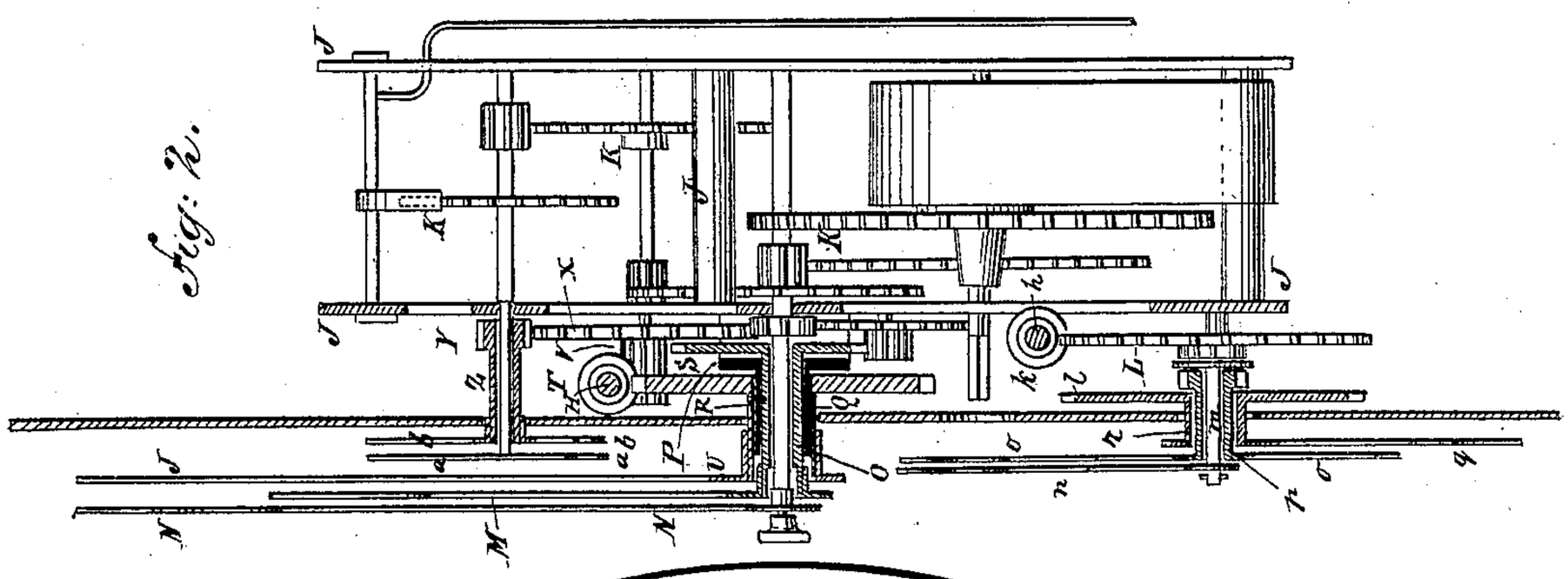
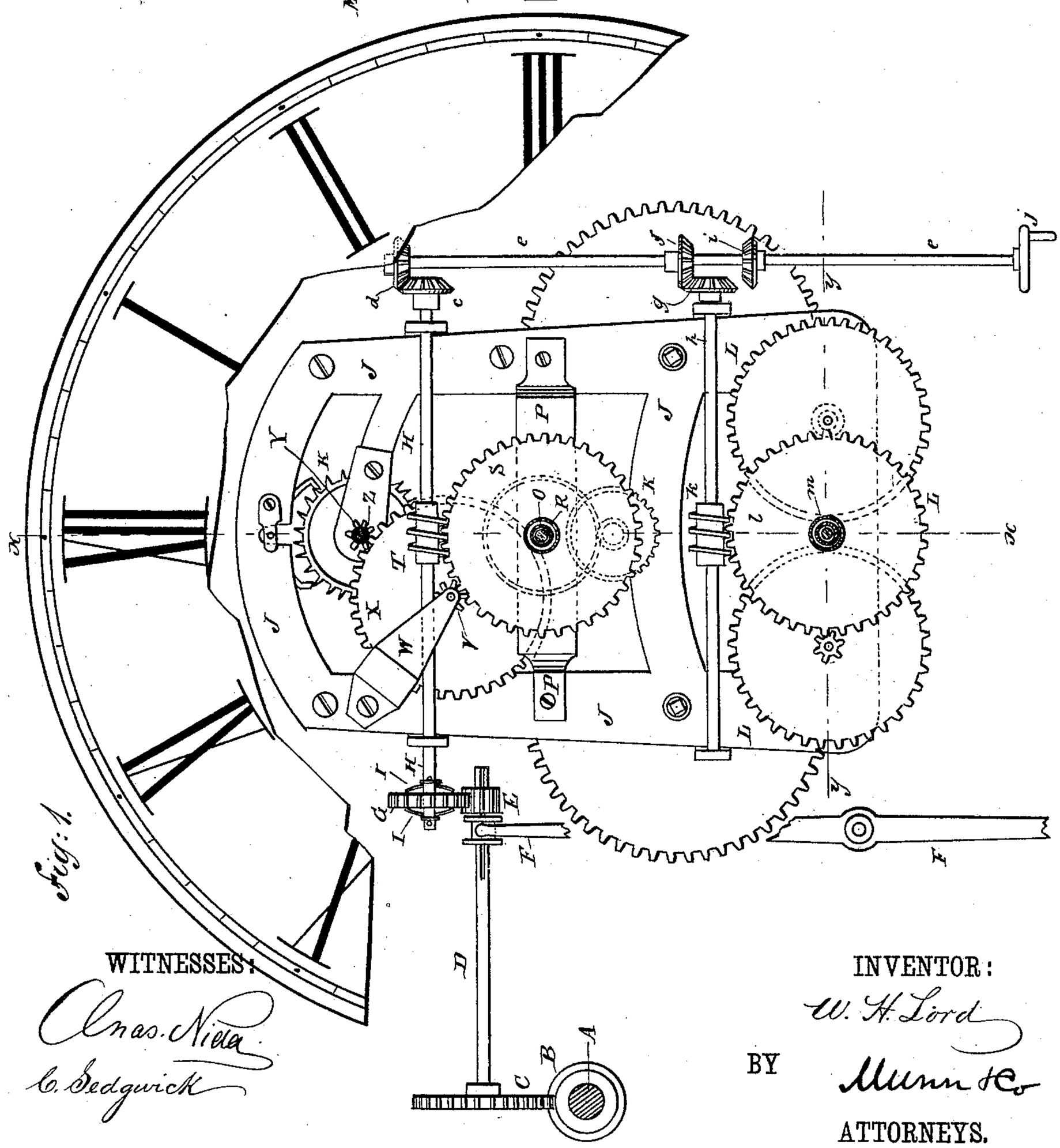


