No. 814,158. PATENTED MAR. 6, 1906.

J. W. NUNAMAKER.

RECORDING AND COMPUTING MECHANISM.

APPLICATION FILED AUG. 25, 1904.

5 SHEETS—SHEET 1.

FIG. 1.

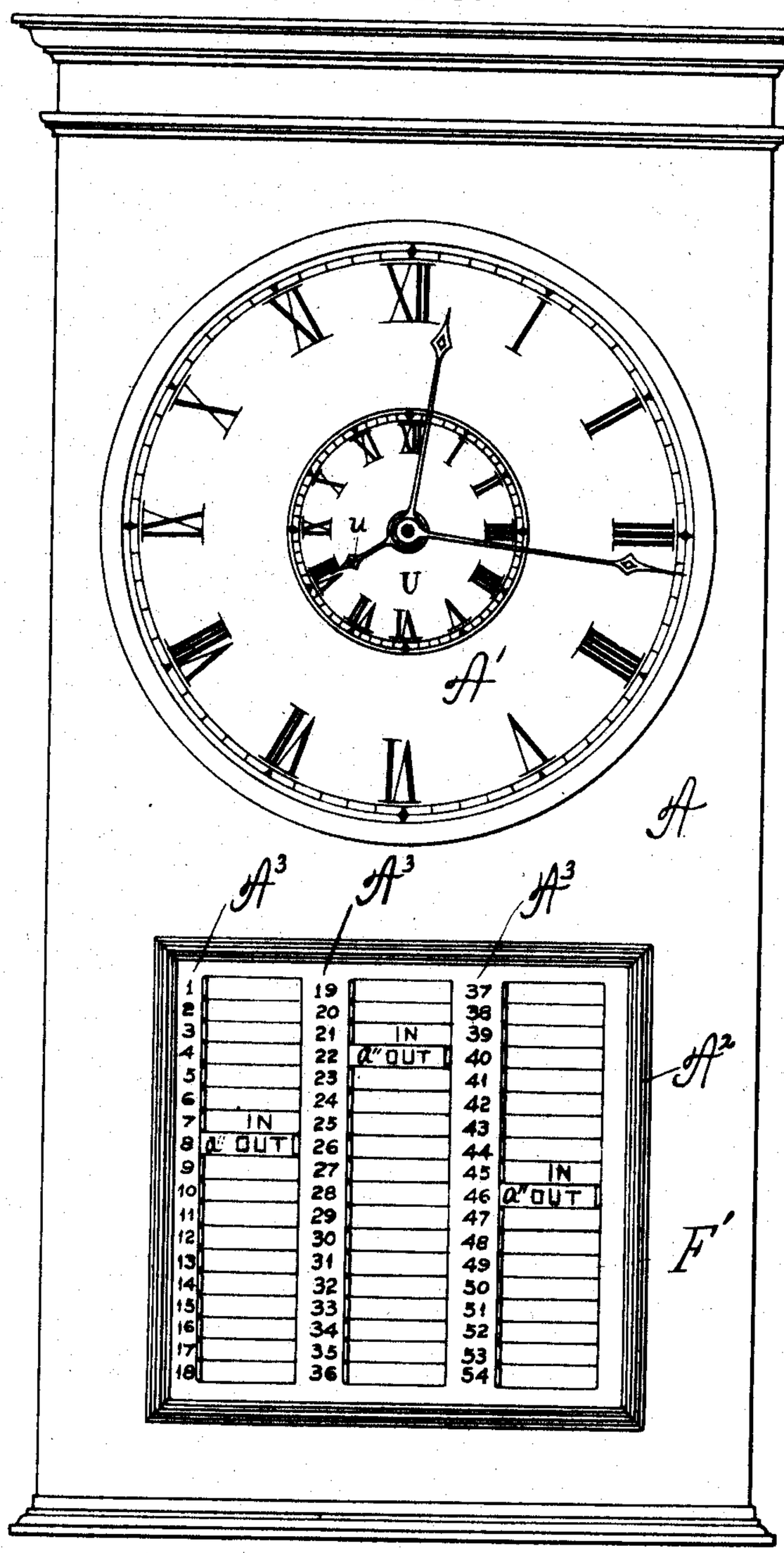
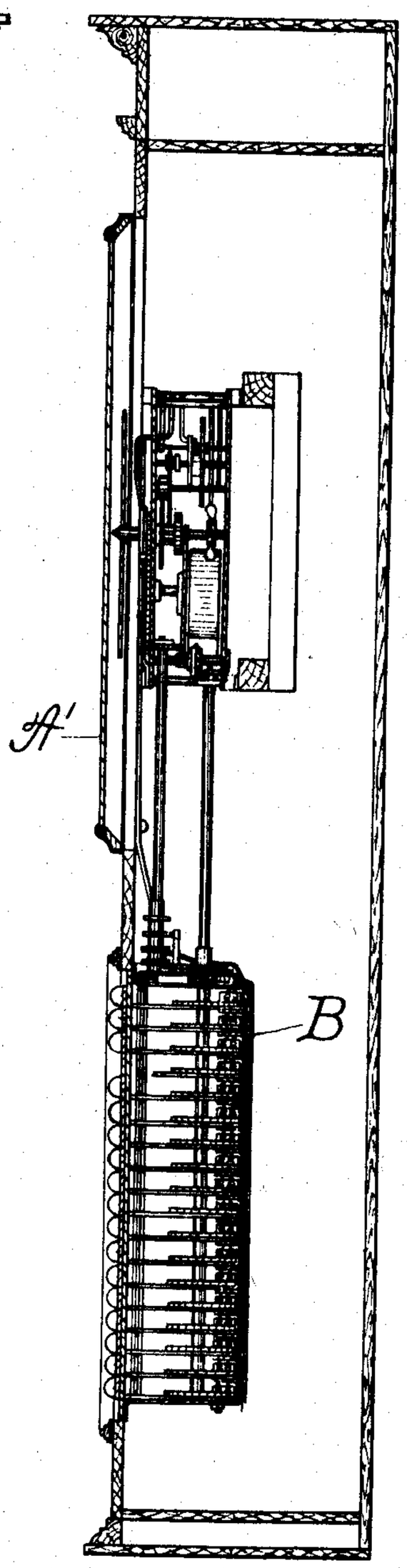


FIG. 2.



WITNESSES

Charles A. Schubert

L. Mandegren

INVENTOR

John W. Nunamaker

BY Howson & King.

ATTORNEYS.

No. 814,158. PATENTED MAR. 6, 1906.

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5 SHEETS-SHEET 2.

