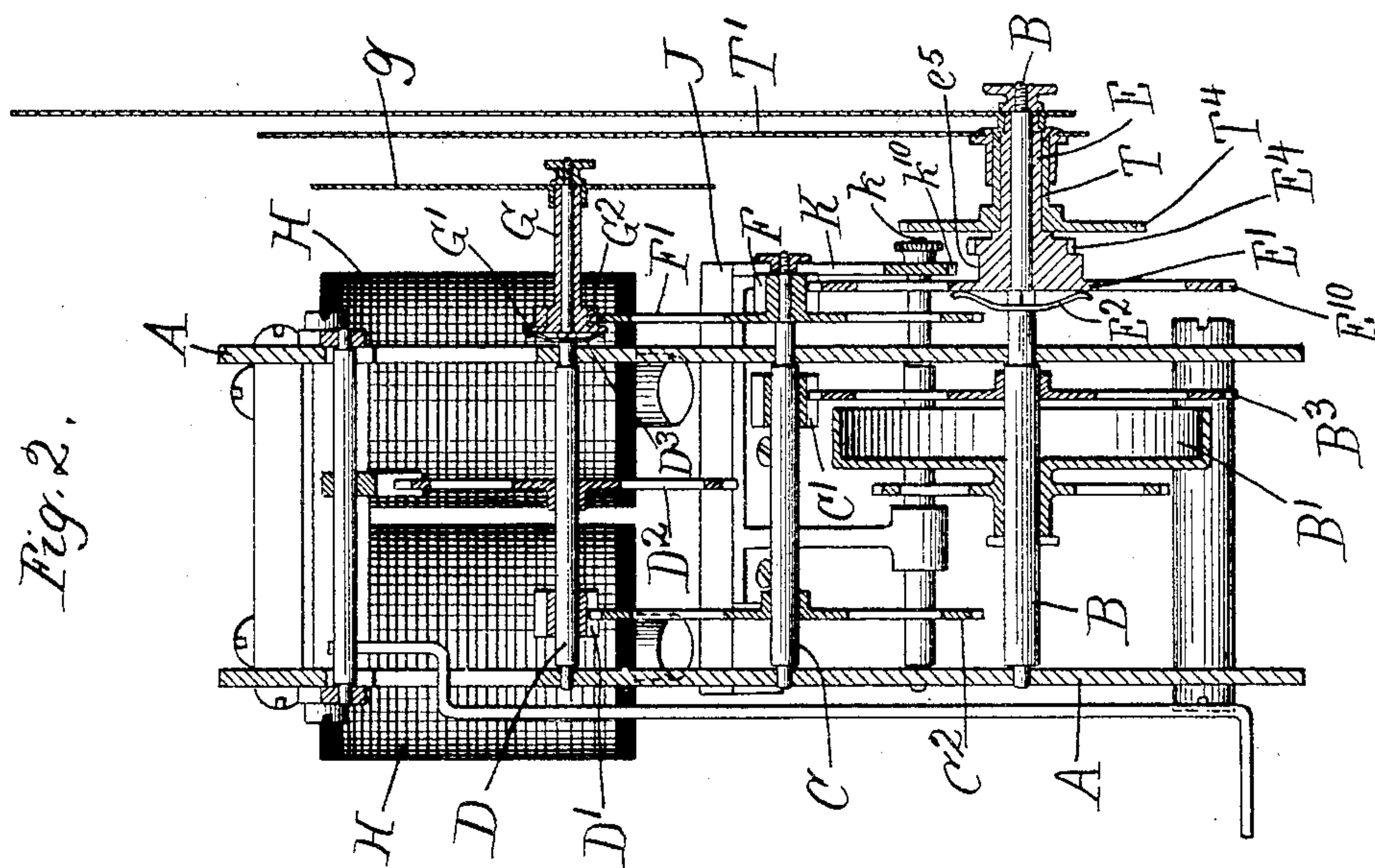
