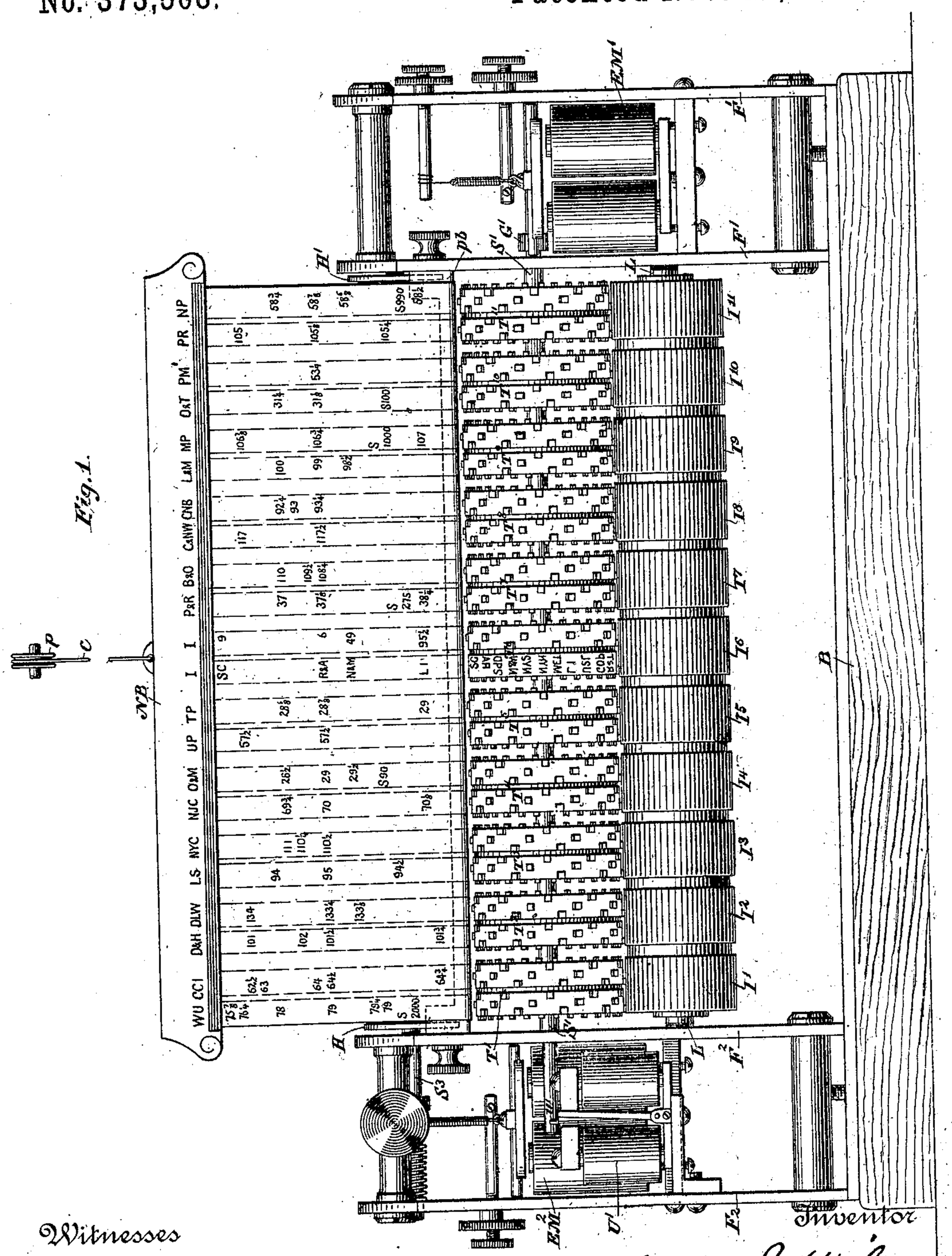
(No Model.)

6 Sheets—Sheet 1.

C. J. WILEY.

PRINTING TELEGRAPH.

No. 373,508. Patented Nov. 22, 1887.



Witnesses

Geo. W. Breck.

Chas. E. Ashley

Chas. J. Wiley

By his Attorney

Chas. A. Anderson

(No Model.) 6 Sheets—Sheet 2.

C. J. WILEY.

PRINTING TELEGRAPH.

No. 373,508. Patented Nov. 22, 1887.

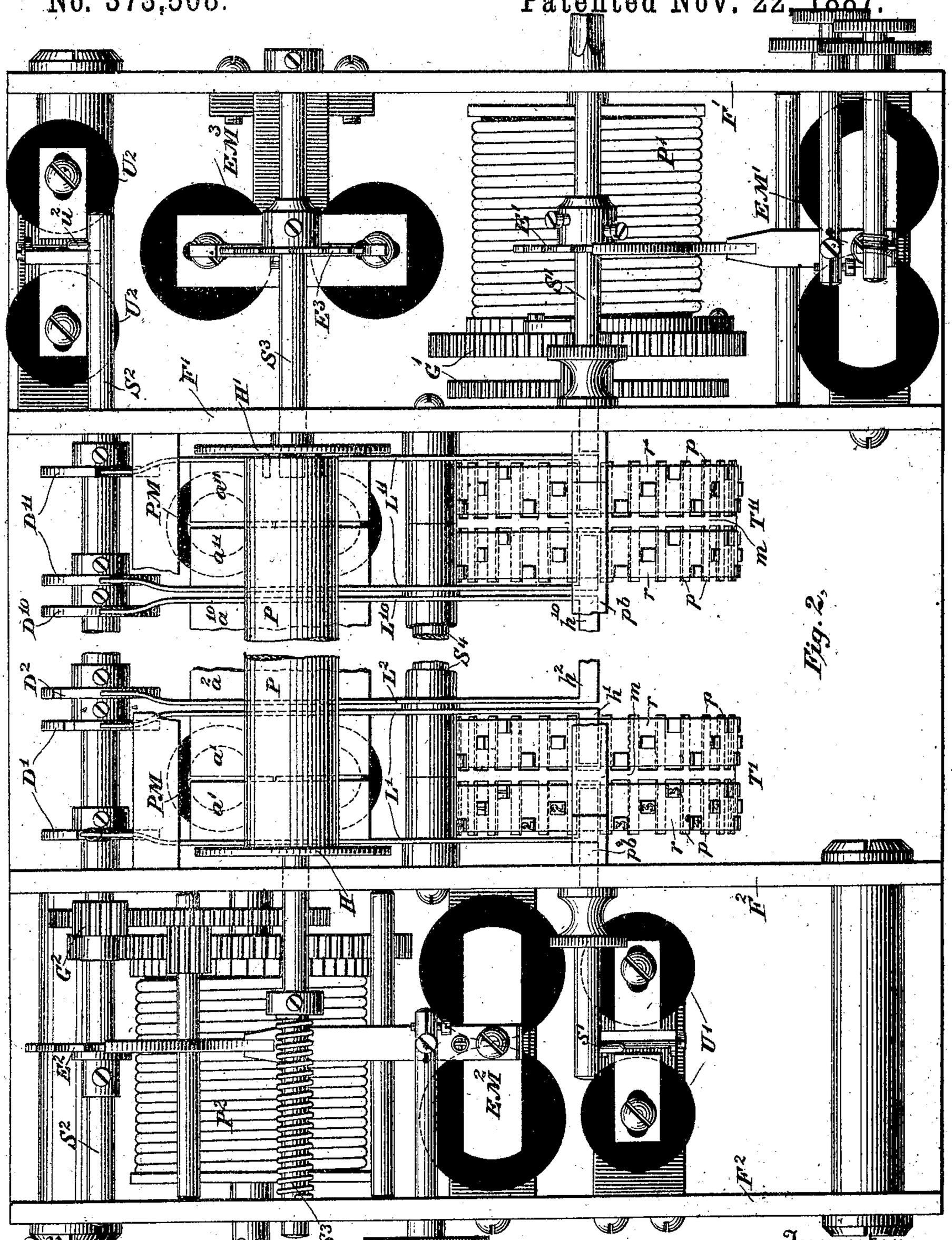


Fig. 2.

Witnesses

Geo. W. Breck.