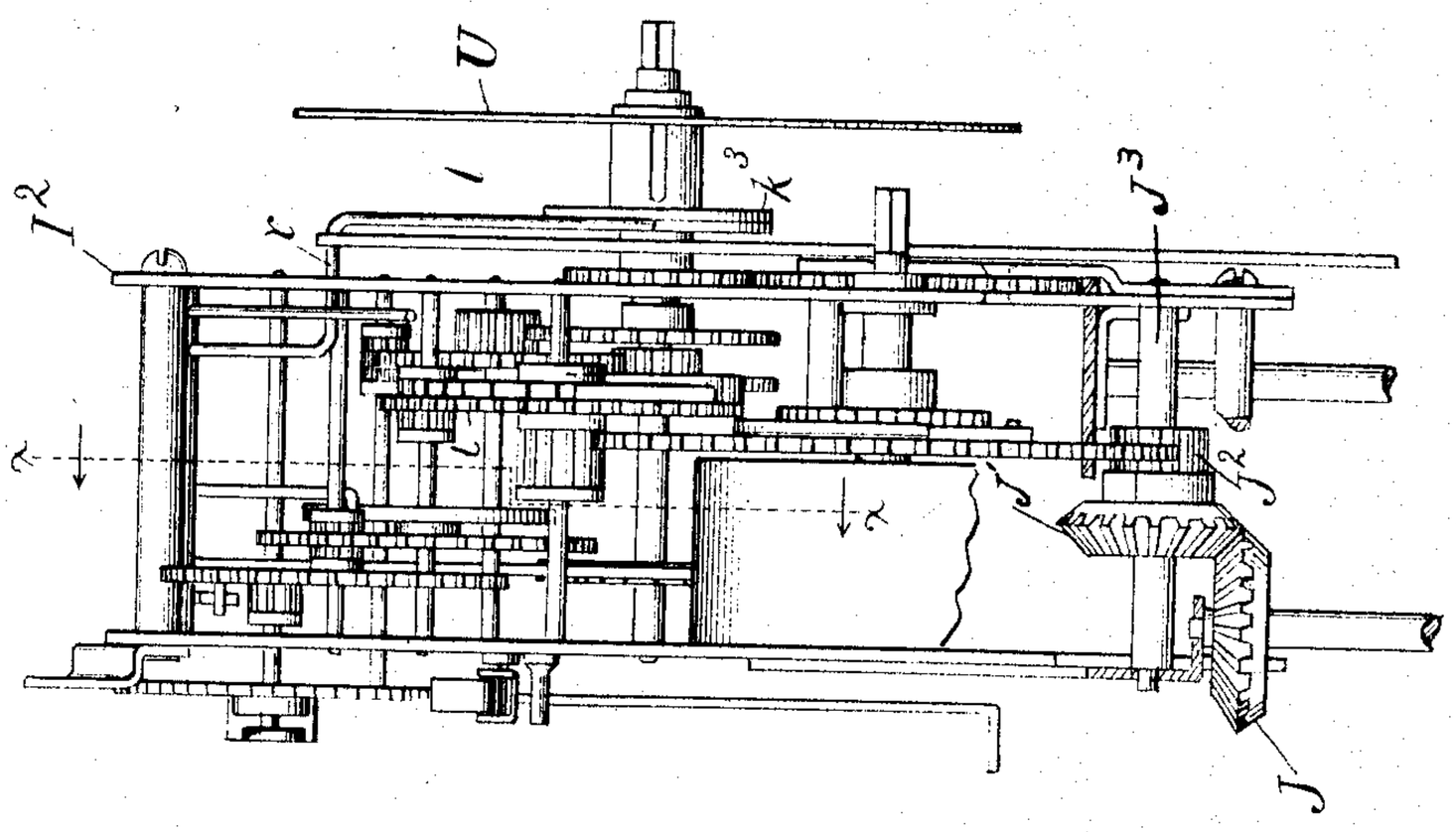

Fig. 4.

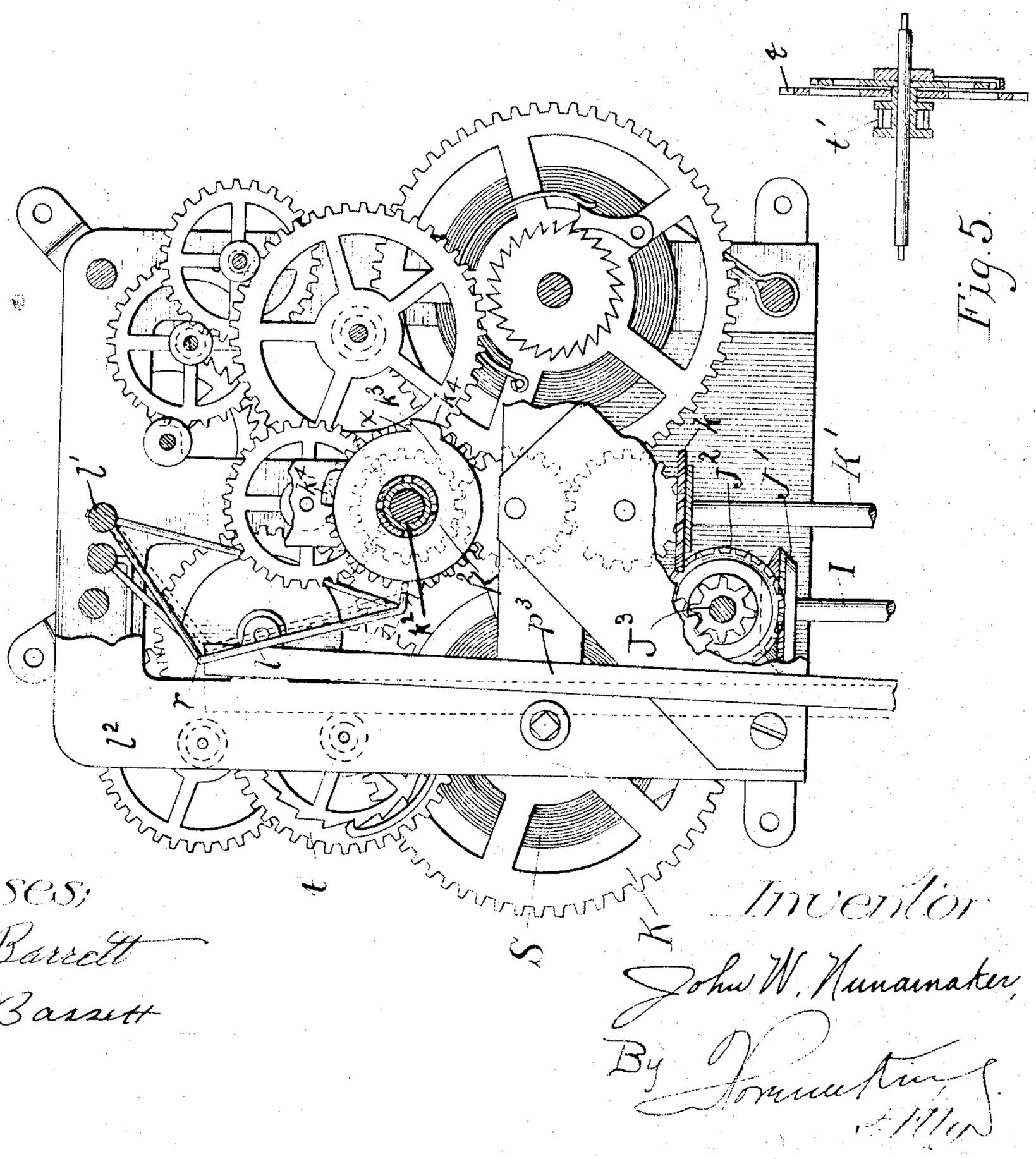

Fig. 3.

Fig. 5.

Witnesses:
Edw. L. Barrett
Chas. F. Barrett

Inventor
John W. Nunamaker,
By Fennemore & Craig
Atty's

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J. W. NUNAMAKER.

RECORDING AND COMPUTING MECHANISM.

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5 SHEETS—SHEET 3.

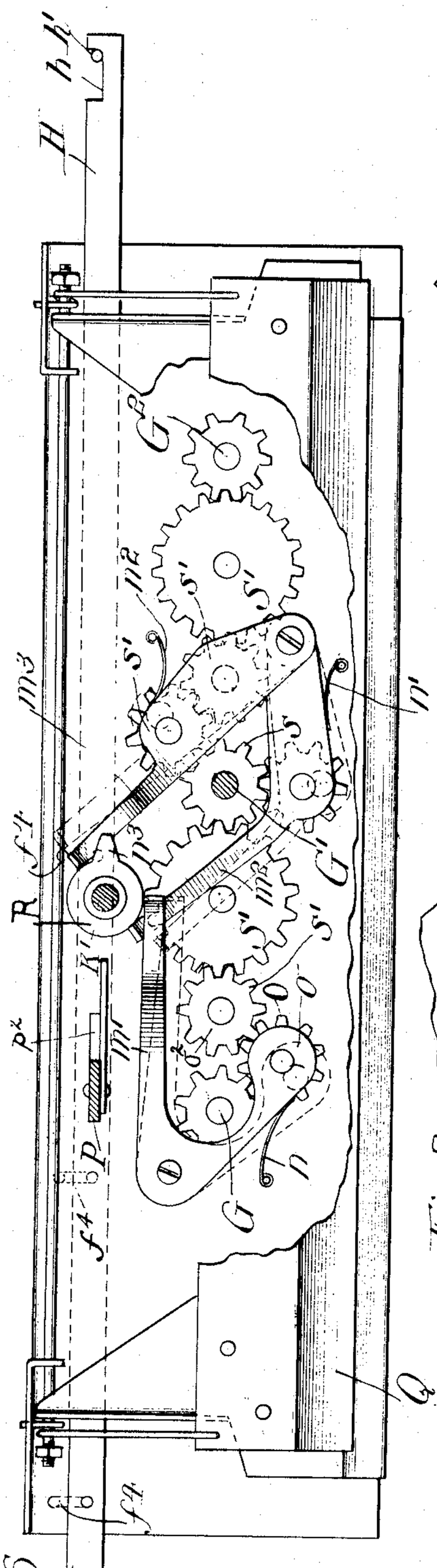

Fig. 6.

