

E. A. HUMMEL.
ELECTRIC CLOCK SYNCHRONIZING APPARATUS.
APPLICATION FILED FEB. 23, 1907.

949,122.

Patented Feb. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1

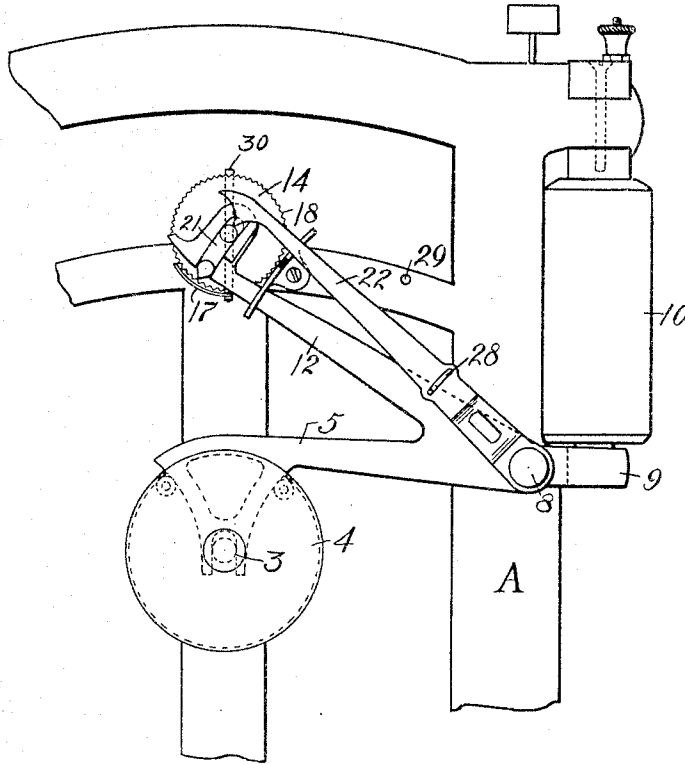


Fig. 2

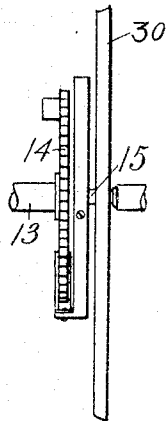
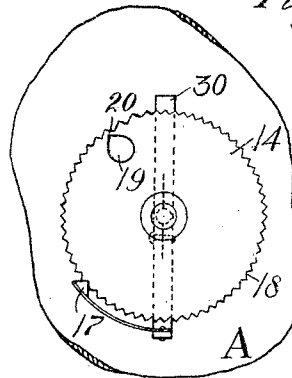


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 4

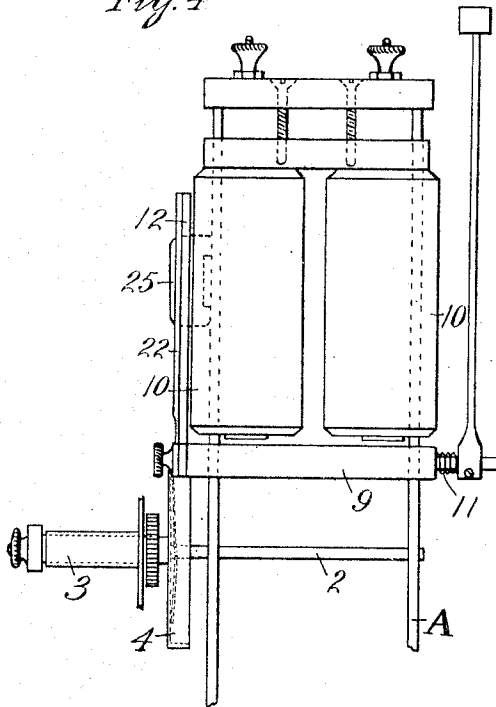


Fig. 5

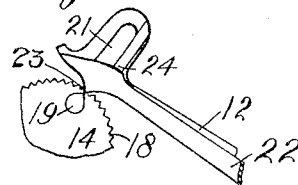


Fig. 6

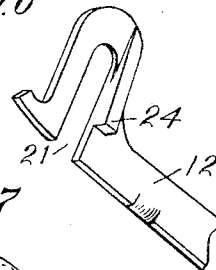


Fig. 7

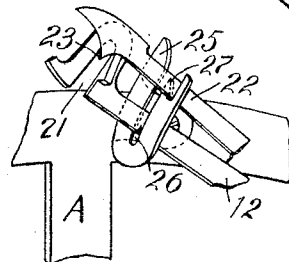
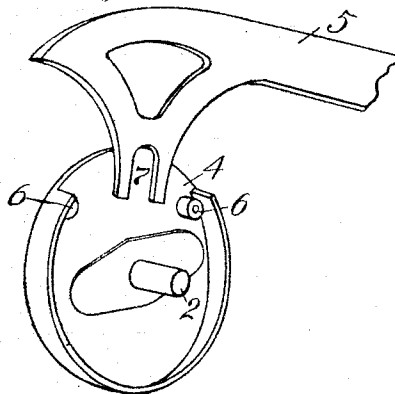


Fig. 8



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UNITED STATES PATENT OFFICE.