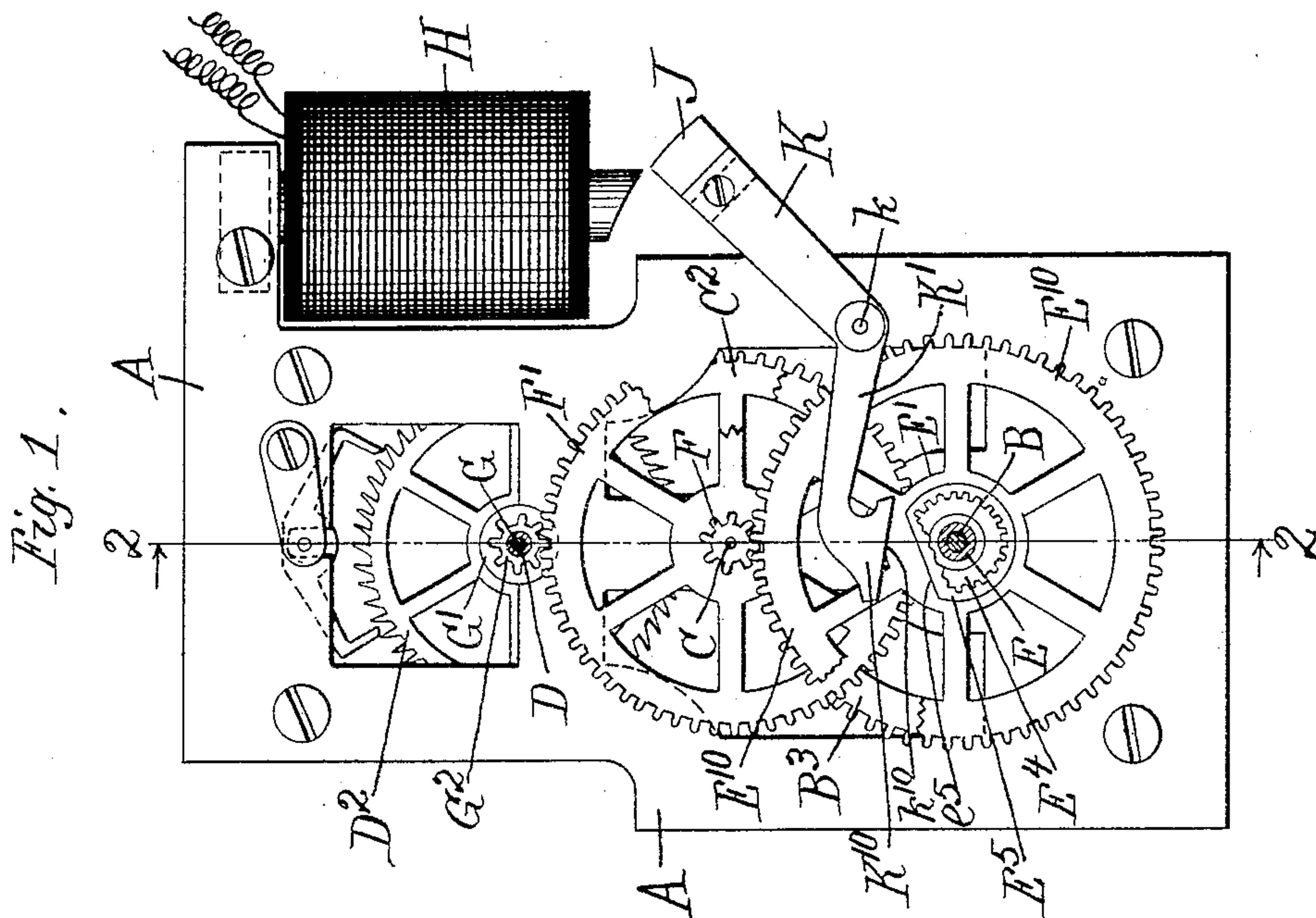


