Sept. 19, 1933. E. HEIMANN 1,927,235

UNIVERSAL TIME CLOCK

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Fig. 1.

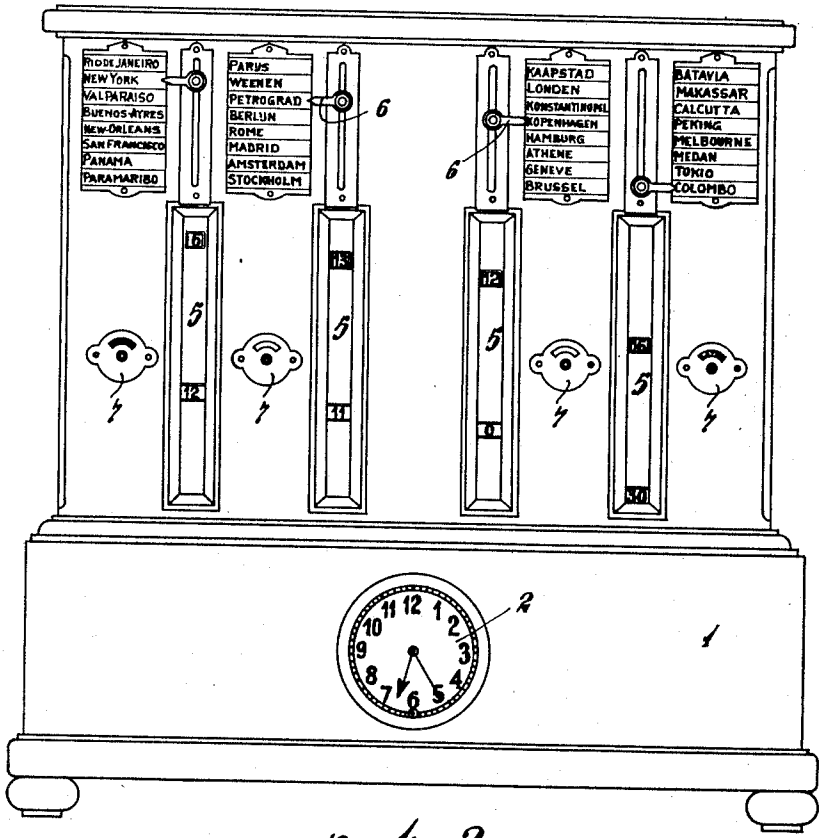
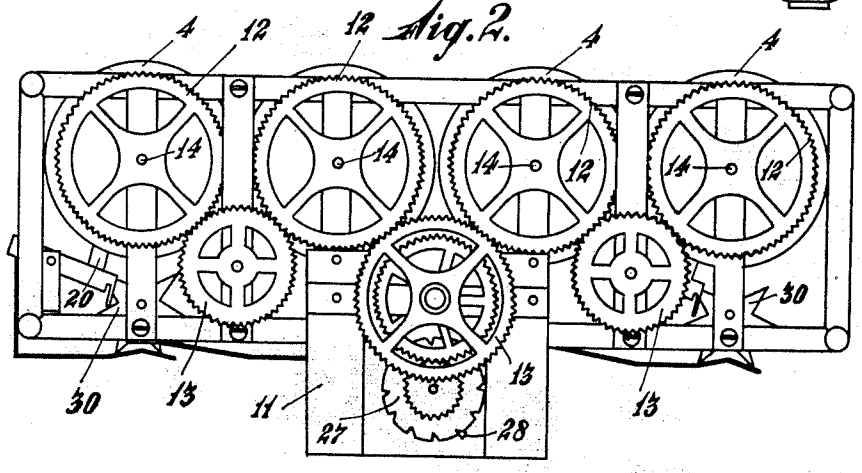


Fig. 2.



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Fig. 3.