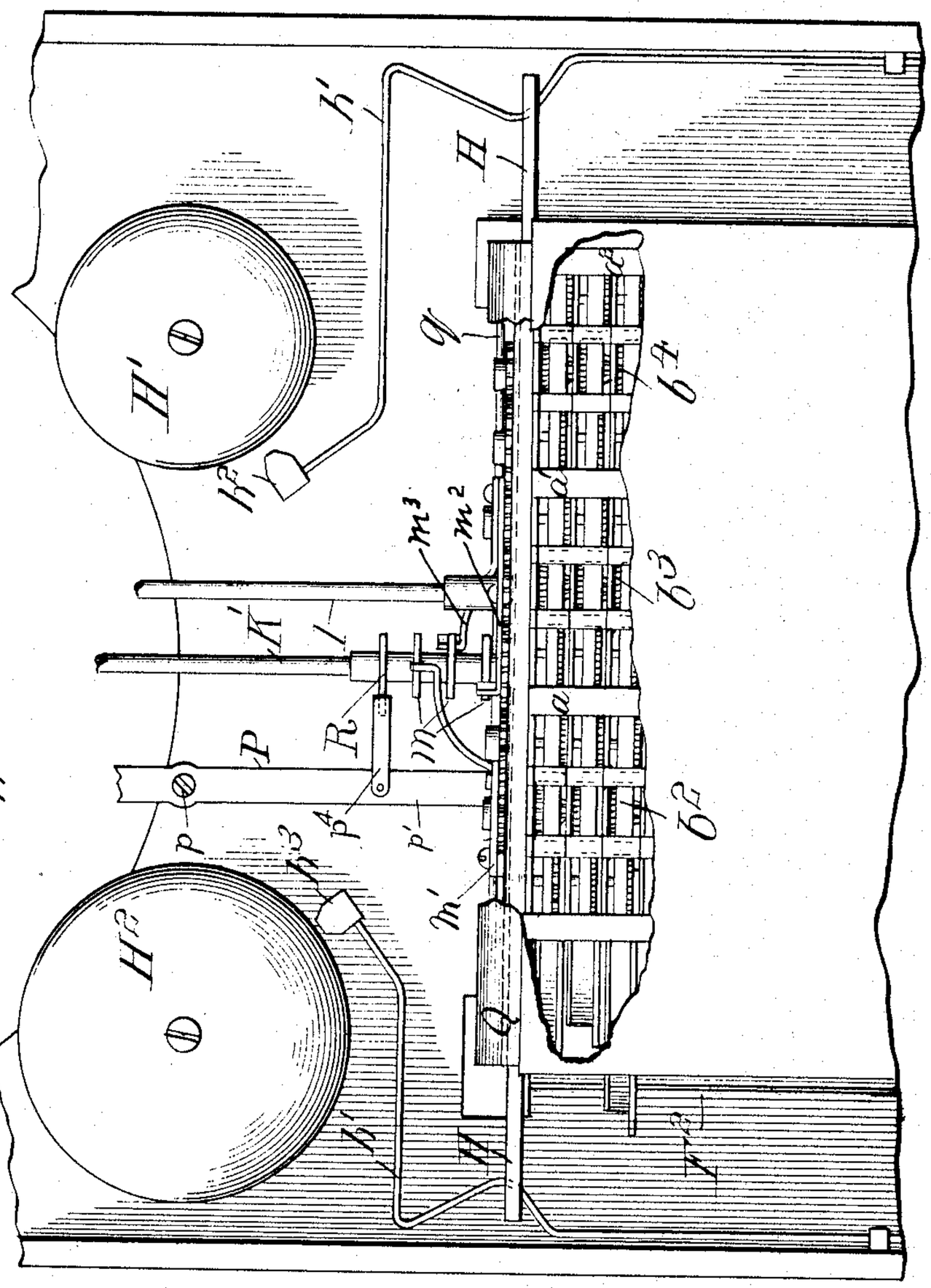

Fig. 7.

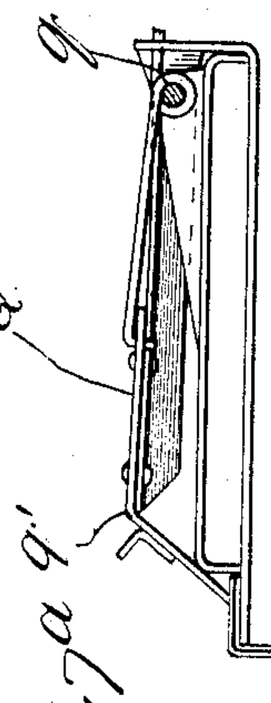

Fig. 7a.

Witnesses;
Edw. X. Barrett
Chas. F. Barrett

Inventor
John W. Nunamaker.
By Howson & Sons
Attys.

No. 814,158. PATENTED MAR. 6, 1906.

J. W. NUNAMAKER.

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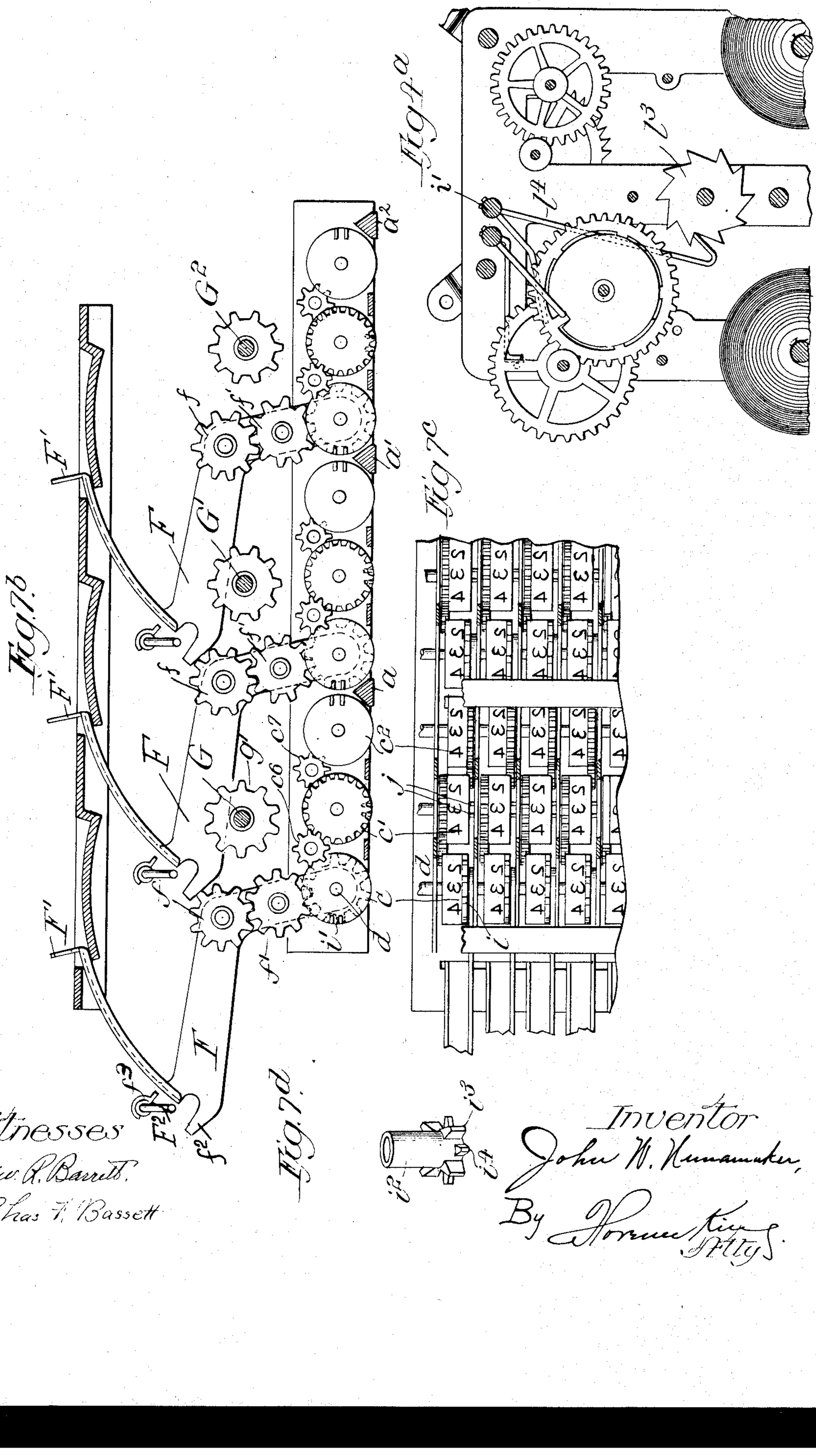
5 SHEETS—SHEET 4.



Witnesses
Edw. A. Barrett.
Chas. F. Bassett

Inventor
John W. Nunamaker,
By Norman Kirkpatrick
Atty's.

No. 814,158. PATENTED MAR. 6, 1906.

J. W. NUNAMAKER.

RECORDING AND COMPUTING MECHANISM.

APPLICATION FILED AUG. 25, 1904.

5 SHEETS—SHEET 5.

FIG. 8.