(No Model.)

C. M. CROOK.
ELECTRIC CLOCK SYNCHRONIZER.

No. 534,319.

Patented Feb. 19, 1895.



Witnesses.

E. T. Wray,
Jean Elliott

Inventor,

Charles M. Brook
by Burtonth Burton
his atty.

UNITED STATES PATENT OFFICE.

CHARLES M. CROOK, OF CHICAGO, ILLINOIS.

ELECTRIC CLOCK-SYNCHRONIZER.

SPECIFICATION forming part of Letters Patent No. 534,319, dated February 19, 1895.

Application filed July 2, 1894. Serial No. 516,394. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. CROOK, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Synchronizing Mechanism for Clocks, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide improved mechanism for setting clocks which are connected in circuit and synchronized simultaneously by electrically connected devices, the particular purpose of the present invention being to cause the setting of the hour and minute hands to cause the seconds hand to be also set so that its indication shall agree with that of the other hands. Heretofore, this purpose has been usually accomplished by separate devices connected with the seconds hand and operated upon by the synchronizing devices simultaneously with the hour and minute hands, but independently of them.

In the drawings, Figure 1 is a front elevation of a portion of the clock having synchronizing devices which include my invention. Fig. 2 is a section at the line 2—2 on Fig. 1, but including some parts which are omitted from Fig. 1. In both of these figures, some portions of the train not forming part of the invention, and not necessary to the understanding of its operation, are omitted.

Since my invention has to do only with so much of the train as extends from the seconds hand, which is on the escape wheel staff, to the minute hand, I need indicate only this portion of the train.

A represents the frame of usual construction.

B is the shaft which carries the minute hand, and which, in the particular train selected for illustration is also the main spring shaft as is indicated by the spring barrel B' and winding ratchet wheel represented in connection with it. These wheels form no part of the present invention and will not be further mentioned.

B³ is a gear rigid with the shaft B, meshing with the pinion C' on the shaft C, on which there is also rigid the gear C², which meshes

with the pinion D' on the shaft D, which carries the escape wheel D², and extends through the forward side plate of the frame and carries the seconds hand. The minute and seconds hands are mounted on their shafts B and D respectively in a familiar and similar manner,—to wit: by means of the long sleeves.

E is the sleeve or barrel of the minute hand having the flange E' at the base, against which the tripod spring E² of customary construction rigid with the shaft B bears to effect the frictional connection of the shaft with the sleeve and thereby with the hand, said flange being, in the present instance, extended and constituting a gear whose rim is shown at E¹⁰, located in front of the frame and equal and similar in all respects to the gear B³, which is rigid with the shaft behind the frame.

It will be understood that the customary train connects the minute hand sleeve with the hour hand sleeve T and hour hand T', only the sleeve and hands and the first and last gears E⁴ and T⁴ being shown. The shaft C extends through the forward plate of the frame, and in front of the latter there is loosely journaled on it a wheel comprising the pinion F and the larger gear flange F', which are respectively equal to the pinion C' and the gear C² which are rigid with the shaft C within the frame.

G is the seconds-hand; G, its sleeve on the forwardly protruding end of the shaft D.

G' is the flange against which the spring tripod D³ rigid with the shaft bears to effect frictional connection between the seconds hand and the shaft. In front of the flange, rigid with the sleeve, is the pinion G², which is equal to the pinion D', which is secured to the shaft within the frame. It will be understood from this description that two precisely similar trains extend between the shafts B and D, one train being within the frame and being the means of communicating rotation from the shaft B to the shaft D, and the other being in front of the frame, and all its wheels being loose on their shafts respectively, so that they communicate motion independently of the shafts except in so far as frictional connection afforded by the tripod springs operates to carry them with their respective shafts or cause them to carry their respective shafts with them. This frictional engagement is

sufficient to carry the hands in the ordinary running of the clock, and the intermediate wheels of the loose or front train neither assist nor hinder the ordinary running except
 5 that if one or the other frictional engagement should be defective and the hand should, on that account, be liable to slip or fail to be carried with its shaft, the defect might be remedied by the forward train communicating proper motion from the other shaft if its
 10 frictional engagement were sufficient to carry both.