Fig: 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig: 3.

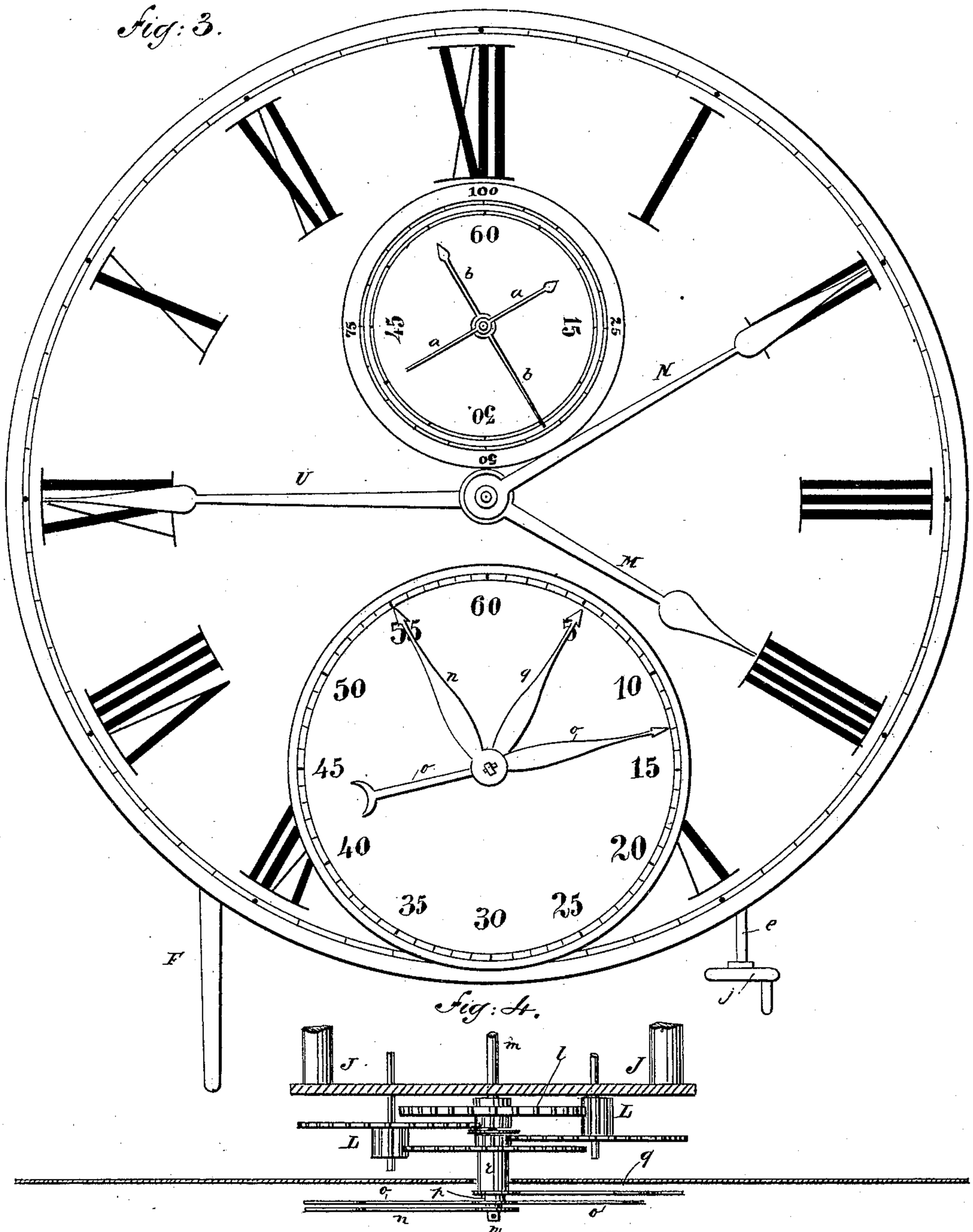

Fig: 4.