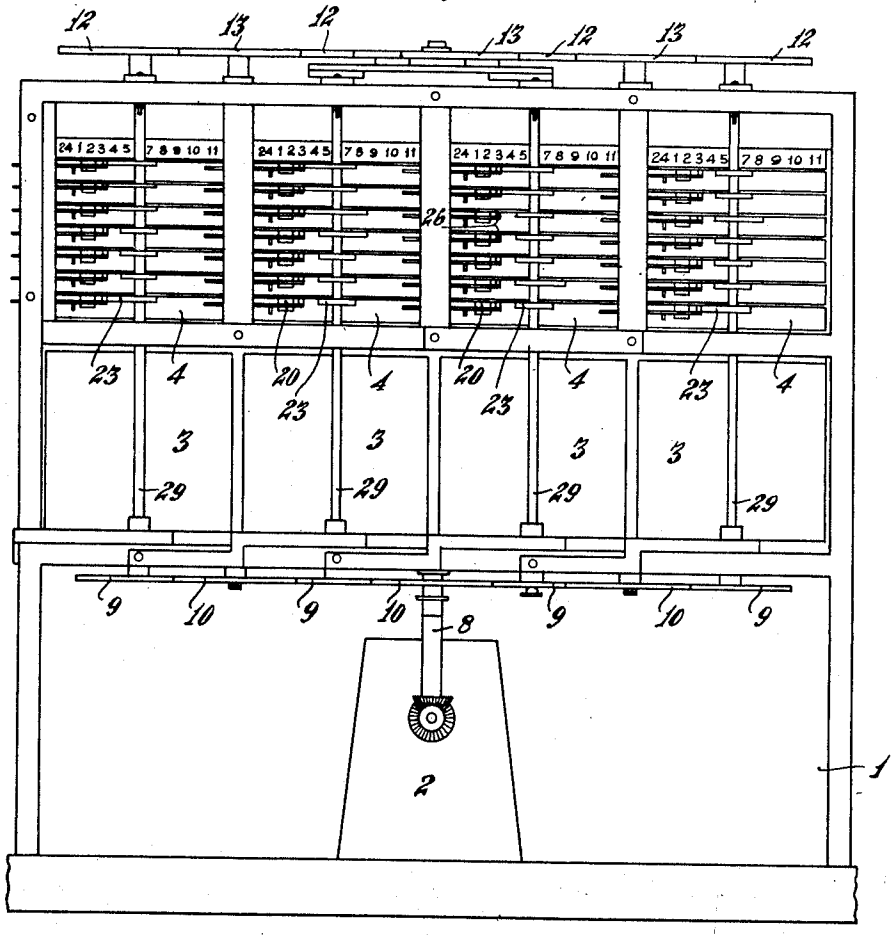
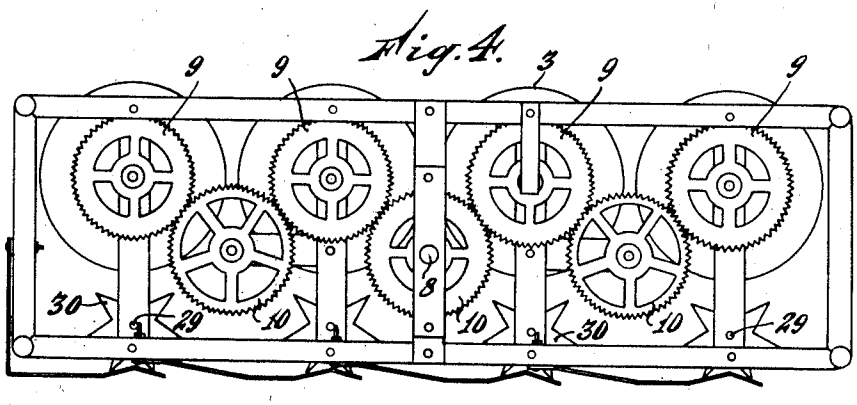


Fig. 4.