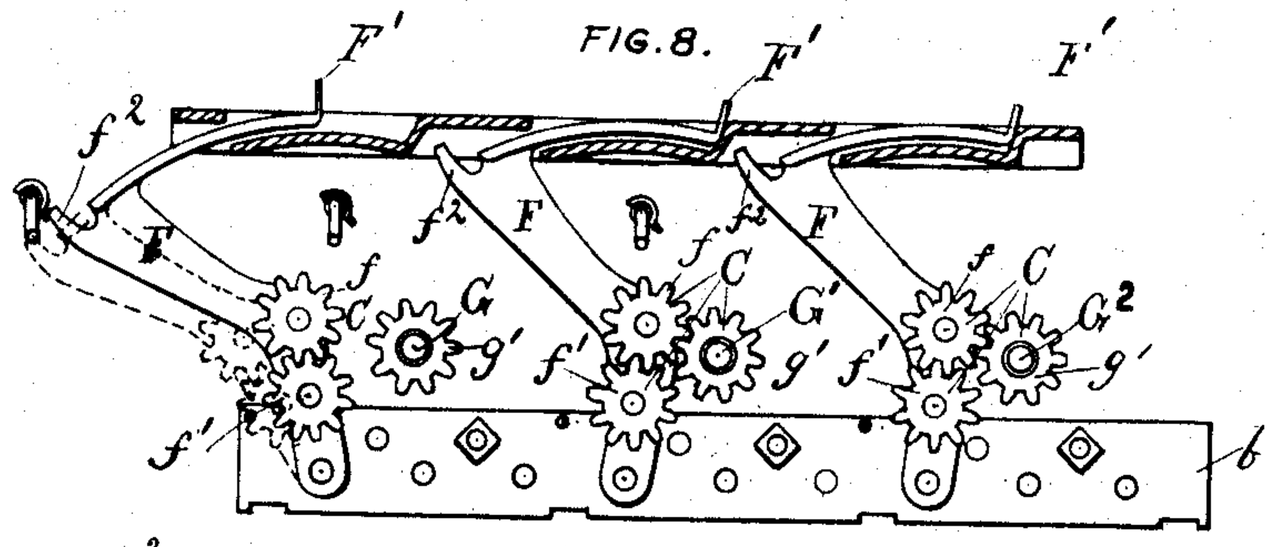


FIG. 9.

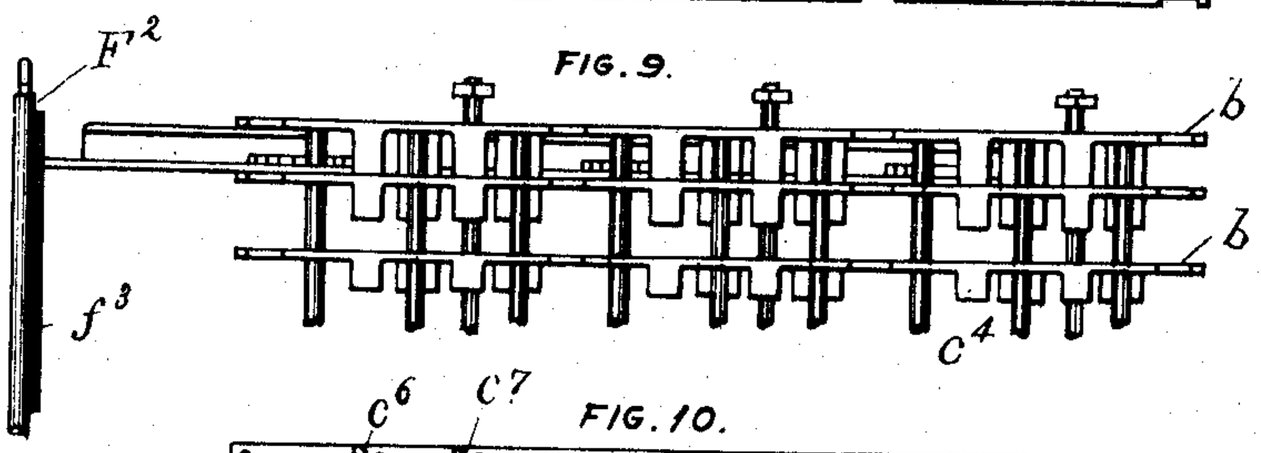


FIG. 10.

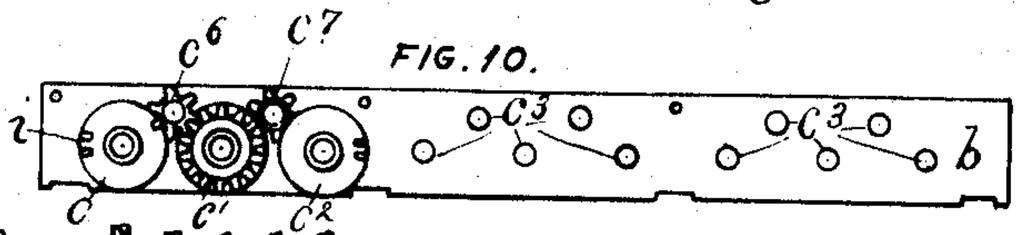


FIG. 16.

FIG. 11.

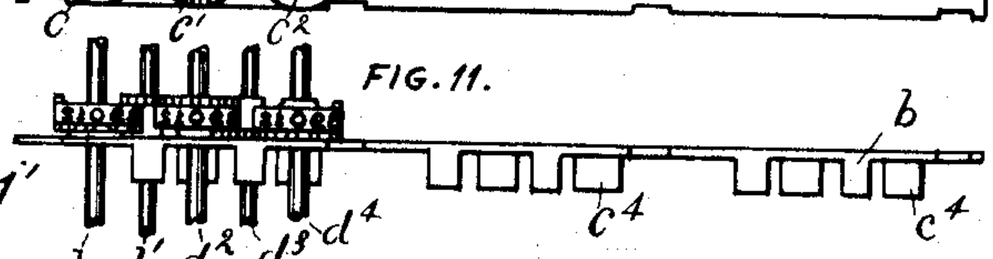


FIG. 16ª

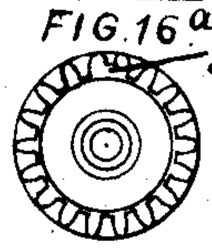


FIG. 12.

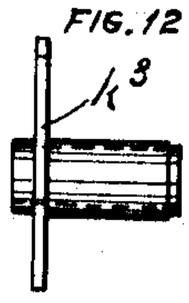


FIG. 12ª

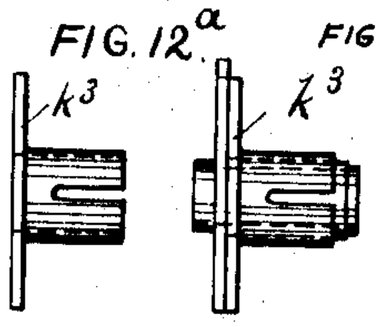


FIG. 13.

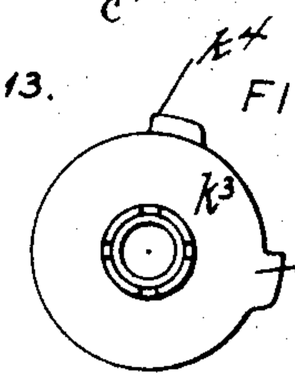


FIG. 13ª

FIG. 17.

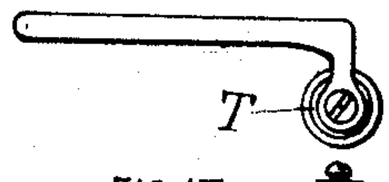
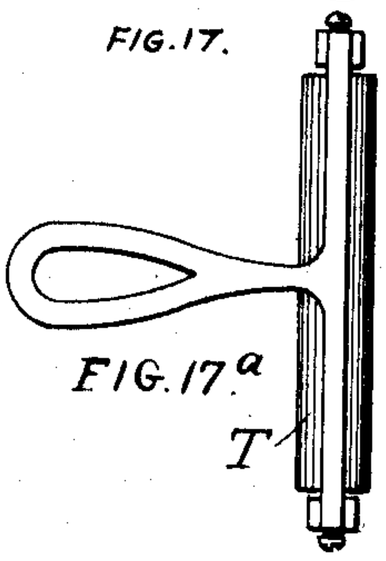


FIG. 17ª



1	0	1	2	19	3	4	5	37	6	7	8
2	0	1	2	20	3	4	5	38	6	7	8
3	0	1	2	21	3	4	5	39	6	7	8
4	0	1	2	22	3	4	5	40	6	7	8
5	0	1	2	23	3	4	5	41	6	7	8
6	0	1	2	24	3	4	5	42	6	7	8
7	0	1	2	25	3	4	5	43	6	7	8
8	0	1	2	26	3	4	5	44	6	7	8
9	0	1	2	27	3	4	5	45	6	7	8
10	0	1	2	28	3	4	5	46	6	7	8
11	0	1	2	29	3	4	5	47	6	7	8
12	0	1	2	30	3	4	5	48	6	7	8
13	0	1	2	31	3	4	5	49	6	7	8
14	0	1	2	32	3	4	5	50	6	7	8
15	0	1	2	33	3	4	5	51	6	7	8
16	0	1	2	34	3	4	5	52	6	7	8
17	0	1	2	35	3	4	5	53	6	7	8
18	0	1	2	36	3	4	5	54	6	7	8

FIG. 18.