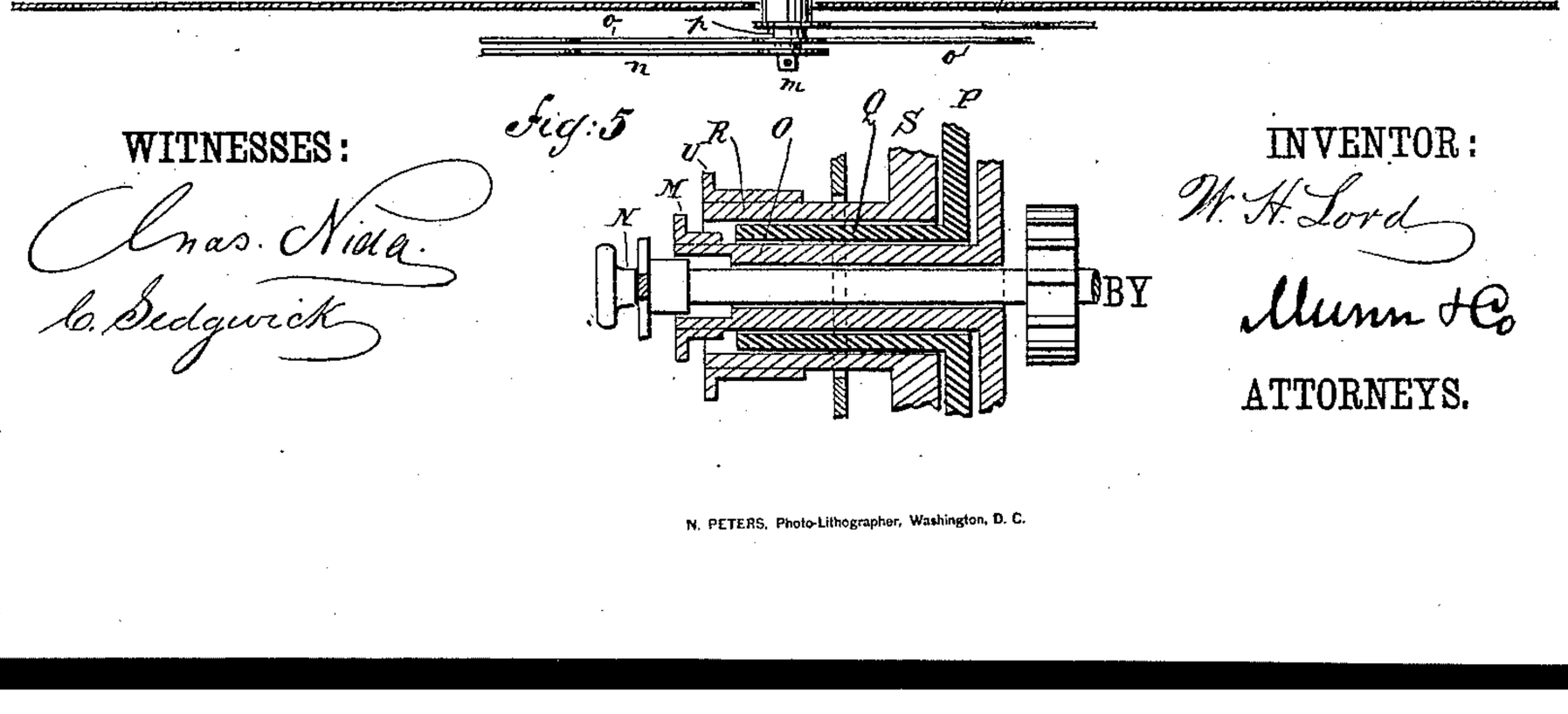

Fig: 5

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UNITED STATES PATENT OFFICE.

WILLIAM H. LORD, OF NEW YORK, N. Y.

SPEED-CLOCK FOR MACHINERY.

SPECIFICATION forming part of Letters Patent No. 300,491, dated June 17, 1884.

Application filed March 14, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LORD, of the city, county, and State of New York, have invented certain new and useful Improvements in Speed-Clocks for Machinery, of which the following is a full, clear, and exact description.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1, Sheet 1, is a front elevation of my improvement, parts being broken away, and the driving-shaft shown in section. Fig. 2, Sheet 1, is a sectional side elevation of the same, taken through the line *x x*, Fig. 1. Fig. 3, Sheet 2, is a front elevation of the same. Fig. 4, Sheet 2, is a sectional plan view of a part of the same, taken through the line *y y*, Fig. 1. Fig. 5, Sheet 2, is a view of a part of the section shown in Fig. 2, enlarged.

The object of this invention is to provide a means for showing the loss or gain in speed of a steam-engine or other machinery.

The invention consists in a speed-clock constructed with the worm-wheel that carries the speed-hand supported and separated from the time-clock works by a bridge and hollow journal. The worm-wheel that carries the speed-hand connected with the time-clock works is connected by a large gear-wheel and two small gear-wheels with a speed seconds-hand revolving upon the post of the time seconds-hand, as set forth, whereby the gain or loss in speed will be accurately shown. The speed-clock works, which are provided with hands revolving one in sixty hours and the other in sixty minutes, is also provided with a hand revolving in sixty seconds, whereby the amount of gain or loss in a given time can be definitely shown. With the worm-shaft driving the speed mechanism of the time-clock works, and driven by friction, and the worm-shaft driving the speed-clock works, is connected by miter-wheels a sliding and rotating shaft, whereby the speed-hands of the two clock-works can be adjusted together or separately, as will be hereinafter fully described.

A represents the driving-shaft, the speed of which is to be registered, and to which is attached a worm, B. The worm B engages with the worm-wheel C, attached to the end of a short shaft, D, which revolves in bearings in some suitable support. Upon the other end of the shaft D is placed a small gear-wheel, E, which is connected with the said shaft D by a tongue and groove or other suitable means, so that it can be moved longitudinally upon the shaft D while being carried around by and with the said shaft in its revolution.