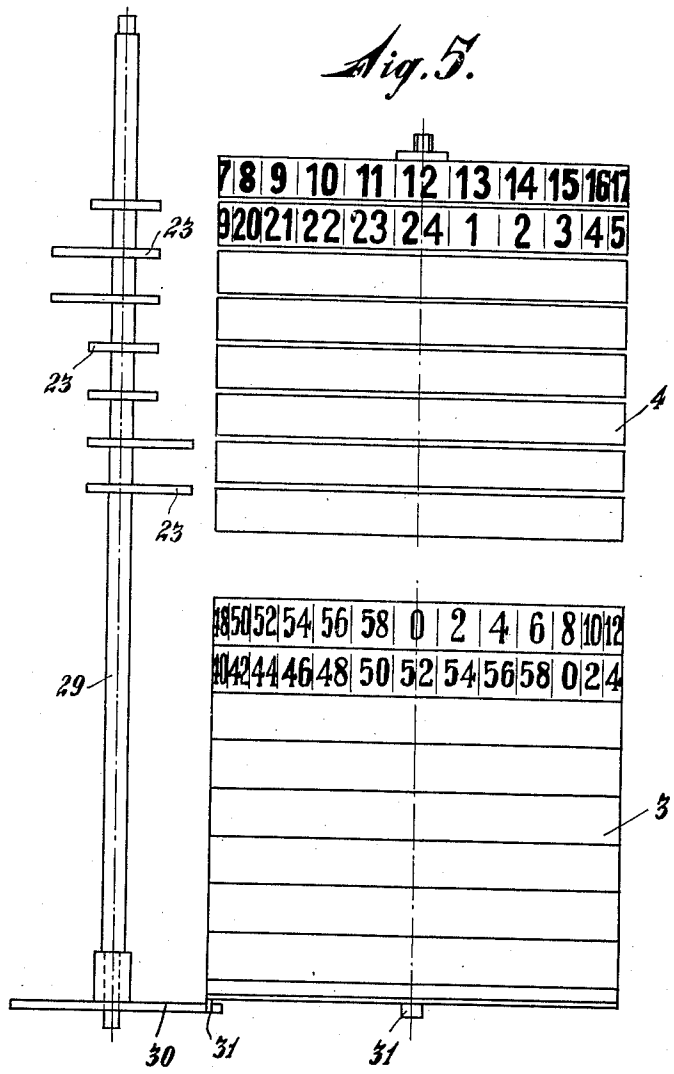
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Fig. 5.



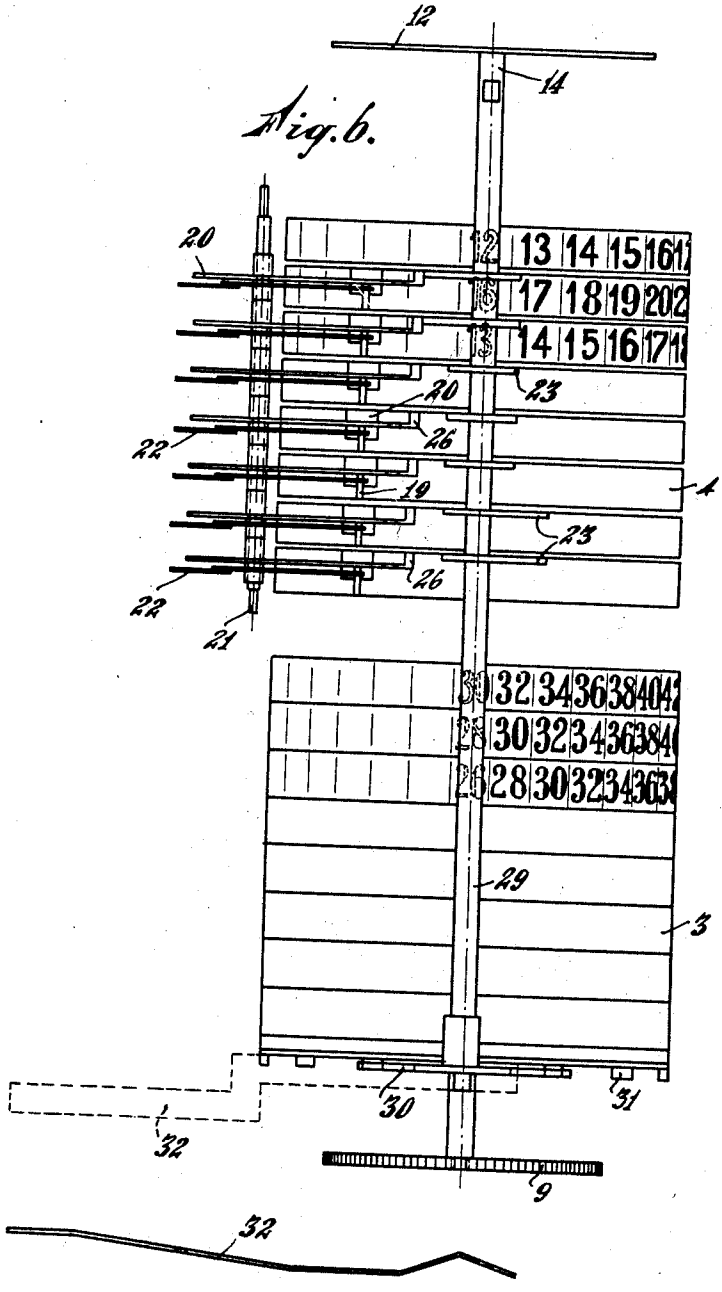
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Fig. 6.



