(No Model.)

G. W. TURNER.

Machine for Constructing Railway Time Tables.

No. 241,519. **Patented May 17, 1881.**

FIG. 1

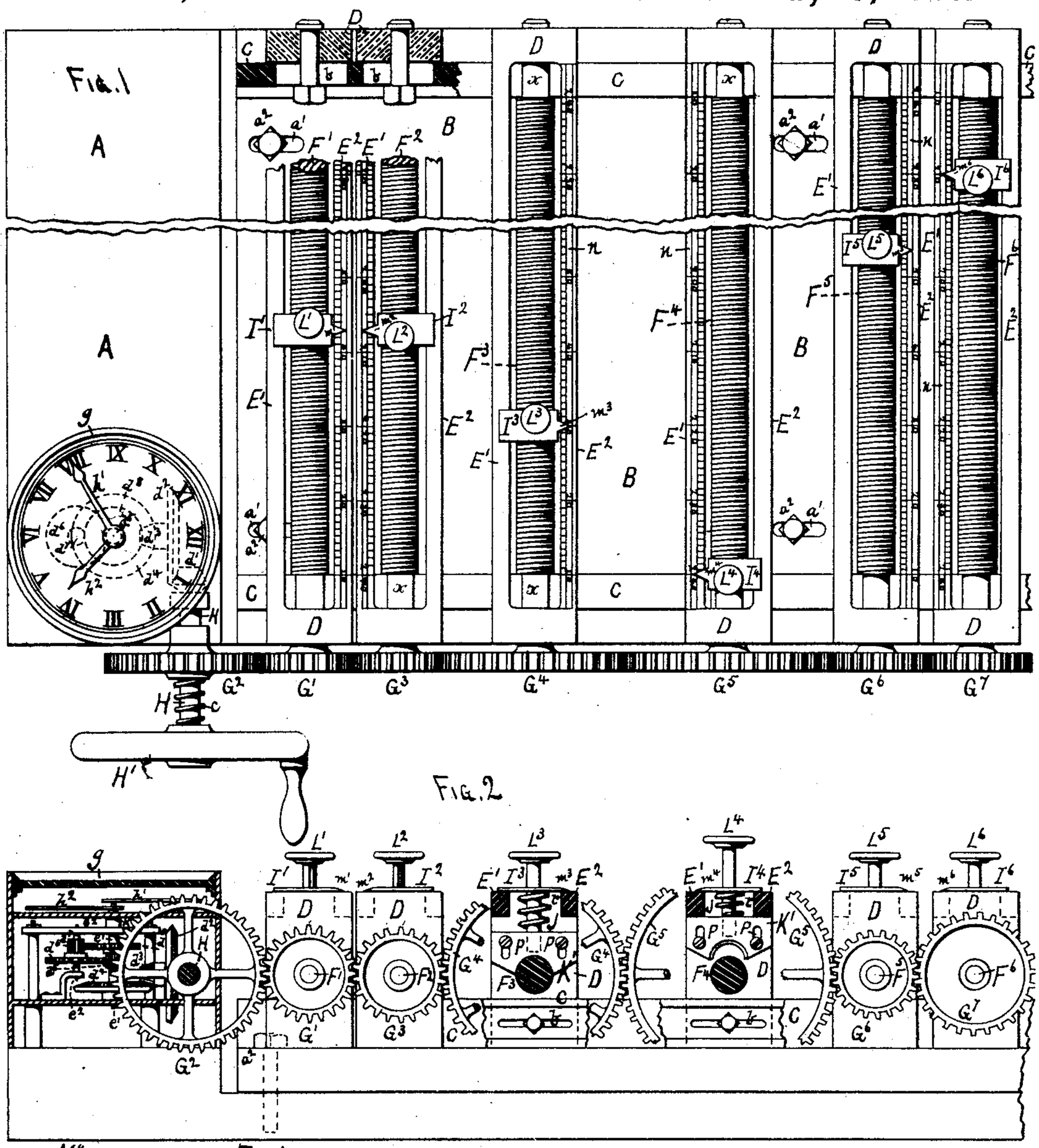


FIG. 2

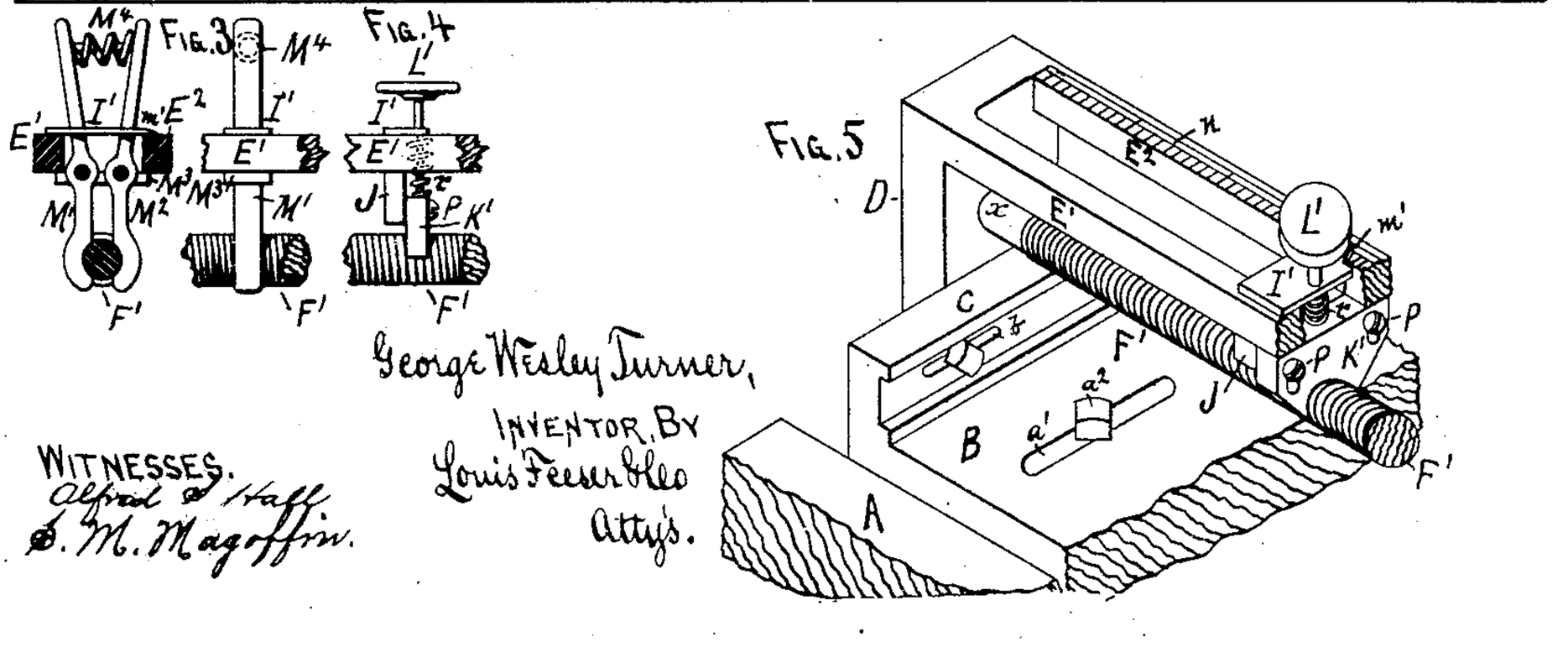