In the projecting end of the hub of the gear-wheel E is formed an annular groove to receive the forked end of the lever F, which is pivoted to some suitable support, so that the movement of the said lever F will throw the said gear-wheel E into and out of gear. The teeth of the gear-wheel E mesh into the teeth of the larger gear-wheel G, placed upon the end of the shaft H, with which it is connected by friction-springs I, secured to the said shaft, and resting against the opposite sides of the said gear-wheel. The shaft H revolves in suitable supports attached to the frame J of the clock-works K and L.

The clock-works K are made the same as the works of an ordinary clock, and are provided with an hour-hand, M, and a minute-hand, N, in the usual manner. The hollow post O of the hour-hand M passes through a hole in the bridge P, the ends of which are bent rearward and then outward, and are attached to the frame J. The bridge P is formed with, or to it is rigidly secured, a hollow journal, Q, upon which revolves the hollow post R. The rear end of the hollow post R is formed with, or to it is rigidly attached, a large worm-wheel, S, the teeth of which mesh into the threads of the worm T, attached to the shaft H. With the forward end of the hollow post R is connected a third hand, U. The gearing of the shaft H and speed-hand U is so arranged that the minute-hand N and the speed-hand U will keep together when the shaft A is driven at the proper speed; but should the shaft A run too fast or too slow, the speed-hand U will be in advance of or behind the said minute-hand, and will thus show the variations of speed. The clock-works K are driven by springs or weights in the ordinary manner. The teeth of the large gear-wheel S mesh into the teeth of the small gear-wheel V, the post of which revolves in bearings in the frame J and in a bridge, W, attached to the said frame. With

the small gear-wheel V is rigidly connected a large gear-wheel, X, the teeth of which mesh into the teeth of a small gear-wheel, Y, attached to or formed upon a sleeve, Z, placed loose upon the post that carries the seconds-hand *a* of the clock-work K. To the forward end of the sleeve Z is attached a speed seconds-hand, *b*, the driving-gearing of which is so arranged that when the shaft A is running at ordinary speed the two hands *a b* will move together; but should the said shaft A be running too fast or too slow, the hand *b* will be in advance of or behind the hand *a*.