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Fig. 7.

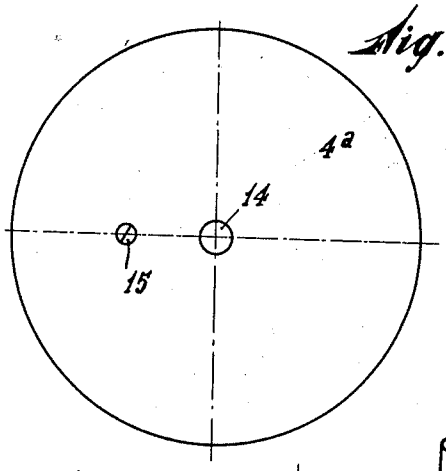


Fig. 8.

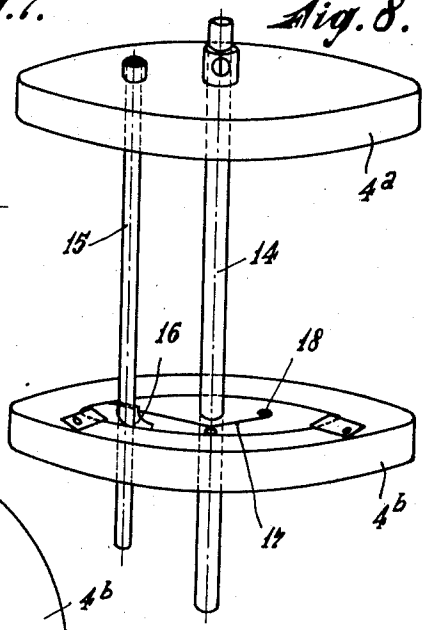


Fig. 9.

