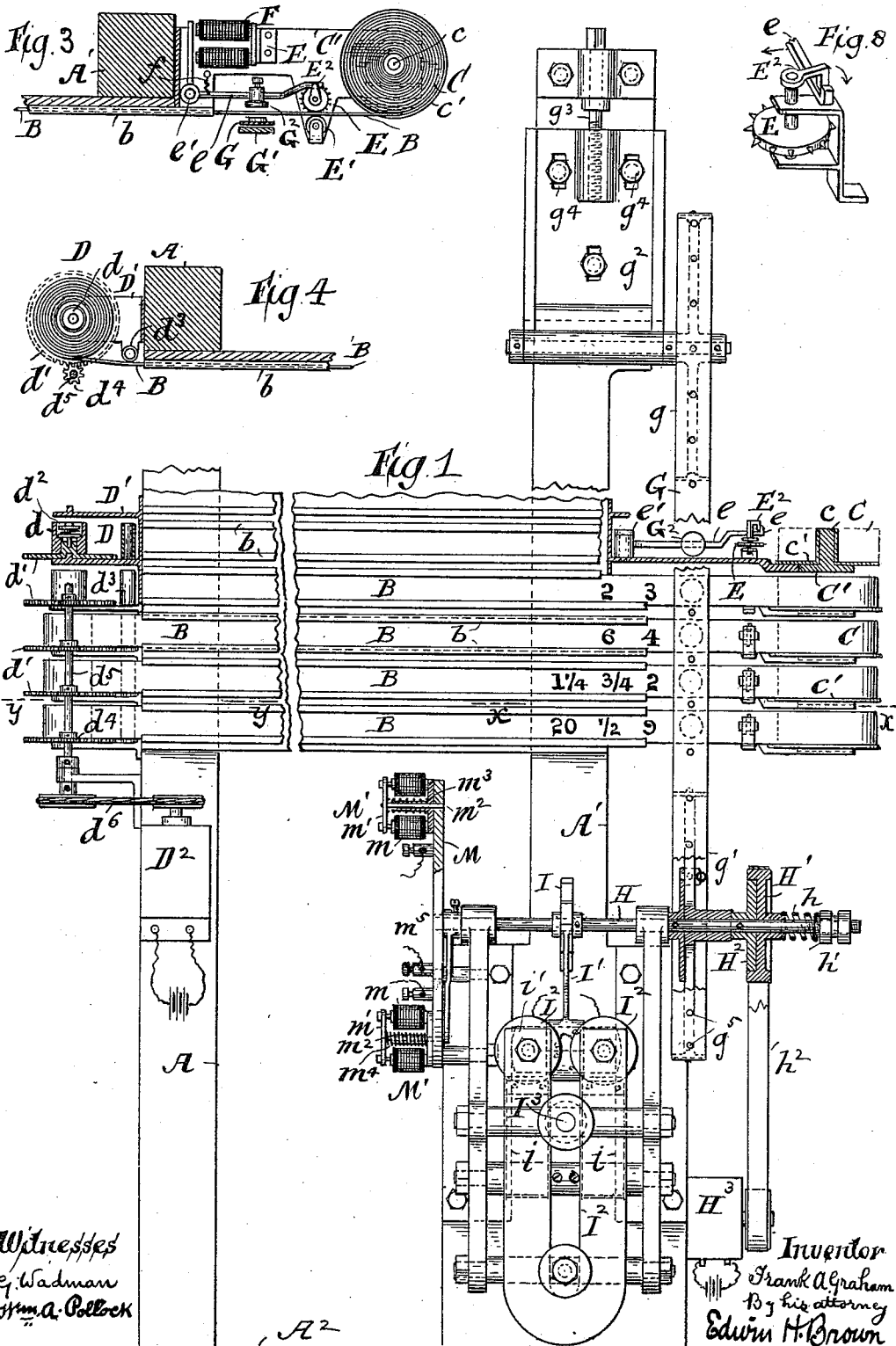


F. A. GRAHAM.
STOCK PRINTER.

No. 579,676.

Patented Mar. 30, 1897.