Carrie E. Ashley

Inventor

Charles J. Wiley

By his Attorney

Charles F. Judson

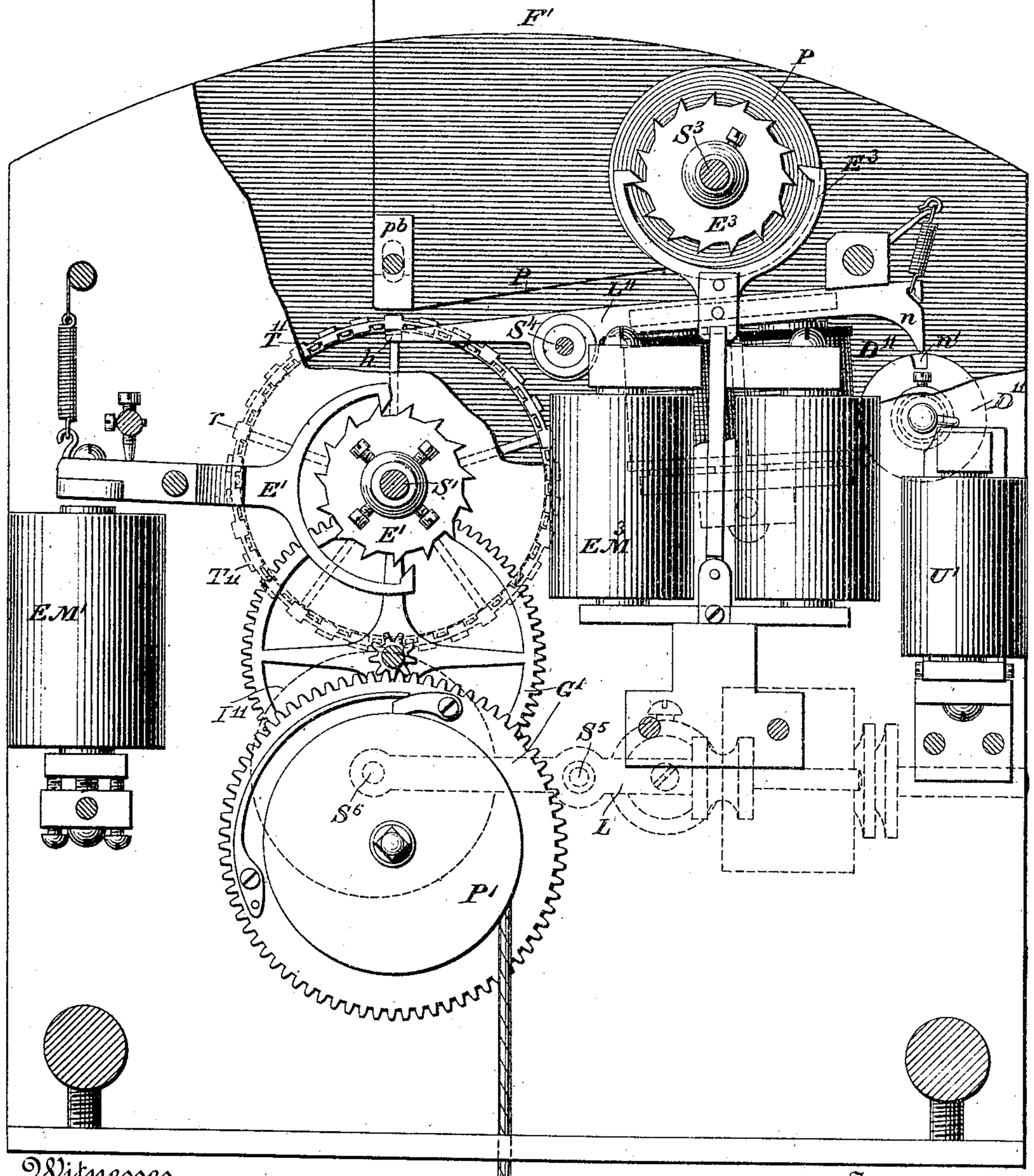
(No Model.) 6 Sheets—Sheet 3.

C. J. WILEY.

PRINTING TELEGRAPH.

No. 373,508. Patented Nov. 22, 1887.

Fig. 3.



Witnesses

Geo. W. Breck.

Carrie E. Ashley

Inventor

Charles J. Wiley

By his Attorney

Charles A. Judson

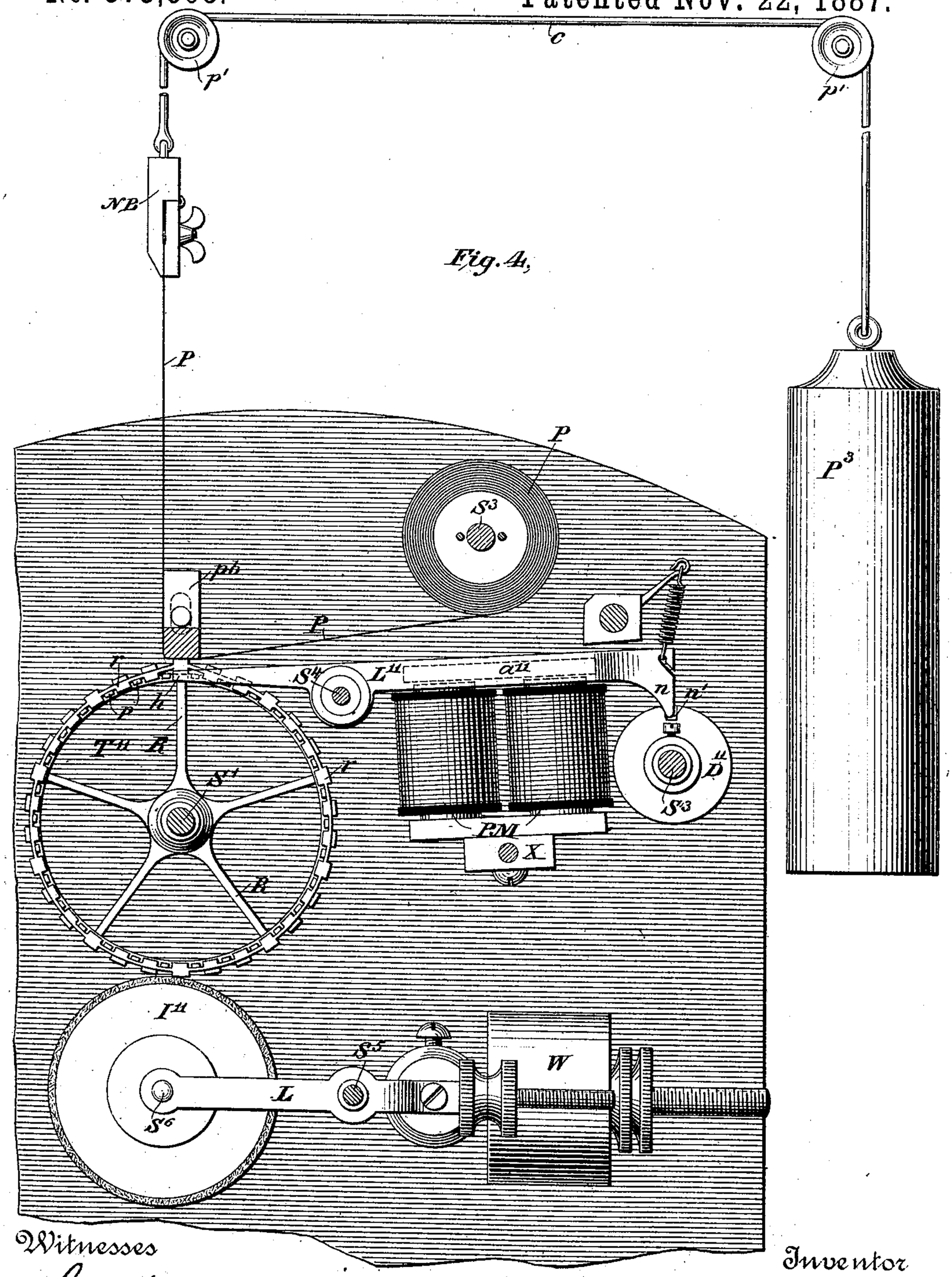
(No Model.) 6 Sheets—Sheet 4.

C. J. WILEY.

PRINTING TELEGRAPH.

No. 373,508. Patented Nov. 22, 1887.

Fig. 4.



Witnesses

Geo. W. Breck.

Carrie E. Ashley

Inventor

Charles J. Wiley

By his Attorney

Charles A. Judson

(No Model.)

6 Sheets—Sheet 5.

C. J. WILEY.

PRINTING TELEGRAPH.

No. 373,508. Patented Nov. 22, 1887.