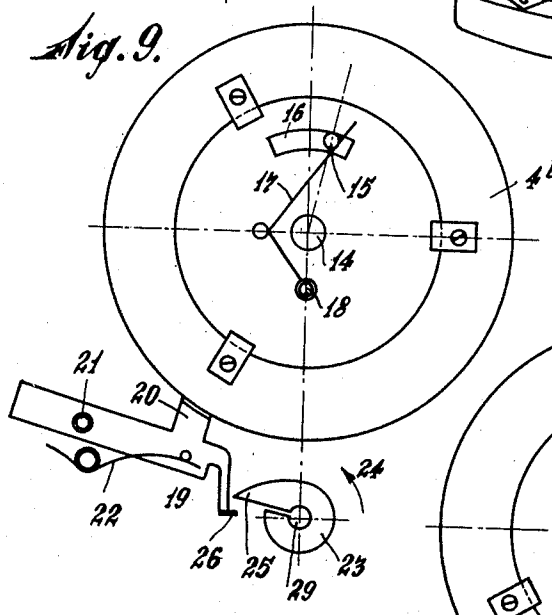
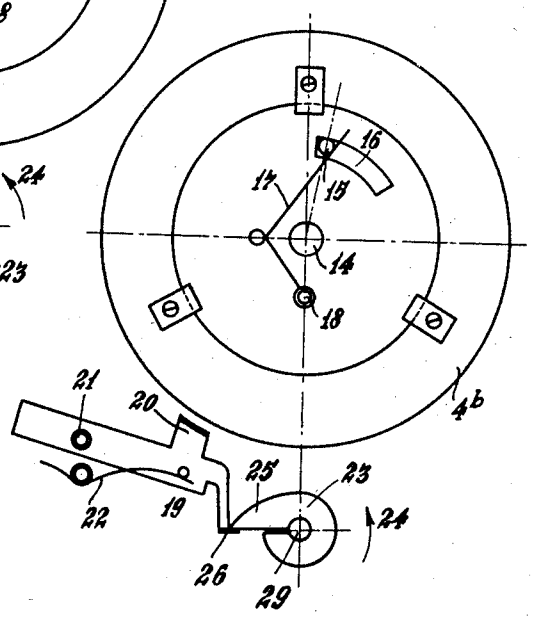


Fig. 10.



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UNITED STATES PATENT OFFICE

1,927,235

UNIVERSAL TIME CLOCK

Emil Heimann, Djokja, Java, Dutch East Indies

Application August 30, 1932, Serial No. 631,094, and in the Netherlands September 16, 1931

7 Claims. (Cl. 58—43)

The invention relates to a clock-work indicating simultaneously the time of different places on earth by means of a rotating clock-driven drum, on which the different times are indicated in circumferential divisions by a common indicator.

Clock-works of this type are known. The time-division of each place on earth is therein indicated on one drum-circumference and the different places on earth are indicated on the drum one above the other. Without having recourse to extraordinary dimensions of the drum-diameter there can be no question of any accuracy of the indication in minutes, and places differing but slightly in time practically will not indicate this time-difference.

The invention consists in this that the drum indicates the minutes only and that below the same indicator a series of separately driven discs for the hours is arranged, each being coupled to its corresponding minute division on the drum in such a manner that the corresponding hour disc rotates by one hour distance as soon as the corresponding minute division has arrived at zero.

The novel clock-work thus possesses separate scales of graduations for the hours and the minutes, resulting in a much greater accuracy of indication. At the same time places can now be entered differing but slightly in time, for instance a few minutes.

The invention will be more fully understood with reference to the accompanying drawings illustrating it by way of example.

Fig. 1 is a front-elevation of the complete clock mechanism.

Fig. 2 is a plan-view of the mechanism.

Fig. 3 is a rear-elevation thereof.

Fig. 4 is a bottom-view thereof.

Fig. 5 is a side-elevation of one of the main parts.

Fig. 6 is a rear-elevation of said main part.

Figs. 7–10 show details.

The clock-work comprises a casing 1, in which a clock 2 is mounted indicating the time of the standing place. Besides this clock the casing contains four units, each indicating simultaneously the time in eight different stations on earth.

Each unit comprises mainly a vertical cylindrical drum indicating the minutes in eight circumferential paths, which when read along a generatrix prevail simultaneously in the eight different stations of the series, and eight cylindrical discs 4 indicating the hours in those stations. The shaft of the drum is arranged in alignment with the shafts of the discs.

The casing of the clock-work comprises for each unit a slide 5 having two openings for the corresponding hour and minute indication. Each slide has an extension with indicator 6. By moving the slide 5 up and down at the left of the drawings, Fig. 1, one will see that e. g. in New York it is 12 past 6 o'clock when in Djokja it is 35 past 6 o'clock and what time it is simultaneously in Rio de Janeiro, Valparaiso, etc. The second series indicates e. g. that in Petrograd at that moment it is 11 past 13 o'clock, etc.

In order to prevent miscalculation of the date adjustable discs 7 are arranged indicating whether the times in question are earlier or later than the time at the standing station.