FIG. 3

FIG. 4

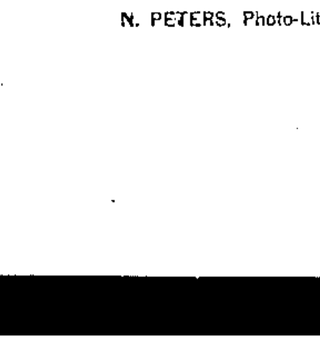
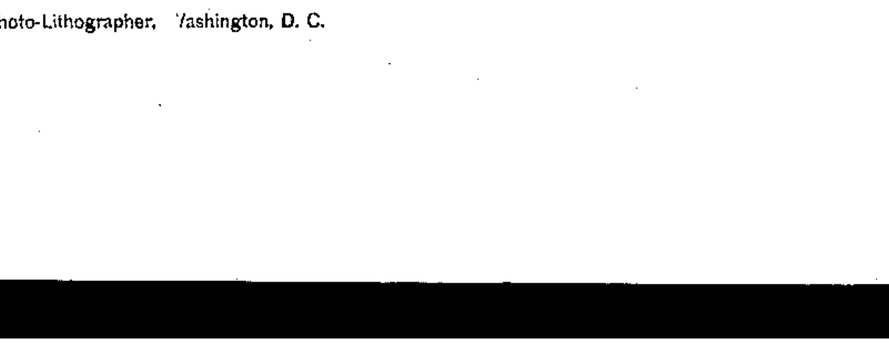


FIG. 5



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UNITED STATES PATENT OFFICE.