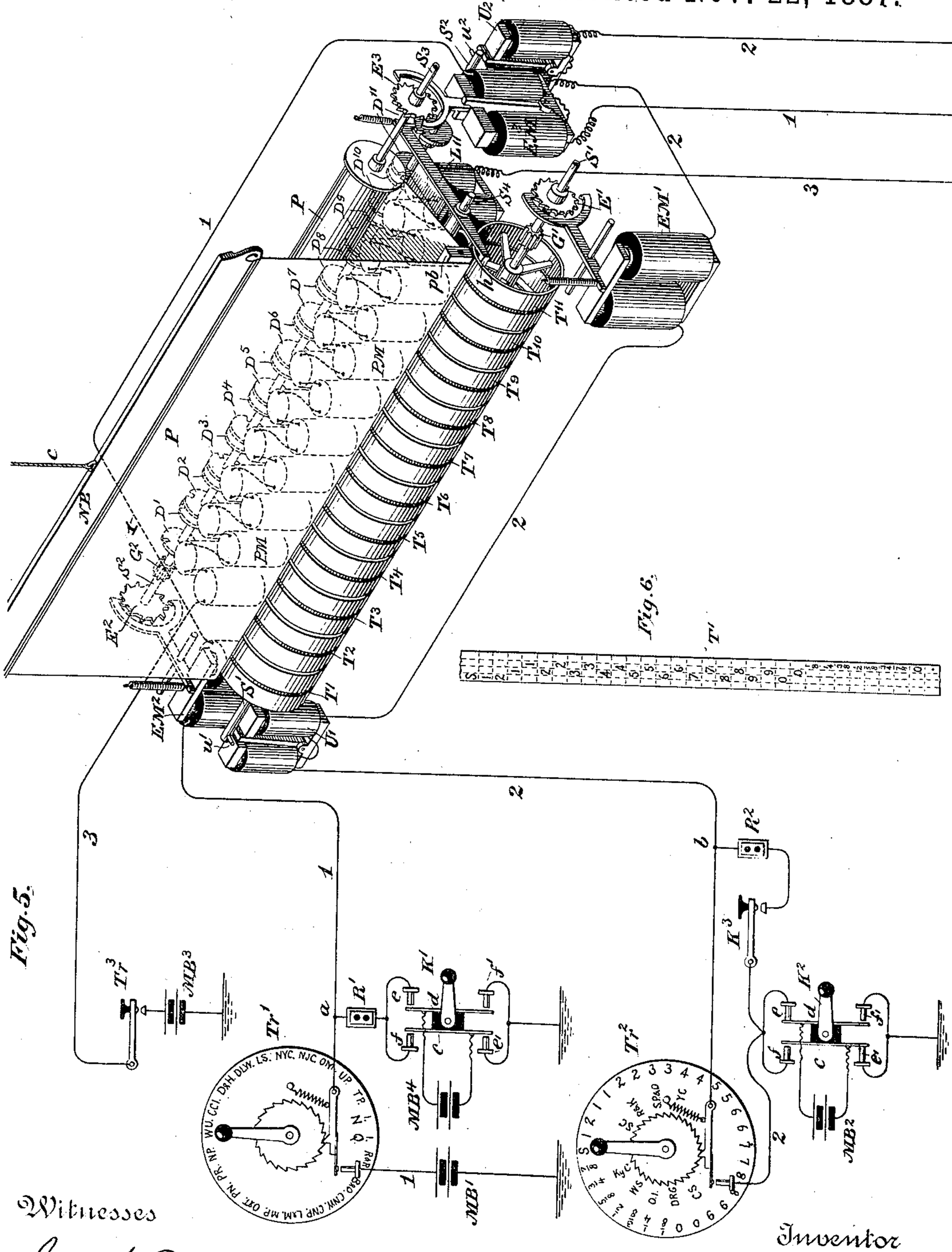


Fig. 5.

Fig. 6.

Witnesses

Geo. W. Breck.

Carrie E. Ashley

Inventor

Charles J. Wiley.

By his Attorney

Charles A. Gridley

(No Model.) 6 Sheets—Sheet 6.

C. J. WILEY.

PRINTING TELEGRAPH.

No. 373,508. Patented Nov. 22, 1887.

