(No Model.)

W. W. HALLETT.

MACHINE FOR CALCULATING AND ILLUSTRATING LONGITUDE AND TIME.

No. 480,367. Patented Aug. 9, 1892.

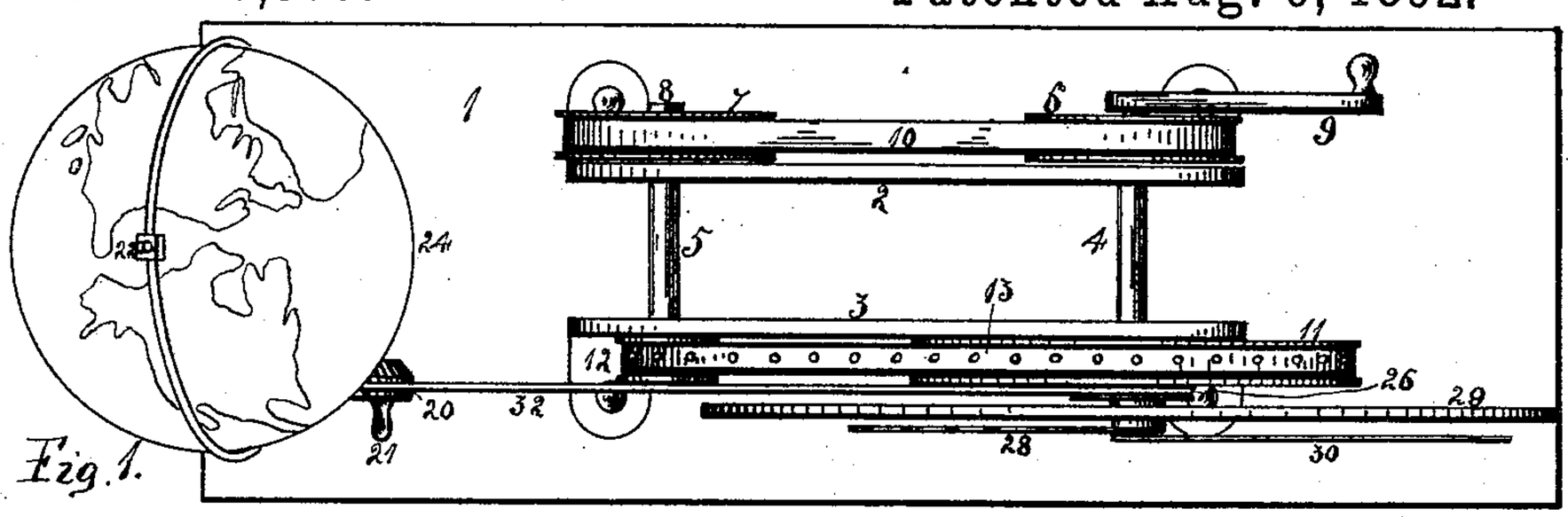


Fig. 1.

Fig. 3.