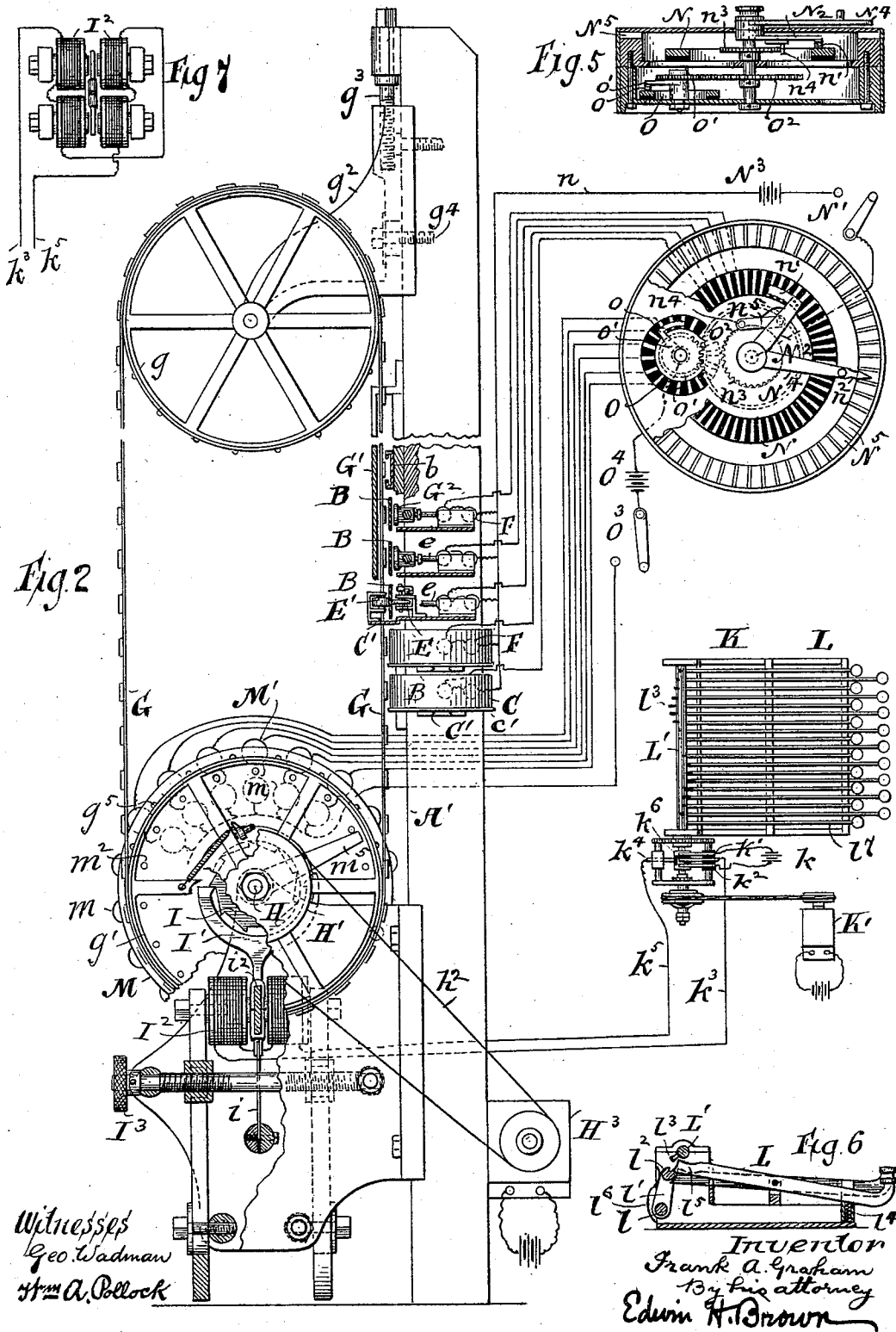
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UNITED STATES PATENT OFFICE.

FRANK A. GRAHAM, OF NEW YORK, N. Y., ASSIGNOR TO JAMES D. STEVENS,
OF SAME PLACE.

STOCK-PRINTER.

SPECIFICATION forming part of Letters Patent No. 579,676, dated March 30, 1897.

Application filed March 11, 1896. Serial No. 582,722. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. GRAHAM, of the city, county, and State of New York, have invented a certain new and useful Improvement in Stock-Printers and Like Machines, of which the following is a specification.

My invention relates to an apparatus for indicating quotations of stocks, securities, &c., by printing the same upon exposed paper ribbons or strips.

I will describe a stock printing or indicating apparatus embodying my invention, and then point out its novelty in claims.