Fig. 7,

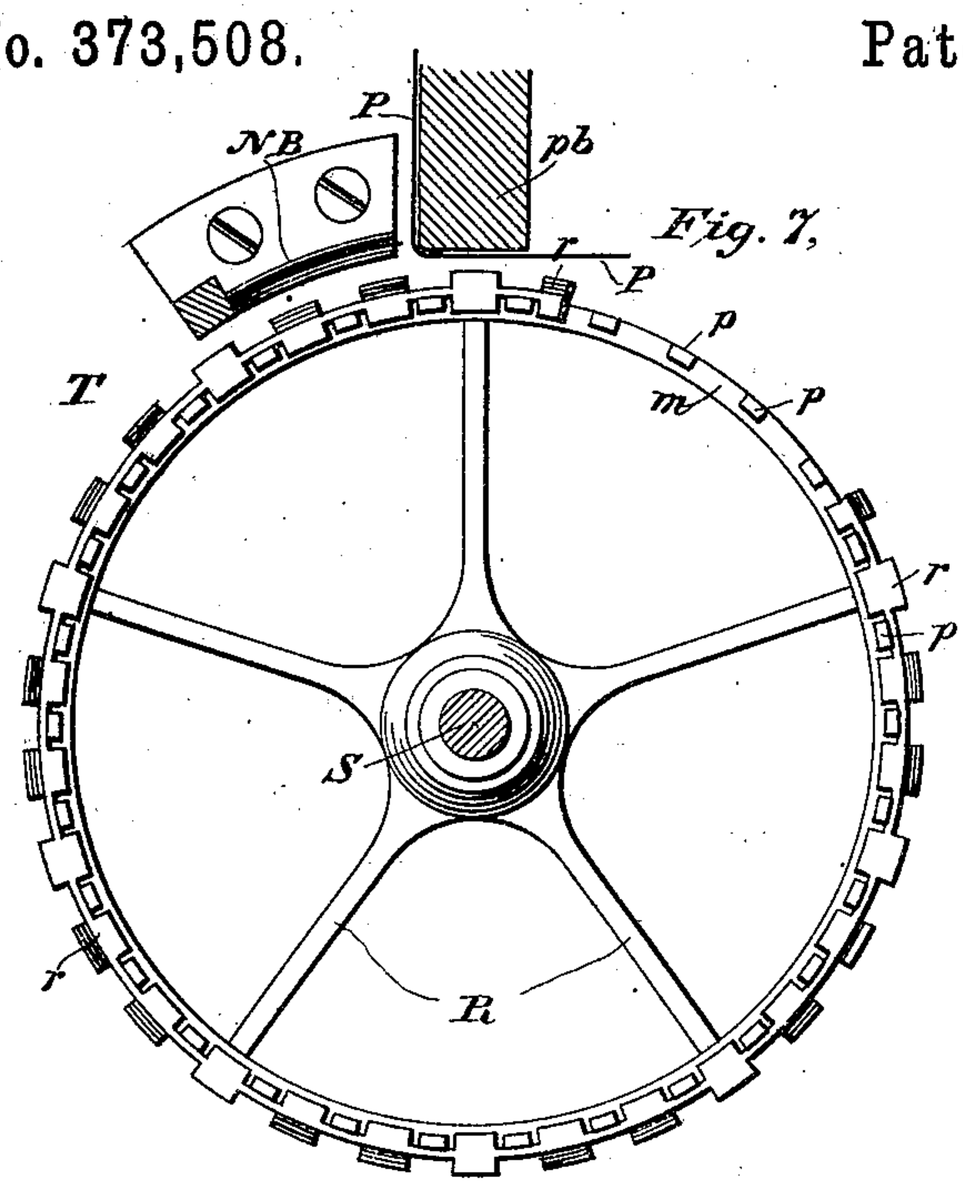


Fig. 8,

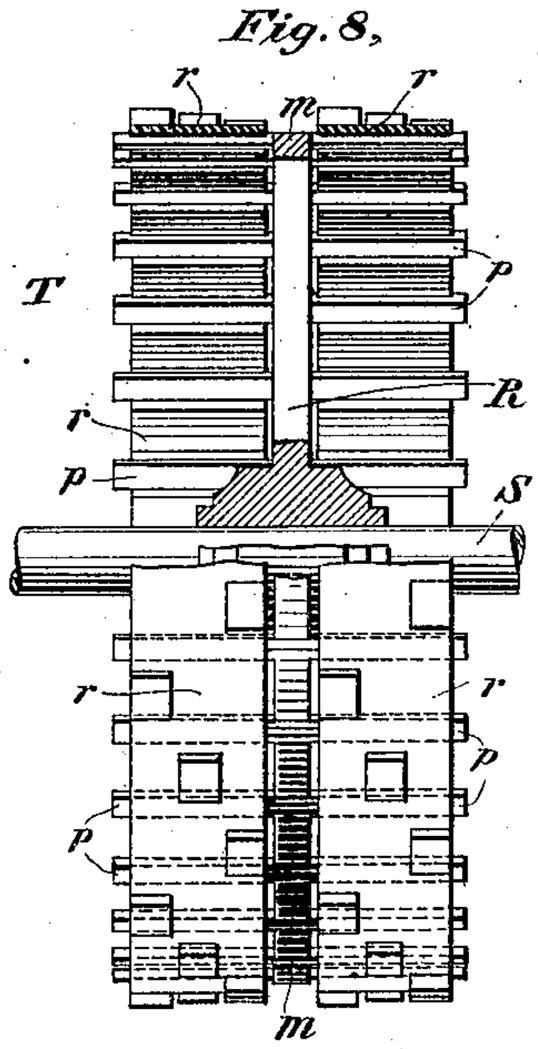


Fig. 10,

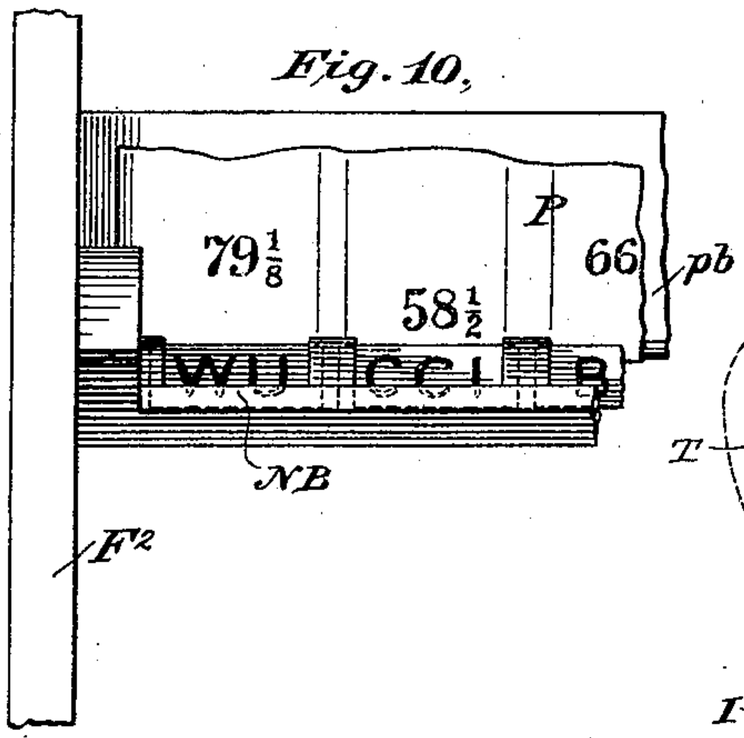
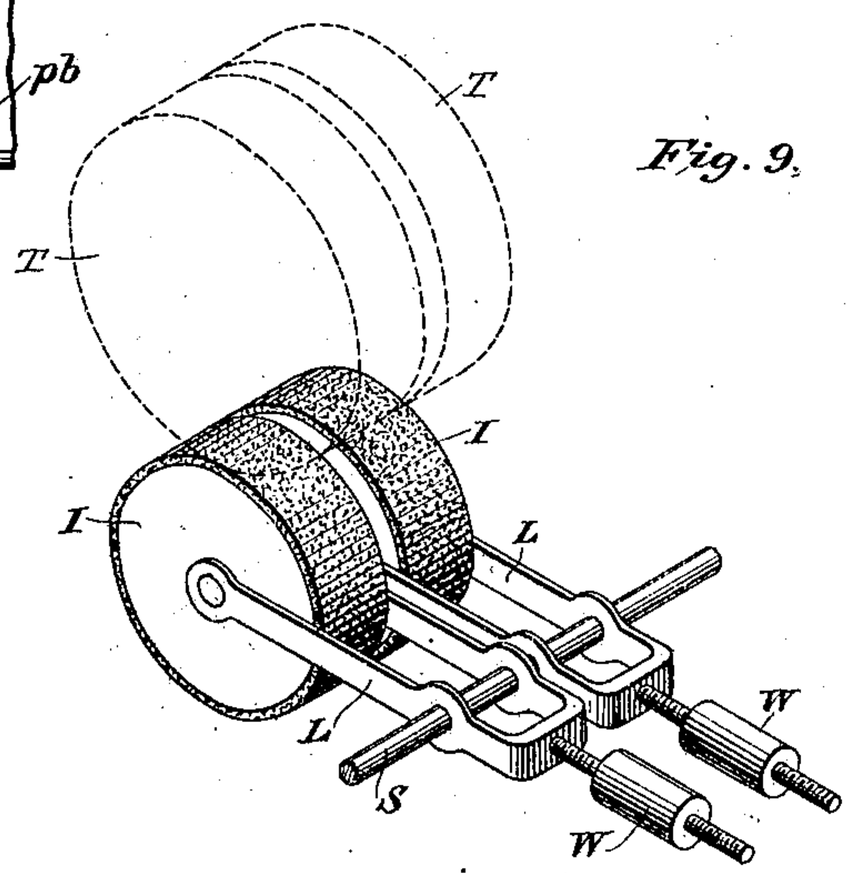


Fig. 9.



Witnesses
Geo. W. Breck.
Carrie E. Ashley

Inventor
Charles J. Wiley
By his Attorney
Charles Hudson

UNITED STATES PATENT OFFICE.

CHARLES J. WILEY, OF BROOKLYN, NEW YORK.

PRINTING-TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 373,508, dated November 22, 1887.

Application filed May 2, 1887. Ser'al No. 236,750. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. WILEY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Printing-Telegraphs, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

Printing-telegraphs heretofore employed in printing quotations of stocks and the like use a narrow fillet of paper upon which the symbols and prices of the commodities are printed from one or two type-wheels in continuous lines. In one-wheel instruments the symbols and prices are in one continuous line, and in the two-wheel instrument the symbols are printed in one line and the prices or quotations in another line. What are known as the "active" or "trading" stocks are intermingled with the dull and inactive stocks, or with bonds, exchange, or other miscellaneous matter. In this class of instruments, in order to ascertain the fluctuations of the market or to find the price of any particular commodity, it is necessary to examine long strips of paper, making the operation a tedious and unsatisfactory one.

The object of the present invention is to provide means for keeping the prices of the various stocks, &c., separate from each other and to obviate printing the name of the commodity, so that it is necessary to print only the price or quantity.

The primary object of my invention, however, is to segregate the quotations of each commodity, so that the quotations of each will be separate from all the rest and can be read at a glance. To effect this I print the quotations of each commodity in a separate line, so that the state of the whole market can be seen and a comparison of quotations of any special commodity made, and a record provided to file away for future reference.

The invention consists, briefly, of a series of type-wheels mounted upon a shaft, each type-wheel being used to print the quotations of its own stock alone, the printing being done upon one broad band or sheet of paper, upon which the quotations appear in columns side by side, with the name of the stock indicated at the beginning of each column. The symbol of the commodity is adjustably attached to a sign-board connected with the sheet of paper or to a part of the machine itself. The type-wheels are rigidly attached to the aforesaid shaft, which is revolved by a spring or weight and governed by an electro-magnet controlled by a suitable transmitter. These type-wheels are of novel construction. The characters thereupon are forced against the sheet of paper by means of a series of levers, one for each set of characters. The printing-levers are acted upon by a series of printing-magnets arranged in the same circuit, but preferably in an independent line controlled by a transmitter, and are governed in their action by a series of disks, one for each printing-lever, which are rigidly secured to a shaft parallel with the type-wheel shaft and controlled by an escapement governed by an electro-magnet in an independent circuit which is under the influence of a suitable transmitter. The series of disks upon the shaft are notched, having one notch in each disk, and preferably so arranged that the notches make a spiral around the shaft. The printing-levers bear at their outer ends upon these disks and are held from printing except when they register with the notches in the disks. But one printing-lever is designed to register with the notch in its disk at a time, so that but one impression can be taken at a time, although all the printing-magnets may be energized at the same time. The paper-feed is controlled by an escapement which is governed, preferably, by a polarized magnet and may be operated at any time by sending a weak reversed current over the line controlled by one of the transmitters. Unison devices are also provided for the type-wheel and disk shafts, so as to unison the type-wheel and the printing-lever disks.

The invention further consists of the novel form of type-wheels before alluded to, and also a new and useful way of arranging the characters thereupon, all of which will be described in detail, and indicated in the claims appended hereto, and in certain details of construction which will be described, and pointed out in the claims.

I have shown my apparatus controlled by

three independent main lines; but I do not confine myself to any number of lines nor to any number of transmitters or circuit-controlling devices for governing the circuit of these lines, and have only shown one means for operating my apparatus.

For the purpose of more fully setting forth my invention I will refer to the accompanying drawings, making a part of this specification, in which the same letters of reference indicate the same parts throughout.

Figure 1 is a front elevation of an apparatus embodying my invention with the mechanism at the rear thereof removed, so as to prevent confusion. Fig. 2 is a plan view of the same upon an enlarged scale, the apparatus being broken away at the center, so as to show the mechanism at each end. Fig. 3 is an end elevation to the right of Figs. 1 and 5. Fig. 4 is an end elevation at either side of the machine, with the electro-magnets and the mechanism at the end removed. Fig. 5 is a perspective view of the same, showing diagrammatically the circuits and transmitters for controlling said circuits; and Fig. 6 is a view showing an elastic periphery of the type-wheels rectified and the way in which the characters are arranged thereupon. Fig. 7 is a vertical section, on an enlarged scale, of one of the double type-wheels of the platen-bar and of the notice-board as it appears when the latter is fixed upon the machine itself, the type-wheel having a segment of its elastic periphery removed. Fig. 8 is a plan view, on an enlarged scale, of one of the double type-wheels as it appears below the line of the shaft, showing, also, a transverse section of the same wheel above the line of the shaft. Fig. 9 is a detail view in perspective of two of the inking-rollers with separate weights. Fig. 10 is a face view, on an enlarged scale, of a section of the notice-board when fixed upon the machine itself, also showing the means for holding the different symbols in little frames or open-faced pockets, so as to be readily changed.

B is a longitudinal base-plate, to which are secured the upright frames F' F², which sustain the different working parts of the instrument. Between the frames F' is situated the mechanism that rotates the type-wheels T' T² T³, &c., rigidly mounted upon a shaft, S', which is given a tendency to rotate by a series of gears, G', under the control of a weight or spring or any suitable source of power, P'. The type-wheel shaft is controlled by an escapement by means of an anchor, to which an intermittent motion is imparted by a weight or spring under control of an electro-magnet, EM'. The anchor is provided with a retracting-spring and limiting-stop, as clearly shown in Fig. 3, and is journaled in the two parts of the upright frame F'. By means of this escapement and gearing the type-wheels may be rotated to any desired character. The type-wheels T' T², &c., may be of any desired number, placed side by side, with a separation between them. A series of inking-wheels, I' I² I³, &c., is journaled upon a shaft, S⁶, common to them all, (see Figs. 3 and 4,) which is carried by levers L, swung upon a shaft, S⁵, and has a weight, W, to keep them against the type-wheels; but each inking-roller may have a separate weight, if desired, as shown in Fig. 9 of the drawings.

The type-wheels are of peculiar construction. The peripheries are composed of any elastic substance, preferably rubber, on which are molded the characters for use in printing. The frame or wheels on which the circumferential form of the elastic peripheries are maintained (see Fig. 2) are composed of metal or other rigid material and constructed of a thin central rim, *m*, with spokes R radiating from the type-wheel shaft S'. From the rim *m* extend cross ribs or projections *p* upon each side, arranged at equidistance and parallel with the type-wheel shaft, forming a wide periphery. The cross ribs *p* form open spaces or slots, over which the characters upon the rubber periphery are placed. By this construction of wheel two rows or sets of characters independent of each other are supported by the same wheel, making substantially two type-wheels out of each wheel, and thus securing a lighter and cheaper wheel, the metal of the wheel being reduced to a minimum.