FIG. 15.

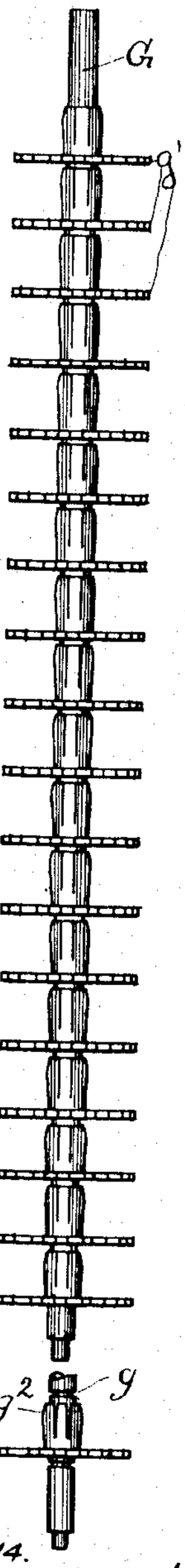
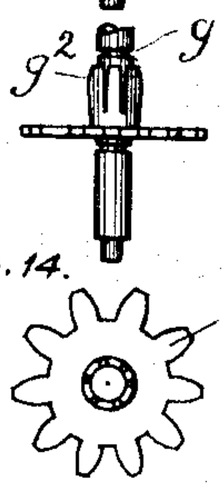


FIG. 14.



WITTNESSES.

Charles. A. Schubert

I. Mandegren

INVENTOR

John W. Nunamaker,

BY Florence King

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN W. NUNAMAKER, OF CHICAGO, ILLINOIS, ASSIGNOR TO NUNAMAKER MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

RECORDING AND COMPUTING MECHANISM.

No. 814,158. Specification of Letters Patent. Patented March 6, 1906.

Application filed August 25, 1904. Serial No. 222,117.

To all whom it may concern:

Be it known that I, JOHN W. NUNAMAKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Recording and Computing Mechanism, of which the following, taken in connection with the drawings, is a specification.

My invention relates to a time recording and computing mechanism, and is designed for use in stores, factories, and other large establishments where it is necessary to compute the time of the employees.

This invention pertains to an improved apparatus by means of which each individual workman has a specific timing device, which by being operated at the beginning and end of any determined interval of time will compute the length of time an employee has worked, in hours and the fraction of an hour.

The object of the invention is to produce a computing mechanism of convenient, simple, and improved form, the arrangement of which will facilitate the operation of computing and will provide means of guarding against errrors and inaccuracies by sounding an alarm, so that an announcement is made of the operation of the lever.

To this end my invention consists of certain details of constructions and combination of parts, all as hereinafter more fully set forth and claimed.

I have illustrated my device in preferred form in the accompanying drawings, in which—

Figure 1 is a front elevation of a clock and case, showing the computer as it appears ready for operation. Fig. 2 is a vertical cross-section of the same. Fig. 3 is a front elevation of the clock mechanism removed from the case with part of the frame broken away. Fig. 4 is a side elevation of the mechanism shown in Fig. 3. Fig. 4ª is a section taken on line *x x* of Fig. 4 looking in the direction of the arrows. Fig. 5 is a sectional detail of the ratchet-wheel. Fig. 6 is a top plan view of the time-computing mechanism with part of the paper-holding device broken away. Fig. 7 is a side elevation of the time-recording mechanism with the impression-paper partially torn away, exposing the time-computing wheels. Fig. 7ª is an end view of the clamp which holds the impression-paper in place. Fig. 7ᵇ is a longitudinal sectional view through the recording mechanism. Fig. 7ᶜ is a partial rear elevation showing the arrangement of the computing-wheels. Fig. 7ᵈ is a detail of one of the pinions. Figs. 8, 9, 10, and 11 are details of the time-computing mechanism and frame. Figs. 12, 12ª, 13, and 13ª are details of a cam-disk. Fig. 14 is a detail of one of the gear-wheels shown in Fig. 15. Fig. 15 is a detail of one of the arbors and gears transmitting movement to the computing-wheels. Fig. 16 is a side elevation of one of the computing-wheels, showing the locking-tooth. Fig. 16ª is a plan view of the same. Fig. 17 is an end view of the impression-roller. Fig. 17ª is a plan view of the same. Fig. 18 is a plan view of the impression-record.

Described in general terms, a machine adapted to carry out my invention comprises as its main feature a series of computing-wheels actuated by the clock mechanism and adapted to compute, according to the way the machine is set to operate, either the time an employee is engaged at work or, if the time of service begins and ends at definite periods, to record the time an employee is not at work. If the latter, the time shown upon the impression-sheet is deducted from the number of hours represented by a full week's work or a full day's work, as the case may be.

My invention also comprises means for resetting the mechanism back to zero when it has registered its capacity of ninety-nine hours, or at any intermediate time, if it is so desired, also a means for automatically stopping and starting the computing mechanism at any time.

My invention further comprises means for taking an impression from the computing-wheels at any time it is desired to know how long any or all of the employees have worked.

Referring to the figures in which the invention is shown more in detail, I will first describe the computing mechanism and then explain its connection with and operation by the clock mechanism.

Referring to the drawings, A, Fig. 1, is a suitable case within which is inclosed the principal mechanism of the machine. The front and back of this case are hinged together, so that it may be opened at any time for inspec-

tion or to take an impression of the time computed. The case A is provided at the top thereof with two dials A′ and U and at the bottom with the opening A^2, inside of which the employees' numbers and the levers for operating the time-recording mechanism are arranged.

A^3 represents number-columns displayed at the front of the case, each number representing one employee. Opposite each of these numbers is a name-plate a'', upon which the employee's name may be placed. When the lever F′ is moved to the right, the name is displayed.

B, Fig. 2, designates as a whole the inner frame of the recording mechanism. This frame is divided into vertical sections or columns b^2 b^3 b^4, Fig. 7, in this instance three sections being shown; but it is obvious that a greater or lesser number could be used, this being determined by the number of employees registering. Each of these vertical sections shown in the drawings contains complete registering mechanism for eighteen employees, the device here illustrated having a total capacity of fifty-four time-computing mechanisms. In columns a a' a^2, Fig. 7, at the right of each of these vertical sections, are arranged consecutively the number by which each employee is registered. These numbers correspond with those shown in the columns A^3. Each number has separate and independent computing-wheels, three in number, c c' c^2, Fig. 10, and a description of one set will suffice for all of them. The frame B, containing this recording and computing mechanism, comprises a number of sections or frame-pieces b, Figs. 9, 10, and 11. These sections are made of sheet metal, having perforations c^3, through which the wheel-arbors pass. At intervals upon each longitudinal edge of these sections or frame-pieces b are lips c^4, bent downwardly at right angles to the top thereof to form partitions between the sections when they are assembled one above the other, as shown more clearly in Fig. 9. Each of these sections or frame-pieces b in a computing mechanism of this capacity has three sets of five perforations c^3, Fig. 10, through which pass the arbors d d' d^2 d^3 d^4, Fig. 11, upon which are mounted the computing-wheels c, c', and c^2 and pinions c^6 and c^7. Each set of numbering or computing wheels comprises what I shall term for the purpose of distinguishing them a "units-wheel" c, an "hour-wheel" c', and a "computing-wheel" c^2. Motion is transmitted to these wheels through the trains of gears C, Fig. 8, which receives motion through arbor I, having connection with the clock mechanism, which in turn is actuated through mechanism hereinafter explained. As the wheels are assembled in the recording and computing mechanism the minute-wheels c are mounted upon the arbor d, the pinions c^6 upon arbor d', the hour-wheels c' upon arbor d^2, the pinions c^7 upon arbor d^3, and the computing-wheels c^2 upon arbor d^4. Each of the numbering-wheels c c' c^2 is provided upon its periphery with impression-numbers from "0" to "9," spaced equidistantly apart. The numbers are positioned upon the wheels so that they may be read horizontally, as shown in Figs. 7ᶜ, 11, and 16. Arbors G G′ G^2, one for each set of recording-wheels, are vertically disposed in the frame B of the recording mechanism. These arbors are alike, so that a description of one will suffice for all three. The arbors G G′ G^2 are provided at intervals corresponding with the sets of numbering-wheels in the column with a notch or recess g, Fig. 15. Mounted upon the arbors G G′ G^2 are a series of gear-wheels g', corresponding in number with the number of sets of computing-wheels in that column. Each of these gear-wheels g' is provided with a split sleeve g^2, Fig. 15, the outer end of which is bent slightly inward and adapted to fit into the notches g on the arbor. The gears are thus held into frictional engagement with the arbor and turn with it in the operation of the computing mechanism.