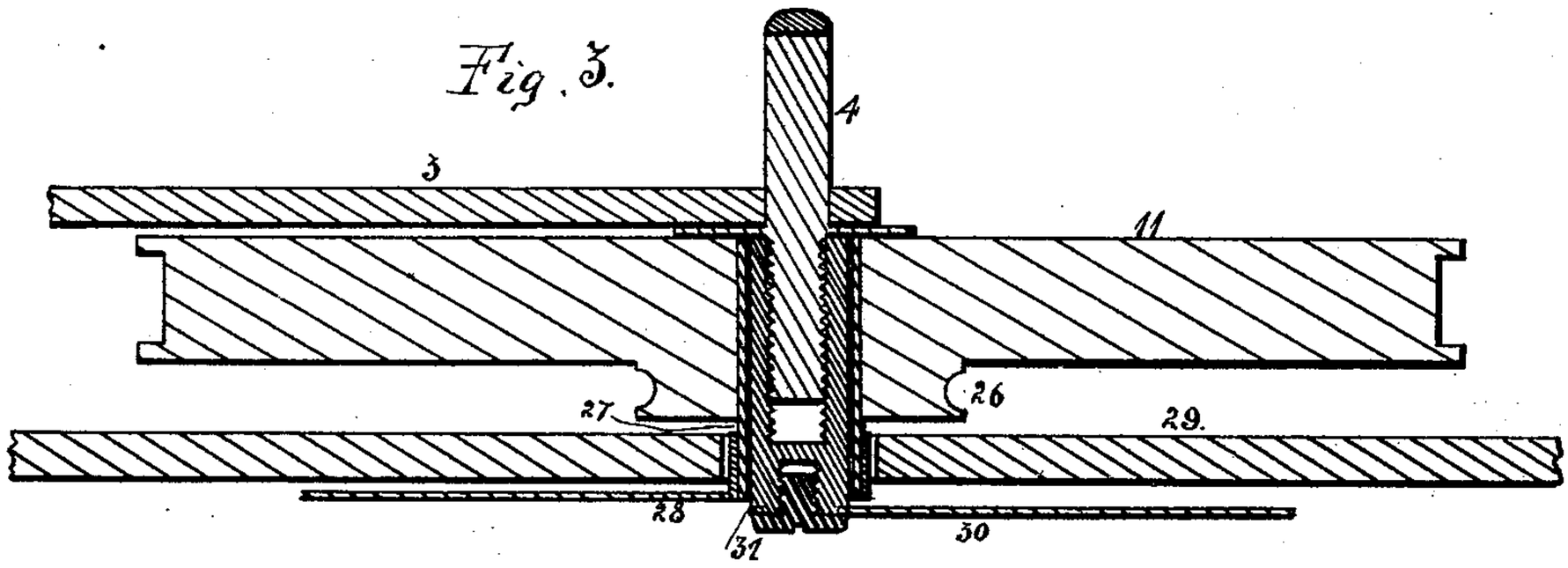
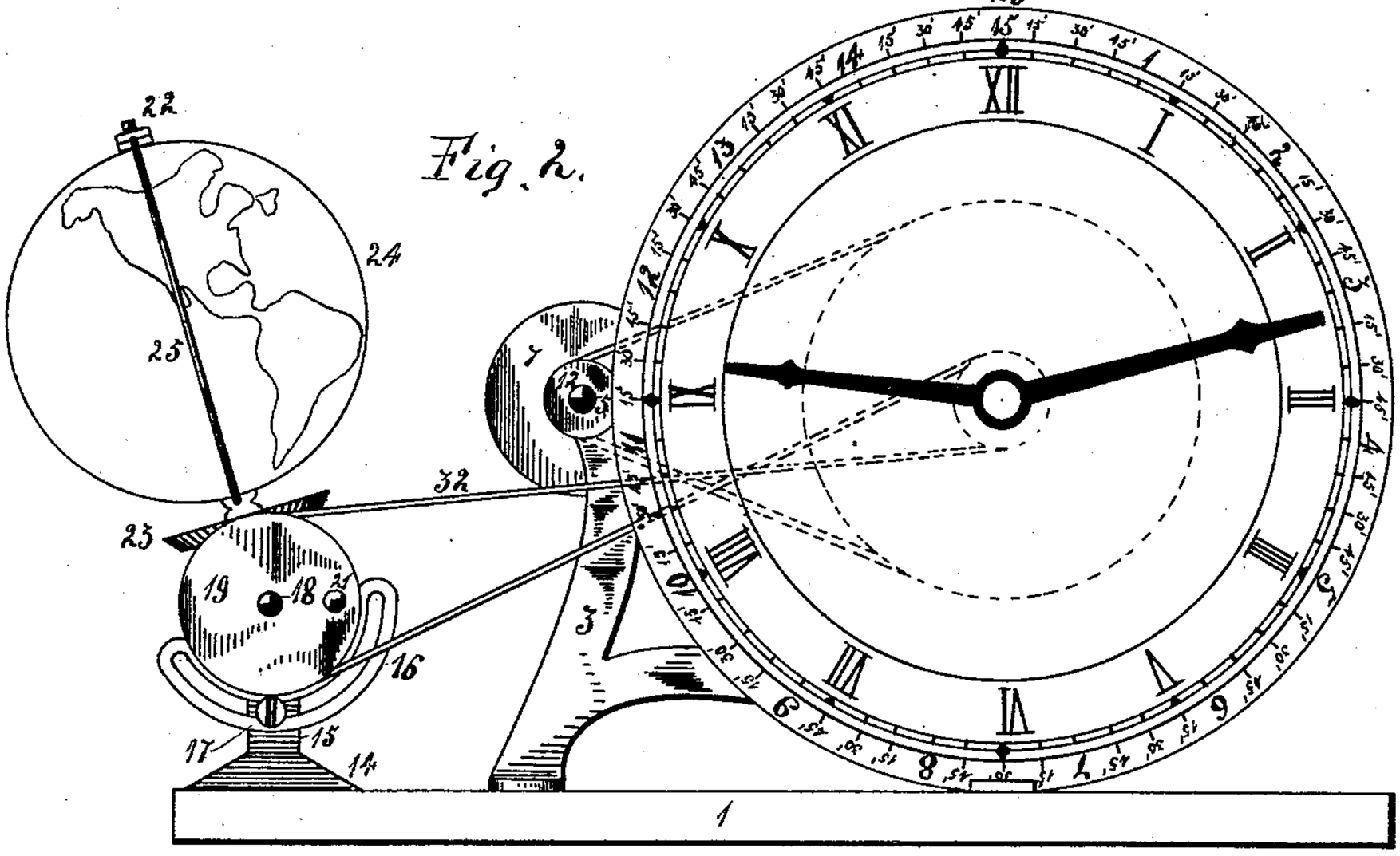