The four minute drums 3 mounted adjacent each other are driven by the clock 2 in such a manner that each drum makes one revolution per hour. The transmission is effected by means of the vertical shaft 8, gear-wheels 9 and transmission-gears 10 (Fig. 4).

The four series of hour discs 4 mounted adjacent each other are driven in a manner to be described later on by a separate drive 11 also by means of gear-wheels 12 and transmission-gears 13 (Fig. 2).

The hour-discs have a 24-hour-division and therefore each carry at the circumference the numerals 1–24.

The uppermost disc 4*a* of each series of eight hour discs is secured to a shaft 14 adapted to be driven by the drive 11; the seven further discs 4*b* are freely rotatably mounted upon the shaft 14. They are held in position axially by spacing-rings (not shown). In the disc 4*a* a long pin 15 is secured serving as a coupling pin between the various discs. Said pin 15 extends through a slot 16 in each of the discs 4*b* (Figs. 7–10). With respect to one another the discs 4 can rotate only by an angle which is determined by the length of the slot 16 and corresponds to $\frac{1}{24}$ part of the disc circumference or one hour-distance.

In circumferential direction the discs 4*b* are coupled to the pin 15 by means of a spring 17 which in the manner indicated in Figs. 8, 9 and 10 is secured at one end 18 to the disc 4*b* and at the other end bears against the pin 15.

Moreover each disc 4*b* is in normal position held against rotation by means of a braking device 19. This braking device comprises a brake-shoe 20 having its fulcrum at 21 and standing under the pressure of a spring 22 and a cam disc 23, by means of which the brake may be released.

Now, if the uppermost hour disc 4*a* is advanced by one hour distance by the drive, the pin 15 moves along therewith and tensions the springs 17 of the underlying discs 4*b*. Now, if in a manner to be described later on the brake 20 is released then the corresponding disc rotates as far as is permitted by the slot 16, that is to say by one hour distance. Fig. 9 shows a disc 4*b* when the spring 17 is in tensioned condition; Fig. 10 shows the same disc at the moment that the brake is released and the disc advanced by one hour distance.

The releasing of the brake 20 is effected for but a short moment. The cams 23 namely are rotated by the minute drum in the direction of the arrow 24. At any time when the nose 25 slides along the hook shaped end 26 of the brake-shoe the brake shoe is lifted. At the following moment, however, the spring 22 again exerts pressure on the brake shoe. During a following movement of the uppermost disc 4*a* the pin 15 is allowed to tension the spring 17 again.

The adjustment of the uppermost hour disc 4*a* by the drive is effected in a manner corresponding to that of the striking mechanism of an ordinary clock. The drive comprises a ratchet wheel 27 with twelve projections and a pawl 28 locking that ratchet wheel and thereby the drive. The said pawl is once per hour lifted out of engagement with the ratchet wheel by a pin on one of the minute drums.

The drive thereby starts rotating which rotation lasts until the pawl snaps in front of a following projection; the uppermost hour disc 4*a* is then rotated exactly by $\frac{1}{12}$ of the circumference, that is by one hour distance.

The coupling between the minute drum 3 and the upper hour-discs is effected in the following manner. Adjacent each unit a vertical shaft 29 is mounted carrying at the bottom the star 30 and to which opposite the hour discs are secured the cam discs 23. The star 30 is rotated by the minute drum by means of pins 31 at the bottom of said drum. A spring 32 ensures the correct position of the shaft 29 after each adjustment. The cam discs are mounted upon the shaft 29 in such a manner that at any time when on the minute drum the zero of one of its divisions has passed the indicator, the brake 20 of the corresponding hour disc is lifted so that the corresponding hour disc is also rotated by one hour distance.

The operation as a whole may be recapitulated as follows:

The corresponding minute of the uppermost hour disc 4*a* has arrived at zero; the drive 11 is actuated by the lifting out of the pawl 28; the uppermost hour disc 4*a* advances by one hour distance. Due to this rotation of the uppermost hour disc the springs 17 of the hour discs 4*b* are tensioned.