In the accompanying drawings, Figure 1 is front elevation, partly in section, of such an apparatus, portions immaterial to an understanding of the invention being omitted. Fig. 2 is a side elevation, partly in section, of Fig. 1. This figure also shows a circuit-controlling device and a transmitter embodied in the invention. Fig. 3 is an enlarged cross-section on the line *x x* of Fig. 1. Fig. 4 is a view similar to Fig. 3, taken on the plane of the line *y y* of Fig. 1. Fig. 5 is central transverse section through the circuit-changing device. Fig. 6 is a cross-section of the transmitter. Fig. 7 is a plan view of the magnets operating an escapement comprised in the improvement. Fig. 8 is a detail.

Similar letters of reference designate corresponding parts in all figures.

The framing of the apparatus conveniently comprises uprights or standards *A A'*, rigidly secured to a suitable base *A*². These uprights afford support to the supply and take-up rolls of a desired number of paper ribbons or strips *B*, upon which the quotations are printed, and which are fed forwardly, as will presently appear. There are as many of these ribbons *B* as there are different stocks, securities, &c., whose quotations are to be indicated. Preferably as they are fed forward across the space from one upright to the other the ribbons pass through guide-ways *b*.

The supply-roll *C* for each ribbon *B* revolves loosely upon a stud *c*, secured to a bracket *C'*, extending from the upright *A*. Advantageously each roll *C* will comprise a lower flange *c'*, rigid with the cylindrical portion of the roll, the better to keep the paper

on the roll in place. The corresponding take-up roll is shown at *D*, and in the method at present adopted for driving the take-up rolls each of these rolls comprises a cylindrical portion *d* and a lower disk portion *d'*, pressed in frictional contact by a spring *d*³. Each roll *D* is rotatably mounted upon a bracket *D'*, extending from the upright *A*, the bracket also supporting a guide-roller *d*³, against which the paper ribbon bears.

The motions of the paper ribbons *B* are made up of periods of rest, during which the ribbons are being printed upon or the printed quotations thereon are being exhibited, alternating with periods of movement. A construction for the attainment of this motion is as follows:

The periphery of the lower disk *d'* of each roll *D* is notched or provided with teeth, with which meshes a driving-pinion *d*⁴, secured to a shaft *d*⁵, journaled in suitable bearings. The shaft *d*⁵ is driven continuously from a suitable motor *D*² by a belt *d*⁶, but the friction between each disk *d'* and the corresponding cylindrical portion *d* of the take-up roll is insufficient to rotate the said cylindrical portion to wind up the ribbon, or even to disrupt the same when the ribbon is firmly grasped. This latter function is performed by a pair of rollers *E E'*. (See more particularly Figs. 3 and 8.) The rollers *E* and *E'* are mounted on stationary supports secured to the bracket *C'* and bear against opposite sides of the ribbon *B*. The roller *E* has an escapement-arm *E*², controlled by the end of a double-armed lever *e*, fulcrumed at *e'*. To preclude slipping, it is well to provide one of the rollers—for instance, roller *E*—with a rough or even a toothed surface. The lever *E* is swung upon its pivot by means of an electromagnet *F*, controlled in a manner that will presently appear, and a retracting-spring *f*, and serves not only to release and engage the ribbon, but also to effect the printing on the latter.

G is an endless type-belt running over an upper pulley *g* and a lower pulley *g'*, each of which is journaled in suitable supports on the framing of the apparatus. Preferably one of these supports will be made adjustable to maintain a due tautness in the belt, and to this end the bearings of the upper wheel

g are mounted upon a plate g^2 , adjustable toward and away from the lower wheel g' by a screw g^3 and provided with clamping-bolts g^4 . The lower wheel g' constitutes the drive-wheel and is provided with peripheral teeth or notches g^5 , adapted to engage with recesses or apertures in the type-belt G . This belt runs across the line of travel of the ribbons B in front of the latter and carries up the face adjacent to ribbons, types, or printing symbols whose impression it is desired at any time to transfer to the ribbons. Facing the side of the belt opposite to that carrying the types is a stationary backing-strip G' , while to the lever e is secured a movable platen G^2 , operating to press the paper ribbon against the type which has been brought into correct position by the movement of the belt G .

I will now describe the mechanism for moving the type-belt.

H is the drive-wheel shaft, to which the drive-wheel g' is secured. Loosely fitted to this shaft is a pulley H' , which serves to drive the shaft frictionally through the intermediary of a friction-disk H^2 , against which the pulley is pressed by a spring h , interposed between the pulley and an adjustable nut h' on the extremity of the shaft. The rotation of the loose pulley H' is effected through the belt h^2 and the motor H^3 .