GEORGE W. TURNER, OF ST. PAUL, MINNESOTA.

MACHINE FOR CONSTRUCTING RAILWAY TIME-TABLES.

SPECIFICATION forming part of Letters Patent No. 241,519, dated May 17, 1881.

Application filed January 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WESLEY TURNER, of St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Instruments for Indicating and Constructing Time-Cards for Railroads, &c., of which the following is a specification.

This invention relates to instruments for indicating and constructing the time-cards for regulating the running of trains on railroads, &c.; and it consists in a revolving screw carrying a nut provided with a pointer arranged to travel along a graduated strip representing miles and fractions of miles and connecting said revolving screw with a time-indicating mechanism, so that the revolution of the screw will cause the time-indicating mechanism to denote the time, while the pointer on the traveling nut will indicate the distance, the gearing revolving the screw being so arranged that its number of revolutions per minute will correspond to the speed of the train.

The invention further consists in coupling two of these revolving screws together by gears of the same or different sizes, whereby their traveling nuts and pointers will move in opposite directions at the same or different rates of speed to correspond to the different speeds of two trains traveling in opposite directions, and thus determine their meeting-points.

The invention further consists in arranging the traveling nuts so that they may be detached from the revolving screws at pleasure to enable the pointers to be held stationary at any desired point to represent the stoppage of trains at stations, &c.

The invention further consists in arranging these revolving screws in suitable adjustable frames, so that they may be adjusted for gears of different sizes to adapt the instrument to trains of different speeds.

The invention further consists in arranging a series of couples of these screws and traveling pointers to represent all the trains upon the road, as hereinafter set forth.

I accomplish these results by the use of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view with the center broken out. Fig. 2 is an end elevation of the same, partially in section. Figs. 3 and 4 are detached detail views of two methods of arranging the traveling nut and pointer. Fig. 5 is a perspective view of a portion of one end of the revolving screw, graduated strip, and adjustable frame, and one of the traveling nuts, showing their arrangement.

A is a base or plate, upon which another plate, B, is set, and provided with slots a' and set-screws a^2, so that the upper plate may be adjusted horizontally upon the lower plate, as shown.

Secured upon either edge of the upper plate, B, are two strips, C C, provided with slots b at intervals, by which standards D are secured to them, so that the standards may be adjusted back and forth along the strips C.

Connected to the tops of each opposite pair of these standards D are bars E' E^2, as shown, leaving an open space between them, and midway between these bars and the strips C a screw, F′, is journaled in the same standards.

Upon the outer end of one of the journals of this screw is a gear, G′, arranged to mesh into another gear, G^2, mounted upon a shaft, H, the latter being journaled in bearings upon the stationary base A.

The shaft H is provided with a feather or other suitable device, which will permit the gear G^2 to be thrown in and out of gear with the gear G′, and at the same time revolve it, a spring, c, being arranged between the gear G^2 and an operating hand-wheel, H′, to keep the gears in mesh when released.

The opposite end of the shaft H is provided with a bevel-pinion, d', connected by bevel gears and pinions d^2 d^3 d^4 to an upright shaft, e'.

Above the gearing d' d^2 d^3 d^4 a clock-dial, g, is arranged, and the upper end of the shaft e' passes up through this dial and is provided with a hand, h', corresponding to the minute-hand of a clock.

d^5 is a pinion upon the shaft e' below the dial, and arranged to mesh into a gear, d^6, upon another upright shaft, e^2, and d^7 is another pinion upon the same shaft e^2, above the gear d^6, arranged to mesh into another gear, d^8, running loose upon the shaft e' above the pinion d^5. This gear d^8 is provided with a tumbler, k, running up through the dial g, and carrying a hand, h^2, corresponding to the hour-hand of a

clock, the shafts e' e^2 and gears and pinions d^5 d^6 d^7 d^8, hands h' h^2, and dial g being arranged precisely as the minute and hour mechanism of a clock, while the pinions d' d^2 d^3 d^4 will be so arranged that twelve revolutions of the shaft H will move the minute-hand h' once around the dial, and the hour-hand one-twelfth around the dial.