Movably secured to each of the frame-pieces b are the lever-arms F, one for each set of computing-wheels. Mounted upon each of the lever-arms is a pair of gear-wheels f f', adapted to mesh with each other and when placed into operating position to mesh with the gears g' upon the arbors G G′ G^2 to transmit motion to the computing-wheels in a manner hereinafter described. The arms F carry the operating-levers F′ (Shown in Figs. 1, 7ᵇ, and 8.) A projection f^2 is provided at what I shall term the "elbow" of the arm F. Disposed at suitable positions in the frame B with relation to the movement of the arms F are vertical rods F^2, partially compassing which is a sheet-metal strip f^3, Fig. 9, having an outwardly-bent flange. The strip f^3 is held in place upon the rod F^2 by being clamped tightly thereon, so that a movement of one will move the other. The lower end of this rod rests in an aperture in the frame B. The upper end is provided with a small crank-arm f^4, Fig. 6.

Extending horizontally across the top of the frame B is a bell-rod H, Fig. 6, provided at intervals with apertures adapted to receive the free end of the crank-arm f^4. At each end of the bell-rod H is provided an offset h. A bell-wire h' is positioned in the case so that it rests within this offset h and is actuated at each movement of the bell-rod H to strike one or the other of the bells H′ H^2 with one of the hammers h^2 h^3. Thus as an employee who is about to start his time moves the lever F′ corresponding to his number to the left he has brought the projection f^2 on the lever-arm into contact with the flange f^3, which has in turn, through the crank-arm f^4, moved the bell-rod H a suffi-

cient distance to actuate the wire h' and ring one of the bells, which sounds an alarm, enabling the person in charge, without observing the clock, to tell how many employees are registering.

Referring now to the assembling and operation of the computing-wheels, as before explained, they have the numbers positioned vertically across the peripheral face thereof. The units-wheel c, positioned upon the arbor d, is provided with a gear i upon the under face thereof, and the teeth of this gear are adapted to mesh with those upon gear f' when gear f is in mesh with gear g'. There are ten teeth in this gear i, one corresponding to each figure upon the periphery of the wheel. Upon the other face of the wheel is a small depression i', upon either side of which is an upwardly-extending tooth. The pinion c^6, mounted upon arbor d', has a sleeve i^2, the edge of which rests upon one of the frame-pieces b to elevate the teeth of said pinion, so that they will mesh with the teeth upon the computing-wheels. The teeth of this pinion are of two widths, as shown in Fig. 7^d, and are disposed alternately, one wide tooth i^3 and one narrow tooth i^4, for a purpose hereinafter described. The hour-wheel c', which is mounted upon the arbor d^2, is the same size as the units-wheel with the ten figures positioned vertically across the peripheral face thereof. The upper edge of the wheel (as it is positioned upon the arbor) is provided with teeth, in this instance twenty in number, two teeth corresponding with each figure upon the periphery of the wheel. The lower edge of this hour-wheel has two projecting teeth j, one upon either side of a small depression in the edge of the wheel. A pinion c^7, mounted upon arbor d^3, having alternately a wide and a narrow tooth, the same as pinion c^6, previously described, meshes with the teeth j upon hour-wheel c' in the operation thereof, and at certain predetermined intervals transmits motion to the computing-wheels c^2. The computing-wheel c^2, mounted upon arbor d^4, is of the same size as the minute and hour wheels and has the figures thereon vertically disposed across the peripheral face thereof. The lower edge of the wheel is provided with teeth. (Shown in detail in Figs. 16 and 16^a.) There are two teeth for every figure upon the periphery of the wheel. As shown in Fig. 16^a, there is a blank tooth j' so positioned upon the wheel that this tooth reaches the pinion c^7 in the revolution of the computing-wheel when the cipher on the said wheel has reached the forward position, or the position from which the impression is taken. The time-recording mechanism has now reached the limit of its recording capacity and is locked in this position until reset, which is done by mechanism hereinafter described.

Referring now to the clock mechanism, I will explain the connection and operation of the same in conjunction with my time-computing device.

In Figs. 3, 4, and 4^a I have shown the movement of an eight-day clock with what changes in its construction I have made in utilizing it to operate the arbor I, which transmits motion to the train of gears C, operating the time-wheels, extends upwardly to the clock mechanism, and has upon the end thereof a bevel-gear J, which meshes with another bevel-gear J'. The bevel-gear J' has a pinion J^2 mounted upon shaft J^3, and this pinion meshes with the striking-wheel K of the clock. In utilizing the main wheel of the striking-train to reset the computing-wheels I have removed the usual pawl and ratchet from the wheel K and have placed it upon the second wheel t, so that wheel K will move in either direction. This wheel t is mounted upon an arbor journaled within the frame of the clock-movement and is operated by a pinion t', journaled upon the same arbor and meshing with the gears upon wheel K. The arbor K' extends upwardly to the clock mechanism and has at the top thereof a gear k, which is connected, through a train of gears, to the hour-wheel K^2. Through this arbor K' and its coöperative mechanism the operation of the computing-wheels is regulated. Upon the hour-wheel spindle k^2 is mounted what I shall term a "double cam-wheel" k^3. (Shown in detail in Figs. 12 to 13^a.) These cam-wheels telescope each other upon the hour-wheel spindle, and by moving one upon the other the extent of the cam-surface can be regulated a greater or less distance, as desired, according to the number of hours it is desired to keep the recording mechanism out of operation. These cam-wheels are kept turning with the hour-wheel, which through coöperative mechanism is operating the arbor K'. I have changed the construction of the striking-rod l of the clock mechanism, and by utilizing the striking train of gears for transmitting motion to the recording-wheels through arbor I. I have extended the release-rod l, which is secured at one end to an arbor l', which is journaled within the frame of the clock mechanism outside the frame l^2 of the clock-movement, and extend the same a sufficient distance that it will contact with the periphery of the cam-wheels k^3. The cam-wheels k^3 being positioned upon and moving with the hour-wheel spindle, it will be observed that they make one complete revolution every twelve hours. If the employees' hours of service extend for illustration we will say from eight a. m. until six p. m. and the computing mechanism is set to operate while the employees are at work, the cams projecting upon these wheels are turned so that they represent one-sixth of the circumferential surface of the wheel, the other five-sixths of this surface representing the number of hours which the computing

mechanism is to be in operation. When the computing mechanism is started, (by an operation to be hereinafter explained,) the rod *l* is in contact with the surface of the cam-wheel at the point *x*, and during the time lapsing from eight a. m. until six p. m. the cam-wheels will have turned until the cam projection k^4 comes in contact with rod *l*, when it is automatically raised, (by mechanism hereinafter explained,) and this operation locks the reading and computing mechanism. Mounted upon the minute-spindle near the rear frame of the clock-movement is the wheel l^3, Fig. 4ª, having ten teeth upon the periphery thereof corresponding in point of time to one-tenth of an hour. This wheel l^3 is operated the same as the ordinary striking-wheel of a clock; but by the uniform arrangement of the ten teeth upon the periphery thereof it is unlatched through the operation of the catch-rod l^4 at intervals of every six minutes. Each time the catch-rod l^4 is actuated and moved out of contact with one of the teeth upon wheel l^3 the said wheel moves the space of one tooth, and by so doing the arbor I has been actuated a corresponding distance, and through the train of gears in contact therewith it has transmitted this movement to the units-wheel *c* and caused it to revolve the space of one figure thereon. This operation is of course repeated every six minutes during the time the computing mechanism is in operation. We will assume, for illustration, that all of the recording-wheels are set at zero and the recording mechanism is ready for operation. The wheel *c*, as above explained, being moved the space of one figure for every six minutes, it requires just one hour's time to make a complete revolution. This wheel is so positioned upon an arbor *d* that at the last movement in the hour the cipher upon the periphery of the wheel is presented in impression position and the depression *i'*, with the two teeth upon the upper edge of this wheel, has come into mesh with the tooth upon the pinion *c*, which meshes with the teeth upon the hour-wheel *c'* and has moved the said hour-wheel the space of two teeth, bringing into impression position the figure "1," which records the first hour's time. The minute-wheel *c* is again being revolved at the rate of one figure every six minutes until it makes the second complete revolution, when through the pinion c^6 it will actuate the hour-wheel and it is moved the space of two teeth and presents the figure "2," thus recording two hours' time. This operation is repeated until the hour-wheel has made a complete revolution and has recorded ten hours' time, when through the operation of the two teeth upon the under face of said wheel coming into contact with the pinion c^7, the teeth of which pinion are in mesh with the teeth upon the computing-wheel c^2, the said computing-wheel is moved the space of two teeth, bringing into impression position the figure "1" on said wheel, recording thereby ten hours' of time. This operation of recording is repeated until the computing-wheel has made one complete revolution. The hour-wheel moves the space of one figure for every complete revolution of the minute-wheel, and the computing-wheel moves the space of one figure for every complete revolution of the hour-wheel. When the computing-wheel has made one complete revolution, it has registered the limit of its capacity and the blank tooth *j'* has come into contact with the pinion c^7 and is locked into this position until the mechanism is reset, which is done by mechanism hereinafter explained.