Now, if the corresponding minute of a second hour disc 4*b* arrives at zero then the corresponding cam disc 23 releases the brake 20 of said disc and the said hour disc jumps by one hour distance after the uppermost one. This play is repeated until all of the seven discs have had their turn, whereupon the disc 4*a* is again rotated by one hour distance by the drive.

I claim:

1. Clockwork for simultaneously indicating the time at various points on the earth, comprising a clock driven rotatable drum, an indicator for indicating the different times on the drum in circumferential division, the said drum indicating only the minutes, a series of separately driven discs disposed below said indicator, each disc corresponding to a unique minute division on said drum, and means coupling said discs with the corresponding minute divisions in such manner that the corresponding disc is advanced a predetermined angular distance corresponding to a one hour interval as soon as the corresponding minute division has reached a predetermined datum.

2. Clockwork for simultaneously indicating the time at various points on the earth, comprising a clock driven rotatable drum, an indicator for indicating the different times on the drum in circumferential division, the said drum indicating only the minutes, a series of separately driven discs disposed below said indicator, each disc corresponding to a unique minute division on said drum, and means coupling said discs with the corresponding minute divisions in such manner that the corresponding disc is advanced a predetermined angular distance corresponding to a one hour interval as soon as the corresponding minute division has reached a predetermined datum, a shaft, a separate drive periodically driving said shaft, that one of the discs which is remote from the drum being fixed on said shaft, the other discs being mounted for free rotation thereabout, the freely rotatable discs having slots therein, a coupling pin fixed in the said fixed disc and extending through said slots and coupling the freely rotatable discs to the fixed disc, brakes cooperating with each of said discs and adapted to be released by said drum, and spring means on each of said freely rotatable discs for advancing the corresponding disc the length of the slot, which length corresponds to a one hour interval, as soon as the corresponding brake is released.

3. Clockwork for simultaneously indicating the time at various points on the earth, comprising a clock driven rotatable drum, an indicator for indicating the different times on the drum in circumferential division, the said drum indicating only the minutes, a series of separately driven discs disposed below said indicator, each disc corresponding to a unique minute division on said drum, and means coupling said discs with the corresponding minute divisions in such manner that the corresponding disc is advanced a predetermined angular distance corresponding to a one hour interval as soon as the corresponding minute division has reached a predetermined datum, a shaft, a separate drive periodically driving said shaft, that one of the discs which is remote from the drum being fixed on said shaft, the other discs being mounted for free rotation thereabout, the freely rotatable discs having slots therein, a coupling pin fixed in the said fixed disc and extending through said slots and coupling the freely rotatable discs to the fixed disc, brakes cooperating with each of said discs and adapted to be released by said drum, spring means on each of said freely rotatable discs for advancing the corresponding disc the length of the slot, which length corresponds to a one hour interval, as soon as the corresponding brake is released, and means whereby said drum positively and periodically rotates the said fixed disc through an angular distance corresponding to a one hour interval.

4. Clockwork for simultaneously indicating the time at various points on the earth, comprising a clock driven rotatable drum, an indicator for indicating the different times on the drum in circumferential division, the said drum

shaft and spindle from one another to tension the flexible transmission means therebetween, and means for locking the plate in adjusted positions in the direction of extent of the flexible transmission means between the prime mover and countershaft to tension said transmission means.

2. In a machine of the class described the combination of a bed or support, a grinding wheel carriage carried thereby and movable transversely thereof, a spindle journaled in said carriage, means for actuating the carriage relative to the bed, a plate carried by the bed, a bracket supported by the plate, a trunnion projecting from one side of the plate, a trunnion projecting from the other side of the bracket, a bearing sleeve having arms extending therefrom and journaled for oscillating movement about the trunnions, a countershaft in said bearing sleeve, flexible transmission means between the countershaft and spindle, and means pivotally mounted at opposite ends concentrically with the axis of the spindle and countershaft for definitely spacing the said axes of the spindle and countershaft from one another to tension the flexible transmission means during the transverse adjustment of the grinding wheel carriage.