I′ is a small plate setting across the tops of the bars E′ E², and provided with a point, m', in the center of one end, adapted to rest over a series of graduations, n, divided into sections of ten each, as shown, while a block, J, beneath the bars E′ E², and secured to the plate I′, forms the plate and block into a slide, so that the pointer m' may be moved along between the parallel bars E′ E².

K′ is a small block secured to the block J by slots and set-screws p, so that it may be raised and lowered by a spring-handle, L′, and having a concave under surface, in which threads corresponding to those on the screw F′ are cut, so that when held down upon the screw by the spring r and the screw revolved the blocks J K′ and plate I′ will be moved along the bars E′ E², while by raising up the threaded block K′ by the handle L′ it will be detached from the screw and remain stationary.

Fig. 3 represents a variation in the manner of connecting the screw F′ and plate I′, consisting of two arms, M′ M², pivoted at their centers to a block, M³, similar to the block K′, and having their lower ends provided with threads, and adapted to be held upon each side of the screw by a spring, M⁴, so that when the screw is revolved the arms M′ M² and plate I′ will be carried along in a similar manner to the other arrangement.

F² is another screw, arranged similar to the screw F′, so that when connected to the screw F′ by a gear, G³, its plate I² and pointer m^2 will travel in the opposite direction from the plate I′ and pointer m'.

F³, F⁴, F⁵, and F⁶ are four other screws, arranged in couples similar to F′ F², and connected by a train of gears, G⁴ G⁵ G⁶ G⁷, and supplied with traveling plate and pointers I³ m^3 I⁴ m^4 I⁵ m^5 I⁶ m^6 and their nuts and blocks, the screws F³ F⁴ traveling in opposite directions and the screws F⁵ F⁶ traveling in opposite directions to each other.

In making up time tables or cards for governing the running of trains on railroads many different circumstances have to be considered, viz., the length of the road, number of stations to determine the number of stops to be made, the location of water and wood stations, places of taking meals for passengers, meeting-points of trains, points of passing freight-trains by passenger-trains, crossing of other tracks, &c., so that the making up of a time-card for a large railroad on which a large number of trains are running at the same time is a work of no small importance. But by my apparatus this work is greatly simplified, as will be seen by the following statement of the method of operating it.

It is necessary, first, to determine the number of trains and their respective speeds, which will be governed by the size and importance of the road and the nature of the road-bed, &c.; but, for the purpose of an illustration, I have shown an arrangement of trains (represented by the plates I′ I² I³ I⁴ I⁵ I⁶ and pointers m' m^2 m^3 m^4 m^5 m^6) traveling at the rate of twenty-four, twenty-six, eleven, ten, twenty six, and twenty-one miles per hour, the sizes of the gears G′ G² G³ G⁴ G⁵ G⁶ G⁷, as before described, governing the speed of the plates and pointers.

Each graduation on the bars E′ E² represents one mile, and the sizes of the gears G′ G², &c., and gears and pinions d' d^2 d^3 d^4, as before described, will be of such a size as to cause the pointers m' m^2 m^3 m^4 m^5 m^6 to move over the distance of twenty-four, twenty-six, eleven, ten, twenty-six, and twenty-one of the graduations on the bars E′ E², respectively, at each hour's movement of the hour-hand h^2 of the time-indicating mechanism.

Having determined at what time the first or twenty-four-mile train I′ m' is to start, the gear G² is disconnected from the gear G′, which will allow the time-indicating mechanism to be operated by the hand-wheel H′ independent of the screws, &c. The shaft H is then revolved until the hands h' h^2 indicate the time for the train to start. The handle L′ is then raised up to release the block K′ from the screw F′ and the plate I′ moved down until its pointer m' is opposite the first graduation on the bar E² corresponding to the first mile or end of the road. The gears G² and G′ are then readjusted in contact with each other and the hand-wheel H′ revolved, which will cause the pointer m' to travel along the graduations, while the hands h' h^2 will show the time occupied in so doing. The operator watches the progress of the pointer m', and when it comes opposite the graduation corresponding to the stations or other points at which it is desired to stop the train he raises up the handle L′ and releases the pointer from contact with the screw until the hands h' h^2 have traveled around the dial g far enough to represent the time it is desired to have the train stop. The pointer is then released and allowed to be moved on again.

By this means a perfect imitation of a moving train is produced, which the operator can vary to any desired extent by changing the sizes of the gears G′ G².