Referring more particularly to Figs. 6 and 7, the arbor K' has mounted thereon a series of cam-wheels *m*, there being one cam-wheel for each column of recording-wheels. Pivotally secured to the top plate of the frame B are the lever-arms m' m^2 m^3, each one held in normal position by a spring n n' n^3. These cam-wheels are so adjusted that the projection thereof comes in contact with the arm of one of these levers m', m^2, or m^3 at the particular hour the employees registering upon the time-wheels in one column leave their work for one hour's time, more or less, at noon. For illustration, referring to Fig. 6, the lever-arm m' regulates the operation of the recording-wheels in the first column b^2. If the noon hour of the employees registering in this column begins at 11:30 a. m., the cam-wheel *m*, contacting with the lever-arm m', is so adjusted upon the arbor K' that the cam projection contacts with the lever-arm m' at that hour. This contact of the lever m' with the projection upon the cam-wheel tilts the lower arm of the lever *o* to the position shown in dotted lines, throwing the gears O out of mesh with intermediate wheel g', thereby disconnecting the operation of the time-computing mechanism in that column until the cam projection has passed beyond the lever-arm m', when it will resume its normal position and the recording-wheels are placed in operation again. To throw the recording mechanism out of operation for longer periods of time, I provide a lever P, secured at its fulcrum-point *p* to the casing A. The lower arm p' of this lever extends downwardly through an elongated slot p^2 in the bell-rod H. The upper arm p^3 extends upwardly to a point enabling it to pass under the shoulder *r*, Figs. 3 and 4, of the rod *l*.

Mounted upon the arbor K' is a cam-wheel R. This wheel R is positioned upon the arbor K', so that at the hour the employees stop work the cam projection n^3 upon said wheel will have reached the small arm p^4, secured to lever-arm p'. By the contact with the cam the lower arm p' of lever P is moved a sufficient distance to throw the upper arm p^3 under the shoulder *r* of the rod *l*,

holding the said rod away from the cam-wheels k^3 and locking the computing mechanism. The lever p^3 will hold the rod l in this "out-of-contact" position until one of the levers F′ has been operated. The first employee to register moves one of the levers F′ corresponding to his number to recording position. This operation moves the bell-rod H to the left, as shown in Fig. 6, carrying with it the lower arm p' of lever P, which extends through the slot p^2 in the bell-rod H. This movement of lever p' has caused the lever p^3 to move in the opposite direction and release the rod l, which drops to normal position and sets the computing mechanism into operation.

When it is desired to know the number of hours the employees or any of them have worked, an impression is taken upon a sheet of paper placed over the computing-wheels in the following manner: Upon the top of the frame B is secured a paper-holding device. (Shown in cross-section in Fig. 7ª.) Q is a metal strip extending across the top of the frame B and is pivotally secured thereto at each end thereof. A spring q holds the bent edge q' of the metal strip Q in normal position firmly against the top section of the frame B. When it is desired to take an impression of the time computed upon the recording-wheels, a sheet of plain paper and a carbon-sheet are secured at one end under the bent edge q' of the metal strip Q, as shown in cross-section in Fig. 7ª. The sheets of paper so hung in the paper-holder cover the front of the computing-wheels, as shown in Fig. 7 with the paper partially torn away to show some of the computing-wheels. As previously explained, the figures upon the periphery of the computing-wheels are in raised position thereon, and in operation the figures directly in front represent the time computed. With the paper in the position just explained an attendant passes a roller (shown in Figs. 17 and 17ª) down over the paper and presses it in contact with the numbers on the wheels, and by means of the carbon-sheet an impression of the time recorded on said wheels is made upon the plain paper. The attendant raises the holding-strip Q and removes the paper with the record of all the employees impressed thereon.

In Fig. 18 I have shown an impression-sheet which, it will be observed, shows the number of each employee and the time in hours and the fraction of an hour which each one has been working. The first column of figures at the left indicates the employee's number and the next three columns the time computed by each of the three recording-wheels and in this impression-sheet indicates that No. 1 has worked one hour and two-tenths of an hour, as have all the rest in that column. Those registering in the second column, beginning with No. 19, have each worked thirty-four and five-tenths of an hour. Those registering in the third column, beginning with No. 37, have each worked sixty-seven hours and eight-tenths of an hour. Upon the impression-sheet here illustrated it is shown that those registering in each column have all worked the same number of hours. It is obvious, however, that each employee might have been registered a different length of time, if the device was in use in a place where the employees were at work at irregular intervals.

When the machine has recorded its full capacity of ninety-nine hours or when for any other reason it is desired to reset the computing mechanism at zero, it is done by winding the striking-spring S of the clock in the usual manner, which, through the medium of the bevel-gears, revolves the arbor I. The arbor I has upon its lower end a gear corresponding in size and number of teeth with the gears mounted upon arbor G′. The arbors I and G′ are joined together at the top of the frame B in any desired manner. The gear upon the arbor I corresponding with that shown at s, Fig. 6, meshes with a train of gears S′ (shown in Fig. 6) and transmits the motion thereof to each of the arbors G G′ G^2 to reset the recording-wheels to zero position. When the recording mechanism is in operation, the wheels are turned from left to right. (Viewed as in Fig. 7ᶜ.) When the device has reached the limit of its registering capacity, the computing-wheels c^2 are locked from further movement in that direction by means of the blank tooth (shown in Fig. 16ª) coming in contact with the pinion c^7. This wheel makes but one revolution in recording the ninety-nine hours, and to reset the mechanism to zero the wheels are turned in opposite direction one revolution to original position. In the operation of winding the striking-spring of the clock it reverses the movement transmitted through the arbor I, and the train of gears meshing with the gear upon said arbor to the arbors G G′ G^2 resetting the computing mechanism. The wheels c c' c^2 are turned in this reverse movement until the blank tooth j' has again come in contact with the pinion c^7, when it is locked in that position, and that set of wheels is in zero position again. When some of the recording-wheels have not registered their full capacity, they are of course reversed to zero position sooner than those that have recorded ninety-nine hours. The gear-wheels upon the arbors G G′ G^2 being positioned thereon, as illustrated in Fig. 15, they are held to the arbor by friction and turn with it until any particular set of recording-wheels receiving motion through one of these gears has reached zero position, it no longer moves with the arbor, but remains at rest, the arbor revolving within the split sleeve g^2 until all of the recording-wheels are reset to zero position, when the striking-train is wound up.

The dial U is mounted upon the hour-wheel spindle and revolves with the cam-wheels k^3. A hand u indicates upon said dial the hour at which the computing mechanism is to be set into operation. The cam-wheels k^3 are so positioned upon the hour-wheel spindle that the said wheels have revolved so that the projections k^4 have passed beyond the rod l and said rod comes in contact with the wheels at the point x, when the computing-wheels are started into operation.

In the foregoing description I have explained the operation of the mechanism computing the time while the employees were engaged at work. In practice it has been found in some instances more desirable to record the time when the employees are not at work. For illustration, if all of the employees are working ten hours a day and are promptly on time each day their full week is counted as sixty hours, and the record-sheet will show the cipher in impression position upon each wheel, indicating that each one of the employees had served his full time. If, however, some of them are late or absent at any time, their recording mechanism being in operation, the length of time of such absence is recorded against them and deducted from the full week of sixty hours. As is obvious, the operation of the computing mechanism would be exactly the same in either case, except that the levers F′ would be moved in the opposite direction.

I have described quite in detail the construction of the mechanism employed herein; but it is obvious that any of the details thereof might be changed without departing from the spirit of my invention, which consists, essentially, in providing time-computing mechanisms having a plurality of computing-wheels having the numbers vertically disposed around the peripheral face thereof, said wheels mounted in longitudinal alinement and operated independently or collectively by any suitable actuating mechanism.

I have shown a clock-movement to be used as the actuating mechanism in this instance; but I contemplate by my invention any other means of transmitting movement to the computing mechanisms which I have shown and described. I also contemplate the mechanical equivalents of any of the mechanisms herein shown as coming within the scope of my invention.

I have herein shown and described a mechanism having a recording capacity of ninety-nine hours; but I do not wish to be limited to that number of hours, as it is obvious that by adding a greater number of computing-wheels the capacity of the machine might be increased to any extent desired.