3. In a machine of the class described the combination of a bed or support, a grinding wheel carriage carried thereby and movable transversely thereof, a spindle journaled in said carriage, means for actuating the carriage relative to the bed, a plate carried by the bed, a bracket supported by the plate, a trunnion projecting from one side of the plate, a trunnion projecting from the other side of the bracket, a bearing sleeve having arms extending therefrom and journaled for oscillating movement about the trunnions, a countershaft in said bearing sleeve, flexible transmission means between the countershaft and spindle, means definitely spacing the axes of the spindle and countershaft from one another to tension the flexible transmission means during the transverse adjustament of the grinding wheel carriage, a prime mover, flexible transmission means between the prime mover and countershaft, and means for adjusting and clamping the plate and bracket in the direction of extent of the transmission means between the prime mover and countershaft for tensioning said transmission means.

4. In a machine of the class described the combination of a bed or support, a grinding wheel carriage carried thereby and movable transversely thereof, a spindle journaled in said carriage, means for actuating the carriage relative to the bed, a plate carried by the bed, a bracket supported by the plate, a trunnion projecting from one side of the plate, a trunnion projecting from the other side of the bracket, a bearing sleeve having arms extending therefrom and journaled for oscillating movement about the trunnions, a countershaft in said bearing sleeve, flexible transmission means between the countershaft and spindle, and means pivotally mounted at opposite ends concentrically with the axis of the spindle and countershaft for definitely spacing the said axes of the spindle and countershaft from one another to tension the flexible transmission means during the transverse adjustment of the grinding wheel carriage, said means including a turn buckle connection between the countershaft and grinding wheel carriage.

5. In a machine of the class described the combination of a bed or support, a grinding wheel carriage carried thereby and movable transversely thereof, a spindle journaled in said carriage, means for actuating the carriage relative to the bed, a plate carried by the bed, a bracket supported by the plate, a trunnion projecting from one side of the plate, a trunnion projecting from the other side of the bracket, a bearing sleeve having arms extending therefrom and journaled for oscillating movement about the trunnions, a countershaft in said bearing sleeve, flexible transmission means between the countershaft and spindle, means definitely spacing the axes of the spindle and countershaft from one another to tension the flexible transmission means during the transverse adjustment of the grinding wheel carriage, a fluid pump mechanism including a pump shaft carried by the bracket, and transmission means between the countershaft and pump shaft for driving the latter from the former.

6. In a machine of the class described the combination of a bed or support, a grinding wheel carriage carried thereby and movable transversely thereof, a spindle journaled in said carriage, means for actuating the carriage relative to the bed, a plate carried by the bed, a bracket supported by the plate, a trunnion projecting from one side of the plate, a trunnion projecting from the other side of the bracket, a bearing sleeve having arms extending therefrom and journaled for oscillating movement about the trunnions, a countershaft in said bearing sleeve, flexible transmission means between the countershaft and spindle, means definitely spacing the axes of the spindle and countershaft from one another to tension the flexible transmission means during the transverse adjustment of the grinding wheel carriage, a fluid pump mechanism including a pump shaft carried by the bracket, transmission means between the countershaft and pump shaft for driving the latter from the former, a second pump adapted to be secured to the bracket or plate including a rotatable shaft, and means for coupling the rotatable shaft with the pump shaft.

7. In a device of the class described the combination of a bed, a grinding wheel carriage carried thereby and shiftable relative thereto, a spindle journaled in the carriage, means for actuating the carriage transversely of the bed, a bearing sleeve, a countershaft journaled in said sleeve, means pivotally mounting the sleeve on the bed, flexible transmission means between the countershaft and spindle, a trunnion formed on the carriage concentric with the spindle, a trunnion formed on the sleeve concentric with the axis thereof, a plate carried by each trunnion and each plate having a threaded socket portion formed therein, and a threaded turn buckle connection received in the threaded socket portions of the plates for definitely spacing the axes of the spindle and floating countershaft from one another to tension the flexible transmission means therebetween during the transverse adjustment of the grinding wheel carriage.

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