Should the two trains represented by the first two pointers, m' m^2, start at the same time from opposite ends of the road, the second pointer will be placed opposite the graduation on the second bar, E′, connected to the second screw, F², corresponding to the number of miles the road is in length, at the same time that the first pointer is placed in position, so that both are moved at the same time in opposite directions, the operator watching both for stopping-places, &c. When the two pointers are opposite to each other the operator knows that that is their meeting-point. In case, however, both trains do not start at the same time the earliest train is arranged as before, and when the

hands h' h^2 indicate the time for the second train to start the pointer m^2 is set at the graduation corresponding to the opposite end of the road, or at any other point on the line it is desired to start the train, and the motion continued, the point where the two pointers m' m^2 meet being their passing-place.

With passenger-trains it frequently occurs that, by reason of heavier grades, &c., or starting at a time so that more meal or other stoppages occur going one way than the other, better time can be made in one direction than the other. Hence I have shown the gears G′ G³ of slightly different speeds (twenty-four and twenty-six miles per hour) to allow for this difference, it being evident that this degree of difference may be varied to any desired extent by altering the sizes of the gears G′ G³.

The ends of the screws F are made without threads, as shown at *x*, so that when the blocks K′ reach the end of the threads they will run harmlessly upon these smooth portions and not cramp against the end bearings.

By setting the pointers m^3 m^4 m^5 m^6 on the other screws, F³ F⁴ F⁵ F⁶, representing other trains on the same road, at the proper points at the proper times, as indicated by the hands h' h^2 and graduations *n*, any desired number of trains and variation of time may be illustrated, so that by watching the progress of the pointers and noting down their places and "times" a perfect time-card may be constructed by any person of ordinary intelligence with very little practice.

What I claim as new is—

1. In a device for constructing time-tables for railroads, &c., the combination of a time-indicating mechanism, a graduated scale representing miles and fractions thereof, a pointer and means for moving the same along said graduated scale and for simultaneously moving the time-indicating mechanism, the means for moving the pointer governing its progress so as to cause it to indicate along the scale the distance traveled by the train at a given speed, whereby, the speed of the train being determined, the pointer is made to indicate the distance traveled and the time-indicating mechanism the time occupied in traveling the distance.

2. In a device for constructing time-tables for railroads, &c., the combination of a time-indicating mechanism, a graduated scale representing miles and fractions thereof, a revolving screw, a pointer moved by said screw along said scale, and gears for operating said pointer and time-indicating mechanism in unison, the said gears being adapted to revolve said screw at a rate that will cause the pointer to indicate along the scale the distance traveled by a train at a given speed, and also to cause the time-indicating mechanism to denote the time occupied in traveling the distance.

3. In a device for constructing time-tables for railroads, &c., having a pointer moved along a graduated scale, so as to indicate the distance traveled, and a time-indicator to denote the time occupied in traveling the distance, the distance-pointer adapted to be disconnected from the means employed for moving the same along the scale and to be again connected therewith, whereby the time mechanism will be caused to indicate the time the train rests at a station by disconnecting the pointer when the train is to stop and connecting it again when the train is to start without interfering with the operation of the other parts, substantially as set forth.

4. The combination and arrangement, with a time-indicating mechanism, of a shaft, H, gears G′ G², screw F′, pointer I′ *m*′, adapted to be connected to or disconnected from the said screw, and the stationary graduated bars E′ E², substantially as set forth.

5. The combination, with the revolving screw F′ and graduated scale E′ E², and a time-indicating mechanism adapted to be moved in unison with the screw, of a pointer, I′ *m*′, adapted to be moved along the graduated scale by the revolution of the screw, and to be disconnected therefrom and again connected therewith, substantially as and for the purpose set forth.

6. The combination and arrangement of the screws F′ F², bars E′ E², standards D, all connected adjustably to stationary ribs C, whereby the gears G² G³ may be varied in size, substantially as set forth.

7. The combination and arrangement of the base A, adjustable bed B, carrying the slotted ribs C C, and having the standards D attached adjustably thereto, and the screws F′ F², and graduated bars E′ E², substantially as set forth.

8. Two or more pairs of the screws F′ F² and F³ F⁴, coupled to each other to indicate the movements of two or more trains of cars on the same road, substantially as set forth.

9. The combination of a time-indicating mechanism, a graduated scale, a pointer and screw for moving the same along the scale, and gears G′ G², the gear G² being adapted to be thrown out of gear with G′, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE WESLEY TURNER.

Witnesses:

C. N. WOODWARD,

LOUIS FEESER.