The rotation of the pulley H' does not cause the rotation of the shaft H , and consequently the wheel g' , unless a positive locking mechanism coöperating with the shaft is released. In the latter event the wheel g' is rotated. The locking mechanism here adopted consists of a ratchet-wheel I , secured to the shaft H , with which there is combined a double-toothed escapement I' , operating to release one tooth of the ratchet-wheel at a time as it is vibrated to and fro upon its support. The escapement I' is carried by a vibrating tongue i , rigidly secured at its lower extremity and provided with an armature i' , arranged between the pole-pieces of oppositely-disposed pairs of electromagnets $I^2 I^2$, whose circuits are disposed as shown in Fig. 7.

I^3 is a regulating-screw for adjusting the supports of the electromagnets $I^2 I^2$ toward or away from each other.

The conducting-wires leading to and from the electromagnets $I^2 I^2$ extend to a commutator or circuit-changing device K of any convenient form, by which the continuous or unidirectional current of the energizing-battery k is transformed into an alternating current necessary for the actuation of the vibrating tongue i . This device comprises metallic fingers k' k^2 , secured to an insulated support and connected with the battery-wires, a third finger, also insulated and connected with one of the wires k^3 , leading to the magnets $I^2 I^2$, and another finger k^4 , to which is connected the remaining wire k^5 , leading to said magnets. These fingers bear upon a commutator-cylinder k^6 , composed of conducting and non-

conducting sections, whose rotation serves to effect an alternation in the current flowing to the magnets $I^2 I^2$. The shaft for rotating the commutator-cylinder k^6 may be driven frictionally by a belt and motor K' , whose construction will be readily understood from what has already been described.

L is a keyboard comprising a number of fulcrumed key-levers.

L' is a rotary shaft whose positive locking or release compels the stoppage or permits the rotation of the commutator-shaft, and hence the sending of an alternating current of a definite number of pulsations to the magnets $I^2 I^2$, the number of these pulses depending upon the period during which the shaft L' is permitted to rotate.

At the rear of the keyboard is a rock-shaft L , adjacent to whose ends are secured arms L' . These arms at their outer extremities carry a longitudinally-notched bar l^3 , in the notch of which the inner end of each of the several key-levers is adapted to rest and project into the path of one of a series of pins l^3 , projecting from the shaft L' , and hold the shaft from rotation. The outer ends of these key-levers are urged upward by springs l^4 , and the lower portion of the inner end of each lever is extended forward in the form of a toe l^5 , adapted to contact with the cross-bar l^2 and when the outer end of the lever is depressed force the bar forward against the resistance of a spring l^6 and release any lever previously resting upon the bar. Each projection of the series l^3 is so positioned as to permit a definite amount of movement of the shaft, and consequently a definite number of pulsations to be sent over the lines $k^3 k^5$. Preferably there will be provided a key l^7 , in juxtaposition to which there is no pin l^3 , which when depressed will permit the shaft to rotate continuously.

The series of types upon the type-belt, which represents the entire range of the characters employed, may be duplicated, triplicated, or reproduced as many times along the belt as found desirable, the belt being of sufficient length to provide for the addition of characters.

Before any movement of the type-belt is brought about by the movement of the keys of the keyboard L the belt is brought to a zero position by the following means:

M is a plate rigidly secured to a fixture adjacent to the extremity of the shaft H , upon which are arranged in a circle a plurality of electromagnetic mechanisms M' , corresponding in number to the number of ribbons B or to the number of ribbons in a set when there is a multiplicity of them arranged in two or more sets to avoid multiplying the number of magnets. Each magnet in the latter case will act for the same ribbon in their order in each set of them. Each of these mechanisms comprises a pair of electromagnets m , an armature m' , a pin m^2 , secured thereto and sliding lengthwise of a cylindrical opening in

bracket m^3 , and a retracting-spring m^4 . The sliding pin when at the inner extremity of its movement projects through the plate M across the path of an arm m^5 , secured to the shaft H. When this arm rests against one of the pins m^2 , the type-belt will have one of its zero-points contained in each set of characters in position opposite the ribbon to be printed on.

The circuits of the magnets m and the magnets F of the printing device are controlled from a circuit-changing device which will now be described.

N is a circular row of contact-pieces alternating with sections of non-conducting material. To each contact-piece there is secured a conductor leading to the magnets F, operating a lever e , while the remaining terminal in each magnet-coil is connected to a return-wire n in electrical communication through an interposed switch N' with an arm N², provided with a contact-finger n' , playing over the surface of the contact-pieces and non-conducting sections N. The energizing-battery is shown at N³. Rigid with the arm N² is a finger-piece N⁴, provided with an index-finger n^2 , arranged in juxtaposition to a set of indicating-symbols N⁵.