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM W. HALLETT, OF LEE, ILLINOIS.

MACHINE FOR CALCULATING AND ILLUSTRATING LONGITUDE AND TIME.

SPECIFICATION forming part of Letters Patent No. 480,367, dated August 9, 1892.

Application filed September 1, 1891. Serial No. 404,470. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. HALLETT, a citizen of the United States, residing at Lee, in the county of Lee and State of Illinois, have invented certain new and useful Improvements in Machines for Calculating and Illustrating Longitude and Time, of which the following is a specification.

The objects of this invention are, first, to provide a simple and accurate clockwork to teach the relative time of different places on the earth's surface and the differences of time between them; second, to teach longitude and time in a practical and perspicuous manner and in such a way that its principles will be fully understood and impressed upon the learner's mind.

In the accompanying drawings, Figure 1 is a plan view of my machine. Fig. 2 is a front elevation of the same. Fig. 3 is an enlarged horizontal section through the forward end of shaft 4, showing the manner of attaching the hands.

In the construction of my calculating-machine I employ the base 1, to which I secure the two side frames 2 and 3, and in the upper part at opposite ends of this frame I journal the shafts 4 and 5, to which are secured the pulleys 6 and 7, respectively. That portion of the shaft extending beyond the pulleys is threaded to receive a nut 8 on shaft 5 and a crank 9 on shaft 4, which hold the pulleys in place, and a belt 10 connects the two pulleys. On the forward ends of these shafts outside the frame, I mount the two pulleys 11 and 12. The pulley 11, being considerably larger than the opposite one, turns freely on shaft 4, and the pulley 12, provided with points to engage corresponding punctures in the belt 13, which extends over them, is rigidly affixed to shaft 5.

On the base 1 at the end of the frame 2 and 3 I fasten the standard 14, which extends upward in the flattened bar 15. The sector 16 is pivotally connected with the flattened bar 15 and is capable of being locked in any position by the screw 17. The outer end of the pin 18 is of less diameter than its body, and on this shank I place the miter-gear 19, in the outer rim of which is formed the groove 20.

On the outer face of the gear 19 is the handle 21. On the upper part of the sector 16, formed integral therewith and extending in a line with its length, is the spindle 22.

I encircle my globe from pole to pole with the wire ring 25, which is fastened to the upper end of the spindle 22 between two jam-nuts, and therefore is at rest with respect to the globe, which revolves within the ring.

On the forward face of the large loose pulley 11 is fastened the grooved pulley 26, and over a sleeve 27, extending through their centers, I slip the hour-hand 28, after first setting the dial 29 in its position.

The minute-hand 30 is secured ridigly to the shaft 4 by means of the internally-threaded sleeve 31, screwing over the threaded shank end of the shaft 4.

The dial is spaced and marked with hours and minutes in the same manner as in an ordinary clock, and outside these marks the circle is divided into fifteen equal spaces to represent the fifteen degrees of longitude in each hour of time, and each of the spaces is divided into four equal parts, each space representing fifteen minutes of time.