When the minute hand is rotated by any means to set the clock, the forward or loose
 15 train will communicate such motion to the seconds hand and set it also, so that if originally mounted accurately on its sleeve, its indication will continue to agree with that of the seconds hand,—whether the seconds hand
 20 reaches position by the running of the movement or by setting independently of the driving movement.

This device is especially intended to be used in connection with an automatic setting or
 25 synchronizing device,—that is to say, one which is connected with a controlling clock and operated thereby, usually by an electric circuit connecting proper devices associated with the controlling and controlled clock.
 30 Such setting and synchronizing device is represented, consisting of the electro-magnet H, its armature J, which is carried upon a lever K fulcrumed at k on the frame and having the arm K' in front of the forward frame
 35 plate and provided with a finger K^{10} , which overhangs the sleeve of the minute hand, said sleeve being provided between the flange E' and the gear E^4 with a segmental circular enlargement E^5 , which is cut away at the chord
 40 e^5 to form a straight edge with which the straight edge k^{10} of the finger K^{10} is adapted to coincide when the lever arm K' is rocked toward the shaft B, and the shaft is in such position that the straight edge of the segment
 45 is facing more or less directly toward the finger.

When the circuit which closes the magnet is energized and the armature is thereby attracted toward the magnet, the lever K being
 50 rocked over its fulcrum, throws the lever arm K' and the finger K^{10} down, causing the straight edge of the latter to engage the straight edge of the segment E^5 at one corner or the other, and force the segment, and
 55 thereby the sleeve and hand, around on the shaft until the straight edge of the segment coincides with the straight edge of the finger, at which point the minute hand will be at the hour, and by which movement the entire loose
 60 train in front of the frame, connecting the minute hand with the seconds hand, will be

rotated and the latter brought to the minute point. The specific device for communicating the setting movement to the minute hand is not a part of this invention, and any device for that purpose may be used in connection with the specific invention which is
 65 herein claimed relating to the communication of motion from the minute hand to the seconds hand independently of the main driving
 70 train.

I claim—

1. In a clock, in combination with the driving train, the seconds hand frictionally connected thereto and the minute hand revolving about
 75 a different center from the seconds hand, and a train from the seconds hand to the minute hand independent of the train which drives the seconds hand: substantially as set forth.

2. In a clock, in combination with the main
 80 driving train, the minute hand and the seconds hand both frictionally connected with the train and an independent train connecting the minute hand and seconds hand, whereby the motion of either is communicated to the
 85 other independently of the driving train: substantially as set forth.

3. In a clock, in combination with the main driving train the minute hand and seconds hand frictionally connected to their respective
 90 shafts in said driving train in front of the frame in which said driving train obtains bearing, an independent train connecting the sleeves of the hands, the wheels in said train corresponding respectively to the wheels in
 95 the portion of the main driving train which operates between the shafts to which said hands are frictionally connected respectively: substantially as set forth.

4. In a clock, in combination with the driving train having the shafts which carry the minute and seconds hands and all the shafts of the intermediate wheels of the train protruded through the forward frame plate; a similar train of gears mounted loosely on the
 105 protruding shafts in front of the frame; the minute and seconds hands connected to and carried by the proper wheels of such loosely mounted train, one or more of the wheels of
 110 said train being frictionally connected to the shaft on which it is loosely mounted, whereby the loosely mounted train is frictionally driven by the main train and adapted to be operated independently thereof to set the
 115 hands: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, this 21st day of June, 1894, at Chicago, Illinois.

CHAS. M. CROOK.

Witnesses:

CHAS. S. BURTON.

JEAN ELLIOTT.