To the end of the shaft H is attached a miter-wheel, *c*, which meshes into a miter-wheel, *d*, attached to the upper end of the shaft *e* in such a position as to engage with the upper part of the miter-wheel *c*. To the shaft *e* is attached a second miter-wheel, *f*, in such a position as to mesh into the upper part of the miter-wheel *g*, attached to the shaft *h* when the miter-wheels *d e* are in gear. To the shaft *e* is attached a third miter-wheel, *i*, in such a position as to mesh into the lower part of the miter-wheel *g* when the shaft *e* is moved upward to throw the miter-wheels *d f* out of gear with the miter-wheels *c g*, thereby permitting the speed-hands of the clock-work L to be adjusted independently of the hands of the clock-work R. The shaft *e* slides and revolves in bearings attached to the frame J or other suitable support, and to the lower end of the said shaft is attached a hand or crank wheel, *j*, for convenience in adjusting and operating it. The shaft *h* revolves in bearings attached to the frame J, and to the said shaft is attached a worm, *k*, which meshes into the worm-wheel *l*, attached to the post *m*, that carries the minute-hand *n*, the gearing being so made that the hand *n* will make a revolution in an hour.

The clock-works L are provided with a seconds-hand, *o*, the hollow post *p* of which is placed upon the post *m*. The seconds-hand *o* is geared to make a revolution in a minute. The clock-works L are also provided with an hour-hand, *q*, the hollow post *r* of which is placed upon the hollow post *p*, and which is geared to make a revolution in sixty hours, that being the number of hours that machinery usually runs in a week. By the use of the three hands *q n o* the amount of lost speed will be accurately registered. With this construction the clock-works K show whether the machinery is running at the required speed or too fast or too slow, and the clock-works L show how much speed, if any, has been lost during the week, or during so much of the week as had passed when the observation was taken. The two clock-works are covered by a single dial-plate having a large scale of sixty division-marks, similar to a clock-dial, for the hands M N U, a small scale of sixty division-marks for the time seconds-hand *a*, accompanied by a scale of one hundred division-marks for the speed second-hand *b*, and a scale of sixty division-marks for the hands *m o q*. When it is desired to find the loss or gain in speed, I wait until the speed seconds-hand *b* arrives at some given point. Then I grasp the hand-wheel *j* of the shaft *e* and stop the speed mechanism, the friction-springs I allowing the wheel G to revolve on the shaft H until the time seconds-hand *a* reaches the said point. I then release the hand-wheel *j* and allow the two seconds-hands *a b* to move on together. As soon as the time seconds-hand *a* completes a revolution, I again stop the speed mechanism, and can then at my leisure ascertain the loss or gain in seconds or percentage, as desired.

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

1. In a speed-clock, the combination, with the frame J, the hollow post O, carrying the hour-hand M, and the hollow post R, carrying the speed-hand U, and the worm-wheel S, of the bridge P and the hollow journal Q, substantially as herein shown and described, whereby the speed mechanism will be kept from contact with the time mechanism, as set forth.

2. In a speed-clock, the combination, with the worm-wheel, S, of the speed mechanism, and the post of the seconds-hand *a*, of the large gear-wheel X, the small pinions V Y, and the speed seconds-hand *b*, substantially as herein shown and described, whereby the gain or loss in speed will be accurately shown, as set forth.

3. In a speed-clock, the combination, with the speed-clock works L, provided with two hands, revolving, one, *q*, in sixty hours, and the other, *n*, in one hour, of the seconds-hand *o*, revolving once a minute, and its driving mechanism, substantially as herein shown and described, whereby the amount of speed lost in a given time can be accurately shown, as set forth.

4. In a speed-clock, the combination, with the worm-shaft H, driving the speed mechanism of the time-clock works, and the worm-shaft *h*, driving the speed-clock works, of the miter-wheels *c d f g i* and the sliding rotary shaft *e*, substantially as herein shown and described, whereby the speed-hands of the two clock-works K L can be adjusted together, or the hands of the latter independently of those of the former, as set forth.

WILLIAM H. LORD.

Witnesses:
JAMES T. GRAHAM,
EDGAR TATE.