I have shown in the drawings eleven wheels supported side by side upon the same shaft, making altogether twenty-two type-wheels; but, as above remarked, any number may be used.

I will refer farther on to the manner of arranging the characters upon the wheel and the means for printing therefrom.

Supported by the frames F' and F² is a second shaft, S², which is controlled by an escapement, E², governed by an electro-magnet, EM², by means of an anchor, the said shaft having a tendency to rotate imparted thereto by a source of power, P², geared to the shaft S² by means of gearing G². The magnet EM² acts upon an open and closed circuit, giving a step-by-step motion to the shaft S². Upon this shaft is placed, side by side, and rigidly attached thereto, a series of disks, D' D² D³, &c. Each disk has a notch in it to receive the nose of its printing-lever, preferably making a spiral around the shaft S².

PM represent a series of magnets supported by the upright frames F' F² by means of a cross-bar, X, Fig. 4. There are a pair of these magnets for each wheel. They are arranged in the same circuit, the electric current passing through all of them at the same time.

L' L² L³, &c., represent a series of arms or levers placed side by side and supported, as well as centered, by a shaft, S⁴, supported between the frames F' and F². They are so arranged upon this shaft that each arm can move independently of the others. One end extends backward far enough to come directly over the shaft S³ and bear upon the disks D' D² D³, &c. Each ends in a nose, *n*, which is adapted to enter the notches in its disk. Each

lever is provided with a retracting-spring, as shown in Figs. 3, 4, and 5. Only one slot registers with the nose of a lever at a time. All the rest of the levers have the periphery of the disks D′ D² D³, &c., presented to them, holding them from operation. The noses *n* do not bear upon the disks when the printing-magnets are de-energized, but are held away by retracting-springs, allowing the shaft S³ to operate with as little friction as possible. Between the shaft S⁴ and the noses *n* are the armatures *a′ a² a³*, &c., situated directly over the printing-magnets PM, and secured to the levers L′ L², &c., two armatures being presented to each magnet, one armature occupying one half of the core of the magnets and the other armature the other half. In this way the magnetism created in the core is divided between the two armatures. The other ends of the levers L′ L² L³, &c., extend forward into the spaces or separations between the type-wheels until they reach the center line of said type-wheels, when they turn inward toward the wheels and directly under the periphery in a line with the opening made by the cross-ribs *p*, thus forming a hammer, *h*, which can enter and recede from the slots between the cross ribs. The object and use of these hammers is to press the elastic periphery outward and to imprint the character against the paper sheet, the elasticity of the periphery permitting this. When the hammer recedes, the periphery returns to its normal shape, and the wheel is ready to revolve to the next character. A platen-bar, *pb*, crosses all the type-wheels in the series and is directly over the line of the hammers *h*.

The paper, which is drawn step by step over the platen-bar, is arranged in a roll upon a roller held between two shafts, S³, supported by the frames F′ F², respectively, which shafts are provided with circular heads H H, from which pins project and take into the roller. The shaft S³ to the left (see Fig. 2) has a spring coiled about it, tending to keep the head H against the paper roll. To remove or insert a roll of paper, the shaft S³ at the left of Fig. 2 is pushed outward and the roll removed or adjusted in place. When the hand is removed, the resiliency of the spring will force the shaft and head H to its normal position.

The shafts S³ are controlled in their rotation by an escapement, E³, which is under the influence of an anchor operated by a polarized electro-magnet, EM³, and can be operated at any time desired by sending a reverse current over the line, which will cause the paper to be fed. The free end of the paper is held by a notice-board, NB, upon which the name of the stock to be printed is placed. I design to have the symbols of the commodities so placed upon the notice-board or machine that they can be changed at pleasure, whereby, when a stock or commodity becomes inactive, an active stock or commodity may be substituted for it. A cord, *c*, is attached to the notice-board and passes over pulleys *p′ p′*, and has a weight, P³, connected to its end, so that when the paper-escapement is operated the paper will be fed. The paper-sheet is held by this means in a vertical position, like a bulletin-board, so that the various quotations are visible at a glance. The sign or notice board NB is as wide as the paper roll. There are the same number of names upon it as there are type-wheels upon the shaft, and the type-wheels are in a direct line with each column of quotations, so that in looking for any stock all that is necessary is to look at this board for the name required, and the fluctuations in the prices thereof will be found under this heading. I prefer to print every two columns of quotations in alternating colors of red and black, as the eye sees and holds the position better when alternating colors are used. This is done by supplying the inking-wheels with different-colored inks. The notice board or the names of the stock or commodity can be fixed upon the machine itself in such a manner as that the symbols may be readily changed and the paper fed downward, if desired. I do not wish, therefore, to limit my invention to any particular way of holding and exhibiting the paper sheet, as the same may be done in other ways than I have shown.

In order to secure synchronism between the transmitter, the type-wheels, and the disks that control the printing-levers, I provide two polarized electro-magnets, U′ and U², the armatures of which may be thrown by a reversal of polarity of a weak current in the paths, respectively, of unison-stops *u′* and *u²*, the former located upon the type-wheel shaft S′ and the latter upon the disk-shaft S², so that when the polarity is reversed and the current pulsated these unison-stops will come against the armatures of the unison-magnets and bring the various parts of the receiver in unison with each other and the transmitting devices.

The elastic band which constitutes the periphery of my type-wheel and which carries the characters to be printed may be arranged in two or more rows of characters, the characters in each row being arranged opposite the spaces between the characters in the other rows. I do not wish, however, to confine my invention to any number of rows of characters so arranged.

In Figs. 1 and 2 I have shown the elastic peripheries as provided with three rows of characters so arranged, which characters register with the spaces between the cross ribs or projections *p*. In Fig. 6 I have shown an elastic periphery having four lines of characters thereupon, the elastic periphery in this case being represented as rectified—that is to say, rolled out in a plane. In quoting stocks it is absolutely essential to have fractions to represent the rise and fall of the same, as it is not usual for them to rise or decline a whole point at a time, so that the last row on the type-wheel must be set aside for fractions, those

usually employed being eighths. So where three diagonal rows of characters are employed, as represented in Figs. 1 and 2, but two of those rows can be utilized to print integral numbers. A wheel of such a construction could therefore print only two integral numbers and fractions—such, for instance, as 79⅞—which would answer for stocks below par, but could not meet the requirements of a stock above par—say, for instance, a stock at 110⅛. To prevent confusion, I have only represented the three rows in Figs. 1 and 2; but I design in practice to use a wheel with four diagonal rows of characters. (See Fig. 6.) In Fig. 1 I have shown the sign-board with the names of the stocks abbreviated and the quotations for said stocks printed upon the paper sheet, the quotations being substantially the state of the market at present. The operation of printing the quotations is as follows: Say, for instance, it is desired to print Western Union (W. U.) 75⅞, as shown in the first quotation upon the bulletin, and speaking, now, with reference to a wheel provided with four diagonal rows of characters instead of three, as shown in Fig. 1, I rotate the type-wheel until 7 in the second row of characters is reached, then I take an impression of the same and rotate the type-wheel until 5 in the third row of characters is reached and take an impression of that. The 5 will be printed to the right of the 7, as the third diagonal row is to the right of the second which produced the 7. Having secured 75, I now rotate the type-wheel until ⅞ in the third row of characters is reached and then take an impression, thus making the quotation 75⅞. If, now, instead of printing 75⅞, it is desired to print 175⅞, I would first rotate the type-wheel until the first row of characters reached 1, and take an impression of that before printing 75⅞, which would give 175⅞. As a matter of fact, it makes no difference whether the ⅞ be printed first or last, or in what order the figures are printed, for each figure will be in a direct line with the line of characters that produced it.

It is rare for stocks to require more than four rows of characters, including fractions, and they rarely, if ever, go beyond two hundred and ninety-nine and a fraction, and for this reason I design to have 2 the highest number in the first column of characters where a four-row strip is used, as shown in Fig. 6. The numbers in the second row, where the characters in the first row leave off, begin with 1 and end with 0, being upon every alternate space, the numbers in the third row being opposite the spaces left blank in the second row and progressing from 1 to 0, as before, and the fractions in the fourth row beginning at the point where the 0 of the third row leaves off, all of which is clearly shown in Fig. 6.

By dispensing with all the characters, except 1 and 2 in the first row, I am enabled to get along with less characters than if I provided the first row with a full complement of characters, beginning with 1 and progressing to 0, as in columns two and three, for, as pointed out, I dispense with just so many unnecessary steps or jigs to the type-wheel and do away with just so many pulsations of current on the line. At the lower end of Fig. 6 dots are shown in the last spaces, corresponding with the unison-point of the type-wheel, and at the beginning of the strip in the first column is represented a letter "S," which I use for the following purpose:

It is desired sometimes to print the numbers of shares of stock sold, and by placing an "S" in the first row I may use this symbol to represent, when followed by a number, the number of shares of stock sold. Thus, for instance, in the first column on the bulletin under "W. U.," I have indicated "S" upon one line and "2,000" on the line below, indicating that two thousand shares of Western Union have been sold at seventy-nine, the quotation previously printed.

To enable me to print thousands, I place a 0 in the fourth row or fraction-series on the type-wheel strip, as shown in Fig. 6. Where a small number of shares of stock are sold less than a thousand, the "S" may be printed upon the same line as the quotation, as will be seen by reference to the bulletin in the eighth column, (O and M), the nineteenth column, (O and T,) and the twenty-second column, (NP.)