ERNEST A. HUMMEL, OF ST. PAUL, MINNESOTA, ASSIGNOR TO ALBERT L. HAMAN, OF ST. PAUL, MINNESOTA.

ELECTRIC-CLOCK-SYNCHRONIZING APPARATUS.

949,122.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed February 23, 1907. Serial No. 358,952.

To all whom it may concern:

Be it known that I, ERNEST A. HUMMEL, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Electric-Clock-Synchronizing Apparatus, of which the following is a specification.

My invention relates to improvements in electric synchronizing apparatus for clocks wherein a large number of clocks may be synchronized automatically from one standard clock.

My invention consists particularly of improvements in the electrically actuated synchronizing parts arranged in connection with the second and minute hands whereby certainty and accuracy of adjustment is obtained.

To this end my invention consists in the features of construction and combination hereinafter particularly described and claimed.

In the drawings forming part of this specification, Figure 1 is an end view of the frame-work of the clock partly broken away showing the minute and second hands and my invention arranged in connection therewith, Fig. 2 is a side elevation of the second hand sleeve and supported parts, Fig. 3 is a front elevation of the same, Fig. 4 is a side elevation of the clock frame partly broken away showing the electromagnets arranged in connection with my invention, Figs. 5 to 7 are detail views of the synchronizing levers of the second hand, and Fig. 8 is a detail view of the synchronizing lever for the minute hand.

In the drawings A represents the frame work of the clock, and 2 the minute hand shaft upon which is suitably mounted a sleeve 3 supporting the minute hand, not shown. Carried by the shaft 2 is a flanged disk or cam 4, the flange of which is cut away on one side, as shown in Fig. 8, to receive the end of the lever 5. Rollers 6 are carried by the disk at the edges of said cut away flange to bear against the adjacent edges of said lever. The lever is formed in its free end with a slotted opening 7 to receive the minute hand sleeve 3 when in synchronizing position, and has pivotal support 8 upon the frame work of the clock. Carried by the outer end of the lever is

an armature 9 above which are suitably supported electromagnets 10. The armature is forced away from the electromagnets by a spring 11.

The synchronizing lever 5 is formed with an upwardly extending lever arm 12 for synchronizing the second hand. Mounted upon the supporting sleeve 13 of the second hand, not shown, is a disk 14. The sleeve 13 is loose upon the second hand shaft 15 and has yielding engagement therewith through the medium of a cross bar 30 secured to the shaft 15 and carrying upon its outer end a spring pawl 17 which engages with the serrated edge 18 of the disk 14. Thus the engagement of the spring pawl 17 with the disk will normally cause the sleeve to rotate with the shaft 15, while at the same time it will allow the sleeve to be turned upon the shaft against the elastic pressure of the pawl 17 in the operation of the synchronizing levers. Carried by the disk 14 at one side of its center is a post 19 preferably having an outer knife edge 20. The free end of the lever arm 12 is formed with a slotted opening 21 of sufficient length to receive both the sleeve 13 and post when in alignment, as indicated in Fig. 1. Mounted upon the pivot 8 and extending outwardly alongside the lever arm 12 is a spring arm or dividing lever 22 formed on the inner side of its free end with a knife edge 23 standing in alinement with the center of the slot 21. The lever 22 normally stands in front of a stop 24 upon the outer end of the lever arm 12.

When the synchronizing lever 5 is forced down into the position shown in Fig. 1, the dividing lever 22 is intercepted and held back by the following described means: Carried by the frame work of the clock is a bracket 25 formed with a slot 26 to receive the lever arm 12, the bracket being formed on the outer side of the slot 26 with an inclined lip 27 which intercepts the dividing lever 22 and forces it out from the stop 24, at the same time holding it, while the lever 12 passes forward to the position shown in Fig. 1. The movement of the lever 22 with reference to the lever 12 is limited by slot and pin connection 28. When the synchronizing lever 5 is returned to normal position by the spring 11 the post 29 will engage the dividing lever 22 to permit the stop 24

to pass it so that said lever may spring back into place against the stop, as shown in Fig. 5.