The fifteen great divisions of the circle on the dial I mark "1°," "2°," "3°," and so on to and including "15°." The dial is therefore marked off not only into hours and minutes of time, but into degrees and minutes of longitude.

A belt 32 runs in the groove 20 on the face of the gear 19 and over the pulley 26, imparting motion from the drive-shaft to the globe through the miter-gears 19 and 23.

The operation of my machine is as follows: Wishing to find the time between any two given points on the earth's surface, I turn the globe by means of the crank 9 into such a position that one of the given points is under the wire ring 25. Then after noting the time indicated by the hands on the clock-dial I continue the motion until the second given point is brought under the wire ring, and the hours and minutes the hands have passed over is the difference in time between the two points. To illustrate: Required the difference in time between London and Chicago. Turning the crank 9 until "London" is brought under the wire ring I set the hands at "12" (or simply note their position) and continue the motion of the globe until "Chicago" lies under the ring. Upon consulting the dial I find the

hands have moved through a space representing six hours, which is the approximate difference of time between the given points. The minute-hand, being attached direct to the shaft bearing the crank, revolves with it; but the hour-hand deriving its motion from the shaft 4 by belt over the pulleys 6 and 7 to the shaft 5 and from thence to the pulley 11 from the sprocket-wheel 12 the relative diameters of the wheels have reduced the speed of the hour-hand to one-twelfth that of the minute-hand. The relation between the diameters of the pulleys 26 and 19 is such that the globe is made to revolve once on its axis when the hour-hand has traveled twice around its circuit, describing a time of twenty-four hours. To calculate the difference of longitude between two given places, I bring one of them under the wire ring, setting the hands at "12," and turn the crank in the direction to most quickly bring the second given place under the wire, when each complete circuit of the minute-hand will represent fifteen degrees of longitude, the minutes being computed by the division of each degree. The adjustment of the angle of inclination of the axis of the globe, which I accomplish by the circular slot in the sector 16, is to illustrate some of the changes that would ensue were the axis of the earth inclined more or less than at present. In these illustrations the clock-dial is reversed, its opposite side being colored a bright hue to more clearly represent the sun.

I claim as my invention—

1. An instrument for calculating and illustrating longitude and time, comprising a dial marked with divisions of time and divisions of longitude, a globe capable of rotation, hands for the dial, and means for rotating the globe and moving the hands at fixed relative speeds.

2. An instrument for calculating and illustrating longitude and time, comprising a dial marked with divisions of time and divisions of longitude, a globe capable of rotation, two hands for the dial, and a crank for turning the hands and rotating the globe at fixed relative speeds.

3. An instrument for calculating and illustrating longitude and time, comprising a dial marked with divisions of time and divisions of longitude, a globe capable of rotation and of an adjustment of the inclination of its axis, hands for the dial, and means for rotating the globe and moving the hands at fixed relative speeds.

4. An instrument for calculating and illustrating longitude and time, comprising a frame, two shafts journaled therein, a crank and a pulley loosely affixed to and a pulley mounted on one shaft, two pulleys on the other shaft, belts for the pulleys, a dial marked with divisions of time and divisions of longitude, a hand for the dial, affixed to the crank-bearing shaft, and a hand affixed to the loose pulley.

5. An instrument for calculating and illustrating longitude and time, comprising a frame, two shafts journaled therein, a crank and a pulley affixed to one of the shafts and two pulleys secured together loosely mounted thereon, two pulleys rigidly secured to the other shaft, belts for the pulleys, a dial marked with divisions of time and divisions of longitude, a hand secured to the crank-bearing shaft, a hand affixed to the loose pulleys, a globe capable of rotation, a pulley for rotating the globe, and a belt from one loose pulley to the pulley of the globe.

6. An instrument for calculating and illustrating longitude and time, comprising a frame, two shafts journaled therein, a crank and a pulley affixed to one of the shafts and two loose pulleys secured together mounted thereon, two pulleys rigidly secured to the other shaft, belts for the pulleys, a dial marked with hours and minutes of time and degrees and minutes of longitude, a hand secured to the crank-bearing shaft, a hand affixed to the loose pulleys, a globe capable of rotation and an adjustment of the inclination of its axis, a stationary ring about the globe, a miter-gear affixed to the globe, a gear meshing therewith, a pulley affixed to the gear, and a belt from the loose pulley for driving the gear.

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