In printing stocks where the quotations of each stock are collated and displayed under its own heading, and there is a rise or fall of a fraction only, it will not be necessary to give the whole number, but only the fraction, as it will be understood that the fraction will refer to the last preceding whole number which has been printed previously. Instead, therefore, of printing two or three characters and a fraction, which would be necessary when the stocks are commingled, as in the ordinary stock-printer now in use, by my system I need print the fraction only, thus dispensing with the printing of two or more characters and attaining a speed of operation which by other machines is impossible. So, too, where there is a rise in the units of a stock, I need print only the unit, which is to be read with the last tens or hundreds previously printed in the same column. It is seldom that there is a rise in stocks or fall in the same that cannot be expressed in fractions and rare that stocks fluctuate in the units-column, so that it will be apparent that when my system is employed but few characters need be printed. In the first place, I dispense entirely with the printing of the name of the stock, which usually would dispense with printing half of the necessary characters. In the next place, my system can be utilized, as just pointed out, to obviate printing more than half of the figures of the quotation itself. It will be manifest, therefore, that such a system will result in a speed of operation which cannot be attained by the systems now employed without mentioning the convenience of the display of quotations

that is afforded by my bulletin, whereby the quotations of each stock can be read at a glance.

I may use any number of type-wheels, and of course quote any number of stocks, or two of the instruments could be used side by side where a great number of stocks would render the instrument cumbersome, the one instrument giving the quotations of stocks beginning with the first letters of the alphabet and the second instrument giving the stocks represented by the last letters of the alphabet, if need be.

Some of the stocks in the market are known as "inactive stocks," and, being dull, there is not much need to give the quotations of these stocks, except occasionally. To print these inactive stocks, I set apart two columns upon my bulletin, which I have represented in Fig. 1 at the center of the bulletin, designated by the characters I I, which I use to designate inactive. In one column is printed the symbol of the stock, and in the other column the quotation thereof. The character-wheel thereunder is provided at one side with the symbols of the stock, as represented in Fig. 1, and at the other side with the diagonal arrangement of figures, as the other type-wheels. To print such stock it is only necessary to revolve the type-wheel T^6 until the symbol of the stock is reached, when an impression is taken, and then to rotate this wheel until the successive numbers of the quotations are reached and impressions taken. The printing in columns I I will illustrate these features.

I will now explain how the instrument may be operated electrically from a distance, and will describe a system of circuits and transmitting devices to control these circuits so as to secure the operation of my instrument. I do not, however, limit my invention to the circuits and transmitting devices shown in Fig. 5. I only show these to illustrate a means whereby my instrument can be operated and to illustrate it as an operative whole.

In Fig. 5 are three main lines, 1 2 3, extending from the transmitting devices to my instruments, of which there may be any number in these lines. Tr', Tr^2, and Tr^3 represent transmitting devices for controlling the lines 1 2 3, and have keys K' K^2 K^3 co operating with Tr' and Tr^2, which keys are brought into operation occasionally, for purposes to be described. Tr' and Tr^2 are rotary transmitters and operate upon precisely the same principle. The former, Tr', is employed to determine the quotation of which stock shall be printed. I have represented around the dial the symbols of the various stocks which correspond with the stocks upon the notice board and may be changed to conform therewith. When the handle of the transmitter Tr' is turned to "W. U.," for instance, the column "W. U." on the bulletin will be printed in, and when turned to any other stock the column adjacent to that other stock will be printed in. To print the inactive stocks two spaces are set apart on the transmitter, (marked I I, one being also marked N,) which, when the handle is turned to it, will position the parts so that the name of the inactive stock can be printed, and when the handle is in the space I (marked also Q) the quotation of the inactive stock can be printed. When the handle of the transmitter Tr' is over the space I – N, the handle of the transmitter Tr^2 can then cause the names of the inactive stocks represented on Tr^2 to be printed by positioning the handle of the transmitter Tr^2 over the name of the inactive stock desired. This will give the name of the inactive stock only. To print the quotation or price thereof, the handle of the transmitter Tr' must be brought over the space I – Q and the handle of Tr^2 positioned successively over the numerals thereon, whereupon the quotation required will be printed. Having positioned the handle of the transmitter Tr' to the stock desired to be printed, the handle of the transmitter Tr^2 is turned to present the successive figures of the quotations, and when these are reached the transmitting-key Tr^3 is closed to print them in their successive order. The transmitter Tr^2 has represented upon it the same figures that are upon the strip shown in Fig. 6, and in the same order that these figures occur on the strip illustrated in Fig. 6, the characters nearest the periphery of the dial Tr^2 representing the characters in the first column of the strip, and the figures next nearest representing the figures in the second row of the strip, and the figures next removed representing the figures in the third row upon the strip, while the fractions indicated upon the dial the farthest removed from the periphery of the dial Tr^2 correspond to the fractions in the fourth column of the strip. By turning the handle of the transmitter Tr^2 to any character and then closing the transmitting-key Tr^3 the figure corresponding to said character will be printed, the column in which the figure is situated being determined by its distance from the periphery of the transmitter Tr^2. I have also represented upon this dial the symbols of the inactive stocks. When the handle of the transmitter Tr' is turned to one of the spaces I (also designated by the letter N) the symbol of any of the inactive stocks can then be printed, the symbol of the inactive stock to be printed being determined by stopping the handle of the transmitter Tr^2 at the symbol desired and then closing the transmitting-key Tr^3. I have only shown a few of the inactive stocks upon this dial in order to prevent confusion. There would ordinarily be an inactive stock corresponding to each tooth of the ratchet-wheel of the transmitter Tr^2, which would correspond with each step-by-step motion of the type-wheel. The number of teeth upon the ratchet-wheel of Tr^2 should also correspond with the number of characters upon the strip shown in Fig. 6, and the number of teeth upon the ratchet-wheel Tr' should be equal to the number of columns upon the

bulletin—that is to say, a column of stock for each tooth on the ratchet-wheel.

Having premised the description of the transmitters by stating the functions to be performed by them, I will proceed to state their construction and operation.

Each of the transmitters Tr′ and Tr² consists of a dial having the characters arranged thereon as explained above, and is provided with a ratchet-wheel and handle, which I have shown as constructed for manual operation, although the same may be turned by any motive power and controlled as printing-telegraph transmitters usually are. The ratchet-wheels above alluded to act upon circuit-closers which make and break the circuit of the lines 1 and 2, putting to said lines the batteries MB′ and MB² intermittently as the ratchet-wheels are revolved. Springs normally hold the circuit-completers, which are operated upon by the ratchet-wheels, away from their contacts, so that the circuits of the lines 1 2 are only intermittently completed through the batteries MB′ and MB², respectively, which are suitably grounded. Connected to the circuit 1 at a point, *a*, is a transmitting device, K′, which is shown as constructed for manual operation. The device K′ is connected to the line 1 through the rheostat R′, the circuit of which is branched, terminating in two contact-stops, *e* and *f*. Corresponding to these are stops *e′* and *f′*, which are grounded. Between the two sets of stops are arranged metal strips *c* and *d*, separated from each other by a block of insulating material, to which a handle, K′, is attached, so that the device can be oscillated back and forth by means of the handle, so as to make contact with the contact-stops *e′ e* or *f′ f*, as the case may be. Connected with the strips *c* and *d* are wires running to a battery, MB⁴. Normally the strips *c* and *d* do not touch either set of stops and the circuit is normally broken. If the handle is rotated upward, the negative pole of the battery MB⁴ will be sent to line through the resistance R′, which will diminish its strength. The positive pole of the battery will be grounded by the strip *d* coming in contact with the contact-stop *f′*. If the handle be depressed, the positive pole of the battery will be sent through the resistance to line by the strip *d* coming in contact with the stop *e*, while the negative pole will be grounded by the strip *c* and contact-stop *e′*. The function of this device will be hereinafter described.

The construction of the circuit-closing key K³, connected with the main line 2, is the same as the key K², except that the strip *d* is constructed to normally contact with the stop *e*, and the strip *c* with the contact-stop *e′*, so that the positive pole of the battery MB² will be connected normally with the conductor 2 and the negative pole thereof grounded. The transmitter Tr² is connected electrically with the stops *e* and *f* by the conductor 2, the circuit of which is interrupted by the circuit-controller of the transmitter Tr². Should the current-reverser K² be rotated upward, the battery MB² will have its opposite pole put to the circuit 2, the object of which will be explained hereinafter. In electrical connection with the stops *e* and *f* of the transmitting-key K² is a circuit-controlling key, K³, connected to the main line 2 at a point, *b*, through a resistance-box, R². When the key K³ is depressed, it serves to send to the line 2 a current of diminished strength, the purpose of which will be alluded to farther on.

Having now set forth the construction of my machine, the magnets for regulating its action, and the transmitters for controlling the magnets, I will proceed to state how the magnets may be disposed in the circuits, although, as before remarked, I do not wish to confine the invention to any number of main lines, nor to the magnets being disposed in the main lines in any definite way, as they may be interchanged and rearranged in circuits in various ways without departing from my invention. I only represent the same in the relations shown in the drawings to illustrate one way in which the magnets may be arranged in circuits.