In operation whenever the electromagnets are energized from the standard clock, which will be at certain predetermined times, the attraction of the armature by the electromagnets will draw the synchronizing levers into the position shown in Fig. 1. This will bring the end of the lever arm 5 through the opening in the side of the flanged cam backward or forward to zero position. At the same time the lever arm 12 will strike the post 19 turning the disk 14 and second hand sleeve into the position shown in Fig. 1 against the tension of the spring pawl 17. In case the post 19 stands in approximately the position shown in Fig. 5 the knife edge 23 of the dividing lever 22 will first strike the post and move it with the disk to one side of the slot 21 so as to bring it into position where it can be engaged by the lever arm 12 and carried to zero position. If it were not for the dividing lever 22 the post 19 if in alinement with the sleeve 3 and slot 21, as indicated in Fig. 5, would pass into the slot, when the synchronizing apparatus is actuated, and prevent the action of the synchronizing lever 12. Thus the lever 22 serves as a switching or starting lever to turn the post, in case it is in approximately the position shown in Fig. 5, so that it can be engaged by the lever 22. As will be evident the limits within which the clock is synchronized will depend upon the length of the opening in the side of the flanged cam 14. This opening will ordinarily be large enough to allow synchronizing of the clock when the minute hand is within five minutes of the zero minute. Of course, any accidental closing of the circuit at any other time than within this limit will bring the lever 5 into contact with the flange of the cam 4 and thus prevent setting of the hands. The disk 4 has sixty serrations in its edge so that the position of the second hand will always correspond with the divisions of the dial.

It will be evident that the yielding connection between the sleeve 13 and second hand shaft 15 allows the sleeve to be turned by the synchronizing apparatus independently of its normal rotatable movement with the shaft; the independent movement imparted to the sleeve by the synchronizing apparatus being a step by step movement through the medium of the spring pawl 17 and serrated edge 18 of the disk 14.

I do not claim *per se* herein the improved devices shown and described for obtaining a yielding connection between the second-hand sleeve and arbor, as said devices are made the subject of a separate co-pending application filed by me November 23, 1909, Serial No. 529,582.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. The combination with the minute and second hand shafts of a clock, of sleeves so supported upon said shafts as to be normally rotatable therewith, and capable of independent rotation thereon, a post offset from the second hand sleeve, and an electrically operated arm adapted to be brought periodically into locking engagement with the minute hand sleeve, a connected lever arm having a slot in its free end in position to receive the second hand sleeve and offset post when in alinement therewith, a dividing lever extending across said slot in position to engage with and turn the offset post into the path of the lever arm, and means holding back the dividing lever when said lever arm is in locking engagement with said sleeve.

2. The combination with the minute and second hand shafts of a clock, of a sleeve supported upon the minute hand arbor and yieldingly engaging the same, a sleeve so supported upon the second hand shaft as to be normally rotatable therewith, but permitting independent step by step rotation when acted upon by an independent force, a post offset from the second hand sleeve, an electrically operated arm adapted to be brought periodically into locking engagement with the minute hand sleeve, and a connected lever arm having a slotted free end in position to receive said second hand sleeve and said offset post when in alinement therewith.

3. In combination with the minute and second hand shafts of a clock, second and minute hand sleeves yieldingly supported upon said shafts, a cam carried by the minute hand sleeve, a pivotally supported lever arm arranged in connection with said cam, an offset post connected with the second hand sleeve, a lever arm having a slot in its free end in position to receive said second hand sleeve and said offset post when in alinement therewith, a dividing spring lever supported in connection with said slotted lever arm, and with its free end in front of said slot, and means for holding back said dividing lever when said lever arms are carried into locking engagement with said sleeves, for the purposes set forth.

4. In combination with the minute and second hand shafts, sleeves yieldingly supported by said shafts, a cam carried by the minute hand sleeve, a fulcrumed lever arm in position to engage at its free end with said cam, a fulcrumed arm having a slot in its free end in alinement with the second hand sleeve, an offset post supported by said sleeve, a dividing lever having spring support upon said lever arm, means normally holding the free end of said driving

lever in front of said slotted opening, means for separating the free end of said dividing lever from said lever arm, and for holding it back when said lever arm is carried into locking engagement with said second hand sleeve, and a post for engaging with said dividing lever and restoring it to normal position in the manner and for the purpose set forth.

5. In combination with the minute and second hand of a clock, a sleeve yieldingly supported upon said minute hand shaft, a flanged cam carried by said sleeve and cut away upon one side, a fulcrumed lever arm having its free end shaped to fit into the opening in said flange, a connected lever arm having a transverse opening in its free end, a second hand sleeve loosely mounted upon said second hand shaft, a disk carried

thereby, an offset post carried by said disk, a spring pawl carried by said shaft and having frictional engagement with the edge of said disk, a spring dividing lever carried by said lever arm, a stop normally holding the free end of said spring lever in front of said transverse opening, means for turning outward and holding back said spring lever when the lever arm is turned into locking engagement with said second hand sleeve, and a post arranged in position to engage with and restore said dividing lever to normal position.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST A. HUMMEL.

Witnesses:

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HATTIE SMITH.