To facilitate the positioning of the finger-piece N⁴, there is provided a relatively immovable notched wheel n^3 , into engagement with whose notches there is a spring-pressed pin n^4 , carried at the free end of an arm n^5 , pivoted to the arm N².

O is a second set of circularly-arranged contact-pieces alternating with non-conducting sections, over which plays a contact-finger o , affixed to the end of an arm o' . This latter arm is secured to a central shaft, which is rotated through the medium of meshing gear-wheels O' O², the former being attached to the shaft of the arm o' , while the latter is rotated by the movement of the arm N².

The contact-pieces in the set O are connected with the terminals of the magnet-coils of magnets m , as shown in Fig. 1, while the return-wire is connected with the remaining terminals and is in electrical communication with the arm o' through an interposed switch O³ and energizing-battery O⁴.

The operation of the device is as follows: The arm N² of the circuit-changing device is adjusted by means of the arm N' to a position in which the circuit leading to the magnets F, operating the printing device of a desired ribbon B, is closed. Switch O³ is then closed, which results in the withdrawal of a particular pin m^2 . Key l' is now depressed, which permits the escapement to vibrate and the shaft H to be rotated until the arm m^5 is brought against the pin m^2 and withdrawn when the shaft H is brought to rest. This will correspond to a zero position of the type-belt G. Switch O³ is then opened and the proper key of the transmitter depressed, whereupon the type-belt is adjusted to bring the desired character opposite the ribbon B which it is designed to print. Switch N' is

then closed and opened, causing the impression of the type to be transferred to the ribbon in a manner understood from the description given.

Having described my invention, what I consider as new, and desire to secure by Letters Patent, is—

1. The combination of a single belt provided with printing-characters, of a series of paper strips, and electromagnetic mechanism for causing an impression to be made upon any one of the series of strips, substantially as specified.

2. The combination of a single type-belt provided with printing-characters, a series of paper strips, and electromagnetic mechanism for controlling the movement of the type-belt, whereby the different characters may be brought in juxtaposition to any one of the series of strips, substantially as described.

3. The combination of a single type-belt provided with printing-characters, a series of paper strips, electromagnetic mechanism for controlling the movement of the type-belt, whereby the different characters may be brought in juxtaposition to any of the series of strips, and means for moving the strips, substantially as described.

4. The combination of a single type-belt provided with printing-characters, a series of paper strips movable transversely to the direction of movement of the type-belt, and means for causing impressions to be made upon the strips, substantially as described.

5. The combination of a single type-belt provided with printing-characters, a series of paper strips, means for bringing the belt to a zero position with relation to each strip, and mechanism for bringing any character upon the belt in juxtaposition to said strips, and means for transferring an impression thereto, substantially as described.

6. The combination of an adjustable type-belt provided with printing-characters, supports for a number of paper strips, means for bringing the belt at will to a zero position relatively to any one of said strips, and mechanism for bringing any characters upon the belt in juxtaposition to the aforementioned strip and for transferring an impression thereto, substantially as specified.

7. The combination of an adjustable type-carrier, a series of paper strips, an electromagnetic mechanism comprising a locking-pin for determining the zero or initial position of the carrier, and means for adjusting the carrier with relation to any desired strip, substantially as described.

8. The combination of an adjustable type-carrier, a series of paper strips, an electromagnetic mechanism comprising a locking-pin for determining the zero or initial position of the carrier, an escapement for allowing the type-carrier to move to a desired position with relation to any strip, and a series of keys controlling the movement of the escapement, substantially as described.

9. The combination of supports for a number of paper strips or ribbons, a type-belt movable across said strips or ribbons, electromagnetic mechanisms for causing the printing of the characters on said belt upon said strips, electromagnetic mechanisms for determining the initial positions of the belt relatively to said strips or ribbons, and mechanism for moving the belt to any desired position, substantially as specified.
10. The combination of a type-belt, supports for a number of paper strips or ribbons, a circuit-changing device, a number of electric circuits extending therefrom, mechanism for determining the initial or zero positions

of said belt relatively to any of said strips or ribbons, and which is controlled by said circuit-changing device, mechanism also operated from said circuit-changing device for causing the types upon the belt to print upon the strips or ribbons, and an escapement for permitting the type-belt to move to a desired position, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK A. GRAHAM.

Witnesses:

ANTHONY GREF,
WM. A. POLLOCK.