In the line 2 is the escapement-magnet EM′, controlling the type-wheel shaft, and also the polarized unison-magnets U′ and U². The escapement-magnet EM′ is of the neutral type and operated by pulsating-currents of either polarity. When the transmitter Tr² is operated, the battery MB², which has its positive pole to line, is pulsated over the line 2 and rotates the type-wheels to any desired character. The armatures of the unison-magnets U′ and U² will be held out of the way of the unison-stops *u′* and *u²* on the type-wheel shaft S′ and the shaft S², respectively, as a positive current will have no effect upon them, leaving them in the position shown in Fig. 1. If, now, the key K² be operated, so as to reverse the polarity on the main line 2, the armatures of the magnets U′ and U² will be thrown in the path of the unison-stops. Some means must be provided, however, to prevent the type-wheel magnet EM′ from responding before the armatures of the magnets U′ and U² can pass into the path of the stops *u′* and *u²*; otherwise the type-wheel magnet EM′ would rotate the type-wheel one space before the armatures of the unison-magnets would be thrown in the path of the stops, as the type-wheel magnet EM′ responds alike to positive and negative currents. In order to prevent this, the key K³ is provided, which, after the key K² is operated to reverse the polarity and before the transmitter Tr² is rotated, is closed, so as to send the reversed current through the resistance R² to diminish its intensity, so that the type-wheel magnet will not be operated. The armatures of the unison-magnets will, however, be thrown in the path of the stops *u′* and *u²*. These armatures having been thrown in the path of the stops, the key K³ is allowed to rise, and the negative or reversed current

pulsated over the line 2 by the transmitter Tr^2 a sufficient number of times to insure unison. When unison is effected, the transmitter Tr^4 is stopped, the controlling device K^2 allowed to assume its normal position, and the key K^3 closed, so as to send a weak positive current over the line to remove the armatures of the unison-magnets from the path of the stops without operating the type-wheel magnet EM'.

The magnet EM^2, controlling the shaft upon which the notched disks $D' D^2$, &c., are located, which determines what printing-lever is to act, is placed in circuit 1, which includes in it, also, the polarized electro-magnet EM^3, governing the paper-feed escapement E^3. The magnet EM^2 is a neutral one, and responds to currents of either polarity, while the magnet EM^3 is arranged to respond to currents of negative polarity only. When the transmitter Tr' is operated, it sends intermittent positive currents over the line 1 from the battery MB', operating the magnet EM^2, and positioning the disks $D' D^2$, &c., so as to determine which printing-lever shall be free to act—that is, which shall register with its notch. When it becomes necessary to feed the paper, the circuit controller K' is operated so as to send a negative followed by a positive current through the resistance R', which resistance diminishes the strength of the current, so that it will not act upon the magnet EM^2, but will be of sufficient strength to move the paper-feed escapement back and forth, thus leaving it in its normal position. The idea of having a weak positive current follow the weak negative is to bring the anchor of the escapement E^3 back to its normal position; otherwise, if a weak negative is sent only, the anchor would be left in a position to be operated by a positive current, so that when the transmitter Tr' is operated and sends its positive currents to line the paper would be fed—that is to say, the positive current of the battery MB' would operate the magnet EM^2, and at the same time would throw the anchor of the escapement E^3 to its original position, which might, under some circumstances, interfere with the operation of the machine, and would not make the magnet EM^3 entirely independent of the magnet EM^2 and the transmitter Tr'.

The circuit 3 is the printing-line, in which are arranged the printing-magnets PM in series, or in any other way. They are all energized by the current from the battery MB^3 when the transmitter Tr^3 is operated.

The operation of my instrument and the method of printing from the same is briefly as follows: Say, for instance, it is required to print Western Union 75⅛, which is the first quotation on the bulletin. The handle of the transmitter Tr' is turned so that it points to W. U. This will actuate the escapement E^2 and bring the first disk, D', in position, so that the first printing-lever of the type-wheels will register with the notch in this disk and be the only lever of the series that is free to act and can print. The handle of the transmitter Tr' is left in this position and the handle of the transmitter Tr^2 rotated until figure 7 of the second row on the type-wheel strip is reached. The printing-transmitter Tr^3 is then operated and an impression taken. The handle of the transmitter Tr^2 is rotated again until figure 5, corresponding to the third row on the type-wheel strip, is reached, and the printing-transmitter again operated, after which the transmitter Tr^2 is again rotated until the fraction ⅛ is arrived at, when the printing-circuit is again established. This will then give us 75⅛, as desired. Say, now, it is necessary to print S. C. (South Carolina) 9, which is an inactive stock. The transmitter Tr' is rotated until the space marked I, and further designated by N, is reached. This would bring the eleventh printing-lever in operation, and by stopping the transmitter Tr^2 at the symbol S. C. and closing the circuit of the printing-line 3 the symbol of the inactive stock would be printed in the eleventh column, as shown in Fig. 1. To obtain the quotation of the same, the transmitter Tr' is rotated one space farther to the division marked I, and further designated by Q, meaning "inactive quotation." The transmitter Tr' is left in this position and the transmitter Tr^2 actuated until the figure 9 corresponding to the third row upon the type-wheel strip is arrived at and the printing-circuit closed, which would give us S. C. 9. It will be observed that the transmitter Tr' is left opposite a certain symbol or space until the quotation of that space is completed, and when the pointer of the transmitter Tr' is opposite any symbol upon the dial the quotation of that stock can only be printed, and as long as the handle is left opposite a certain-symbol on the dial the printing will be done in the column corresponding to that symbol on the bulletin. If, now, after having printed the quotation S. C. 9, it be desired to feed the paper so as to quote Western Union again, the key K' is operated back and forth, so as to send a weak negative and a weak positive current over the line 1 to operate the paper-feed magnet EM^3, as before explained, leaving the escapement-magnet EM^2 undisturbed. Having fed the paper, the handle of the transmitter Tr' is turned to W. U. and the operation before described repeated. The paper can be fed at any time during the operation of the apparatus. The stocks can be printed in a continuous line across the face of the paper sheet, as shown in one of the lines in Fig. 1, and the paper fed at the end of the line, if desired. It will be obvious that stocks can be quoted in any order desired and whenever the quotation of a stock is received. The quotation of each can be printed as often as required and omitted whenever desired. The diagram of quotations represented in Fig. 1 will illustrate the manner in which the quotations are displayed and how they can be printed and spaced. If it is necessary at any time to print the number of shares of stock sold—say, for instance, P. and R., (Philadel-

phia and Reading,) 275 shares, at 37⅛, (see column 13, Fig. 1)—the transmitter Tr' is turned to P. and R. and the transmitter Tr^2 to the letter S and an impression taken, and after the line upon which the S is printed is finished the paper is fed and the transmitter Tr^2 rotated and an impression taken, so as to give the number 275.

This invention not being for the greatest speed or the latest quotations, but in practical use being somewhat dependent upon other machines from the quotations of which the market can be analyzed and printed at brief periods of time, will be of service to a large class of bankers and investors, although machines made in accordance with my invention can be used to quote directly from the market reports, if so desired. If, however, the system I have outlined in printing only in the unit or fraction column be adopted, the machine may be made to give much greater speed in transmission.

Having now fully described my invention and set forth its operation and the uses to which it can be put, I desire to have it understood that I do not limit myself to the exact construction shown, nor to the precise arrangement described, as the same may be varied in many ways without departing from my invention, and I reserve to myself all changes within the scope of the invention and the right in practice to make all changes within the scope of what I now desire to claim and secure by Letters Patent, which is—

1. A type-wheel upon a fixed rotary shaft, having an elastic periphery with the printing-characters rigidly affixed thereupon and a platen for forcing said printing characters against the surface to be printed upon, substantially as described.

2. A type-wheel upon a fixed rotary shaft, having an elastic periphery upon which the printing-characters are rigidly affixed, means for rotating said type-wheel, a stationary platen over which the paper is fed, and a printing-lever for forcing said printing-characters against the paper, substantially as set forth.

3. A type wheel with two or more rows of figures arranged in substantially the manner set forth, the first row or rows of figures being devoted to integral numbers and the last row to fractions, for the purpose described, and essentially as set forth.

4. A type-wheel adapted for printing the quotations of stock or other commodities, having the characters thereon in four rows, arranged substantially as set forth, the first row of characters stopping at 2, the second and third rows progressing from 1 to 0, the characters in each of said rows being opposite spaces in the other rows, and the fourth or last row of said type-wheel being devoted to fractions, all substantially as set forth.

5. A type-wheel adapted for printing the quotations of stocks or other commodities, having two or more rows of characters, two of said rows beginning at 1 and progressing to 0, and a third row thereof set apart for fractions, as shown and described.

6. A printing-telegraph having a series of figure-wheels, each adapted to print the quotation of any given stock or commodity, and having the name of the stock adjustably affixed to a part of the apparatus, whereby the printing of the name or symbol of the stock is obviated and the quotations only have to be printed.

7. A printing-telegraph with the name or symbols of the stocks adjustably affixed to a portion of the apparatus and the quotation of the stock arranged in columns side by side directly in a line with or adjacent to said symbols upon a paper sheet, substantially in the manner described, whereby the state of the market can be read at a glance and the fluctuations of each stock be readily seen and a comparison of prices made.

8. A printing-telegraph having a series of type-wheels rigidly attached to a rotary shaft common to all, said type-wheels having an elastic periphery with the printing-characters rigidly affixed thereupon, and a sheet of paper arranged to be printed upon, and a series of platens for printing upon said paper from any desired one of said wheels at will in a separate column, substantially as described.