I claim—

1. In a time recording and computing mechanism, a plurality of recording and computing wheels, synchronous mechanism operating said wheels, means for automatically connecting one with the other at predetermined periods and means for automatically disconnecting them at other predetermined periods, substantially as described.

2. In a time recording and computing mechanism, the combination of the computing-wheels raised figures positioned vertically across the peripheral face of said computing-wheels, means for actuating said wheels to predetermined rotation, and means for automatically computing the time, substantially as described.

3. In a time recording and computing mechanism, a plurality of sets of time recording and computing wheels, raised figures positioned vertically across the peripheral face of the recording and computing wheels each set of wheels mounted in longitudinal alinement, means for actuating said wheels at predetermined intervals, and means for automatically recording and computing the time upon said wheels during the said intervals, substantially as described.

4. In a time-recorder, a supporting-frame for the time recording and computing mechanism, a plurality of sets of recording-wheels mounted in columns in said frame, raised figures disposed vertically across the peripheral face of said wheels, and adapted to be read from left to right in the column, substantially as described.

5. In a machine of the class described, a supporting-frame for the recording and computing mechanism, a plurality of sets of recording and computing wheels mounted in said frame, each set of said wheels mounted in longitudinal alinement, raised figures positioned vertically at regular intervals across the peripheral face of said wheels and adapted to be read from right to left from one wheel to the next, substantially as described.

6. In a machine of the class described, a sectional supporting-frame for the recording and computing mechanism, vertical number-columns upon the front of said frame, longitudinal frame-pieces b between each set of recording and computing wheels adapted to support the arbors upon which said wheels are mounted, and to form partitions between the different sets of mechanisms, substantially as described.

7. In a machine of the class described, a sectional supporting-frame for the recording and computing mechanism, a plurality of sets of recording-wheels mounted in columns in said frame, an arbor connected through a train of gears with the striking-train of a clock-movement, said arbor adapted to transmit motion through another train of gears to each set of the recording and computing wheels, substantially as described.

8. In a time-recorder, a sectional supporting-frame for the time-recording mechanism, a plurality of sets of recording and comput-

ing wheels mounted in columns in said frame, synchronous mechanism for automatically operating said recording and computing wheels, and lever mechanism adapted to connect and disconnect the computing-wheels and the operating mechanism, substantially as described.

9. In a time-recorder, a sectional supporting-frame for the time-recording mechanism, a plurality of sets of recording and computing wheels mounted in columns in said frame, synchronous mechanism for automatically operating said recording and computing wheels, and mechanism for disconnecting any individual set of wheels from the operating mechanism at regular periods, substantially as described.

10. In a time recording and computing mechanism, a plurality of recording and computing wheels, said wheels mounted in longitudinal alinement and adapted to be read from right to left in combination with a clock mechanism operating in conjunction therewith, a cam-wheel mounted upon a clock-actuated shaft, the periphery of said wheel adapted at predetermined times to be in contact with the operative mechanism of the clock-movement, whereby the recording and computing mechanisms are automatically started or stopped, substantially as described.

11. In a recording and computing mechanism, a set of recording and computing wheels for each employee registering in combination with a clock mechanism adapted to operate in conjunction therewith, a toothed wheel mounted upon the minute-wheel spindle of said clock, the teeth upon said wheel representing predetermined fractional parts of an hour, said wheel adapted to be moved the space of one tooth at every fractional part of an hour represented thereby and to transmit said movement to the computing mechanism, substantially as described.

12. In a recording and computing mechanism, the combination of the recording and computing wheels with a clock-movement for operating the same, means for locking said wheels when they have reached the limit of their recording and computing capacity, an arbor connected through a train of gears with each set of recording and computing wheels, said arbor also having connection with the striking-train of the clock mechanism, whereby through the winding of said spring of the striking-train the recording and computing wheels are reversed in their movement and reset to zero position, substantially as described.

13. In a recording and computing mechanism, a plurality of sets of recording and computing mechanisms, a clock mechanism adapted to transmit movement to said recording and computing mechanism, means for automatically starting and stopping said mechanisms, and means for locking said mechanism when it has reached the limit of its computing capacity, and means connected with the striking-train of the clock mechanism for resetting the recording and computing mechanisms to zero position, substantially as described.

14. In a device of the class described, a plurality of sets of recording and computing mechanisms, a clock mechanism adapted to transmit movement to said recording and computing mechanisms, means for automatically starting and stopping said mechanisms, means for locking the computing-wheels in position when they have registered the limit of their capacity, and means connected with the striking-train of the clock mechanism adapted to reverse the movement of any one or all of said sets of recording and computing mechanisms to zero position, substantially as described.

15. In a device of the class described, a case containing the recording and computing mechanism, and clock mechanism for operating the same, said case having in front an opening through which are exposed columns of numbers and name-plates representing each employee registering thereon, lever-arms corresponding with each number in said columns, each lever adapted when moved away from or toward its corresponding number to start or stop the recording and computing wheels operating in conjunction therewith, substantially as described.

16. In a device of the class described, a case containing the recording and computing mechanism and clock mechanism for operating the same, an opening through the front of said case through which are exposed columns of figures representing the number of each employee registering thereon, and lever-arms corresponding with each number in said columns, said levers adapted to actuate a bell-rod and sound an alarm each time it is operated to connect or disconnect the registering mechanism with the operating mechanism, substantially as described.

17. In a device of the class described, the combination with the time recording and computing wheels and the clock mechanism adapted to operate the same, cam-wheels mounted upon the hour-wheel shaft which automatically regulates the time for starting and stopping said recording and computing wheels at predetermined intervals during each day, substantially as described.

18. In a device of the class described a supporting-frame for the recording and computing mechanism, number-columns in proximity to each set of computing mechanisms, said columns having raised figures thereon corresponding to each set of recording and computing mechanisms and indicating the number by which each employee is registered, and recording and computing wheels having

raised figures thereon so mounted in the frame that the numbers presented in impression position upon the wheels are on a plane with the numbers upon the number-columns, substantially as described.

19. In a device of the class described, a supporting-frame for the recording and computing mechanism having number-columns with the numbers in raised and vertical position thereon, the figures presented in impression position by the wheels of the recording and computing mechanism being on a plane with those upon the number-columns, a paper-holding device mounted upon the top of the said supporting-frame and adapted to hold a sheet or sheets of paper upon which an impression of the numbers is taken, substantially as described.

20. In a computing mechanism the combination of a plurality of sets of recording and computing wheels mounted in columns in a supporting-frame, each set of said wheels operating in longitudinal alinement, substantially as described.

21. A computing mechanism, comprising in combination, sets of recording and computing wheels for each individual registering, said wheels mounted in a supporting-frame, means for operating the units-wheels predetermined distances of rotation, and means for transmitting the record made upon the units-wheels to the computing-wheels, substantially as described.

22. In a computing mechanism, the combination of a supporting-frame having disposed therein the separate set of recording and computing wheels for each individual registering, means for actuating the units-wheels a predetermined number of times, and means for transmitting to the computing-wheels the number of times the units-wheel has been actuated.

23. A computing mechanism comprising the combination of a supporting-frame having disposed therein the recording and computing wheels, means for actuating the units-wheel a predetermined number of times, means for transmitting to the computing-wheels the number of times the units-wheel has been actuated, and means for reversing the movement of said wheels when they have reached the limit of their recording capacity whereby they are set to zero position, substantially as described.

24. In a computing mechanism, the combination of the recording and computing wheels with an arbor having a plurality of gear-wheels frictionally mounted thereon, means for actuating said arbor whereby movement is transmitted to said computing-wheels, substantially as described.

25. In a computing mechanism, a plurality of sets of recording and computing wheels mounted in columns in a supporting-frame, an arbor vertically disposed in each column of said frame and means for actuating the same, a plurality of gear-wheels frictionally mounted upon said arbor, one of said gear-wheels adapted through a train of gears to transmit motion to each set of the recording and computing wheels, substantially as described.

26. In a computing mechanism, a plurality of sets of recording and computing wheels arranged in columns in a supporting-frame, a power-transmitting arbor having a plurality of gears frictionally mounted thereon disposed in each of said columns, means for actuating said arbor, whereby through a train of gears the recording and computing wheels are operated, means for locking said wheels when they have reached the limit of their recording capacity, and means for reversing the movement of said wheels to reset them to zero position, substantially as described.

27. In a computing mechanism, the combination of the computing-wheels with a friction-arbor having circumferential recesses therein, gear-wheels mounted upon said arbor, said gear-wheels having split sleeves, one edge of which fits into said recesses, and means for actuating said arbor whereby movement is transmitted to said computing-wheels, substantially as described.

In witness whereof I have hereunto signed this specification in the presence of two witnesses.

JOHN W. NUNAMAKER.

Witnesses:
CHARLES I. COBB,
ROBERT T. CLEGG.