9. A type-wheel consisting of a rim portion, *m*, suitably carried by a shaft with cross ribs or projections extending from either side, making slots or cut-away portions between the same, and an elastic periphery of less dense material carried by said cross-ribs conforming to the contour of said cross-ribs and carrying the printing-characters, whereby a light type-wheel is secured.

10. A type-wheel mounted upon a rotary fixed shaft, having a rim portion, *r*, and spokes *s*, supporting the same, with cross-ribs *p*, extending upon either side thereof, making slots or cut-away portions between the same, an elastic material carried by said cross-ribs and conforming to their contour, with the printing-characters thereon, which register with the spaces between the cross-ribs, and a platen-hammer, also registering with said spaces for forcing the characters against the surface to be printed upon.

11. A type-wheel having a rim portion, *r*, with the cross-ribs *p* extending therefrom, having spaces or cut-away portions between the same, and an elastic periphery surrounding the cross-ribs and carrying the printing-characters arranged in rows thereon, disposed in the manner shown, the said characters registering with the spaces between the cross ribs, for the purpose specified.

12. A type-wheel consisting of a rim portion, *r*, with cross-ribs *p* extending therefrom upon either side, and an elastic material having the printing-characters disposed upon either side thereof and carried by said cross-ribs, whereby the wheel is made up of two type-wheels with independent characters and

lightness of the same insured, essentially as set forth.

13. A printing-telegraph having a notice-board with the name or symbol of the stock or commodity thereupon, a sheet of paper adjustably attached thereto, and means for progressing the same at will and for printing the prices thereof upon said paper sheet in parallel lines, as specified.

14. A paper-feed for a printing-telegraph or the like, consisting, substantially, of a shaft for supporting a coil of paper, an independent escapement governing the same through the instrumentality of an independent electro-magnet, and a weight suitably attached to the free end of said paper and holding it in any position desired for imparting a rotary tendency to the aforesaid shaft and paper.

15. A printing-telegraph having a series of type-wheels, each printing the figures of the quotations of its own stock, with the name of the stock arranged at the head of said columns, respectively, and affixed adjustably to a portion of the apparatus, and a character-wheel carrying the names of the inactive stocks arranged in said instrument and having an adjacent figure-wheel set apart for co-operation therewith, whereby the inactive stocks can be given and the quotations thereof printed, as well as quotations of the active stocks, in the manner specified.

16. A printing-telegraph instrument having two type-wheels arranged side by side, the one carrying the symbols of the inactive stocks and the other figures arranged in two or more rows, and means for revolving said type-wheels, so as to take an impression of any desired symbol upon said character-wheel and also its corresponding quotation from the figure-wheel, substantially as set forth.

17. A series of type-wheels, as T' T^2, &c., arranged side by side and rigidly attached to a shaft having a motor controlled by an electro-magnet for rotating the same, so as to position any character upon said wheels, a printing-lever common to each type-wheel, a paper sheet arranged contiguously thereto, and a transmitter for determining which printing-lever shall act upon its type-wheel, substantially as set forth.

18. A printing-telegraph having a series of type-wheels adjacently and rigidly arranged upon a shaft common to them all, a motor controlled by an electro-magnet for controlling said shaft and rotating the type-wheels to any character desired, each type-wheel being set apart for the printing of quotations for one stock only, as designated by a notice-board, a paper sheet, with the symbol of the commodity upon said notice-board attached or adjacent to said paper sheet, a printing-lever co-operating with each type-wheel, and a transmitter for determining which printing-lever shall be free to act, depending upon the quotations of which stock it is desired to print.

19. The combination, in a printing-telegraph instrument, of a series of wheels, T' T^2, &c., rigidly attached to a shaft controlled by an escapement and electro-magnet under the influence of a transmitter, printing-characters upon said wheels, a series of printing-levers mounted upon a shaft, one for each independent set of characters, a series of disks located upon a shaft and controlled by a second escapement and an electro-magnet under the influence of a transmitter, with a notch in each disk, upon which disk the outer end of each printing-lever may rest, a series of printing-magnets acting upon said printing-levers, whereby when the notch in any disk registers with its printing-lever the corresponding type-wheel only can be printed from.

20. The combination, in a printing-telegraph, of a series of printing devices carrying the characters to be printed, a printing-lever for each series of character-carrying devices, a series of printing-magnets for operating said levers, a series of notched disks, and means for controlling the same from a distance, determining which printing-lever shall be free to act, all the others being held from action, substantially as set forth.

21. The combination, in a printing-telegraph instrument, of a series of type-wheels, as T' and T^2, &c.; each carrying two independent sets of characters upon an elastic periphery and mounted upon a type-wheel shaft, S', under the control of an electro-magnet, EM', a series of printing-levers, as L' L^2, &c., mounted upon a shaft, S^4, and a series of disks, D' D^2, &c., carried by a shaft, S^2, under the control of an escapement, and an electro-magnet, EM^2, for holding said levers from operation except when a notch therein is made to register with the end of the printing-lever, a series of printing-magnets, PM, arranged in series or otherwise in the same circuit and acting upon said printing-levers, and a paper sheet, P, passing step by step over a stationary platen-bar, *pb*, upon which paper sheet the characters are printed in substantially the manner set forth.

22. The combination, in a printing-telegraph having a series of type-wheels each printing the quotation of its own stock, of a sheet of paper arranged contiguously to said type-wheel and mounted upon a roller controlled by an escapement under the influence of an electro-magnet controlled by a transmitter, whereby the paper may be fed at any time at will and the quotations spaced and printed whenever desired, substantially in the manner described.

23. The combination, in a printing-telegraph, of a series of wheels, as T' T^2, &c., rigidly attached to a shaft, S', and controlled by an escapement, E', under the influence of an electro-magnet, EM', of a series of printing-levers, as L' L^2, &c., mounted upon a shaft, S^4, parallel with the type-wheel shaft, and a shaft, S^2, carrying a series of notched disks, D' D^2 D^3, &c., for co-operating with said printing-lever and a second escapement, E^2, and an electro-magnet, EM^2, governing the latter shaft and determining which printing-lever shall register with its notch in the disks and be free to print.

a series of printing-magnets, PM, acting upon said printing-levers and arranged in the same circuit, a paper-feed escapement, E^3, for the paper sheet P, arranged contiguous to said type-wheels and passing over a platen-bar, *pb*, and an electro-magnet controlling the said paper-feed escapement and governed by a transmitter, in the manner described.

24. The combination, in a printing-telegraph, of a series of type-wheels, T' T^2, &c., arranged upon a shaft which is controlled by an electro-magnet, EM', in a main line, 2, the circuit of which is controlled by a transmitter, Tr^2, pulsating the current from the battery MB^2 in the manner specified, a paper sheet upon which the quotations are printed in the manner described, and a series of printing-levers, L' L^2, &c., acting upon said type-wheels, having means, as D' D^2, &c., controlled by an electro-magnet, EM^2, under the influence of the transmitter Tr', operating as described, and a main line, 3, including printing-magnets PM in its circuit, which circuit is closed when it is desired to take an impression.

25. The combination, in a printing-telegraph, of a series of type-wheels, as T' T^2, &c., rigidly affixed to a shaft governed by an electro-magnet, EM', in main line 2, controlled by transmitter Tr^2 in the manner specified, and a series of printing-levers acting upon said type-wheels in the manner described, means governed by the transmitter Tr', located in main line 1, for determining which printing-lever shall be actuated, and unison-magnets U' U^2 in the main line 2 for unisoning said type-wheel shaft and the means governing the printing-levers, and transmitting devices K^2 and K^3, co-operating with the transmitter Tr^2 to effect unison of the apparatus and establish synchronism between the transmitters and the machine, substantially as specified.

26. The combination, in a printing-telegraph, of a series of type-wheels arranged and controlled substantially as described, a series of printing-levers co-operating therewith, and means, as D' D^2, &c., determining which printing-lever shall be actuated, an electro-magnet, EM^2, in a main line, 1, independent of the circuit of the type-wheel electro-magnet, a paper sheet upon which the printing is effected, and a paper-feed escapement, also located in the line 1 and governed by a polarized electro-magnet controlled by a circuit-reversing device, K', at the transmitter, sending a weak positive and weak negative current to line, in the manner specified and for the purpose described.

27. The combination, in a printing-telegraph, of a main line, 1, controlled by transmitter Tr', which is operated in the manner specified, and governs an electro-magnet, EM^2, in said line, a series of disks, D' and D^2, &c., controlled thereby, a series of printing-levers common to a series of type-wheels, which levers are governed by the aforesaid disks, determining which shall be actuated to print, a transmitter, Tr^2, controlling the circuit of a main line, 2, in the manner specified, so as to position the type-wheels to any desired character through the instrumentality of the electro-magnet EM', controlling the shaft upon which they are located, and a main line, 3, controlled by a transmitter, Tr^3, to energize the printing-magnets to effect an impression, transmitting devices, substantially as K^2 K^3, connected to the line 2 in the manner shown, and governing, together with the transmitter Tr^2, the apparatus, and unison-magnets U' U^2, located in the circuit 2, so as to effect unison between the type-wheel shaft and the printing-lever-disk shaft and establish synchronism with the transmitter, a paper sheet arranged adjacent to and across said type-wheels, controlled by an escapement through the instrumentality of a polarized electro-magnet in the main line 1, and a transmitting device, K', connected to the circuit 1 in the manner shown, for operating said paper feed escapement in the manner specified, substantially as described.

CHARLES J. WILEY.

Witnesses:
CHARLES N. JUDSON,
A. M. HAYES.