4 Sheets---Sheet 1.

R. E. HOUSE.

PRINTING TELEGRAPH.

No. 9,505. Patented Dec. 28, 1852.

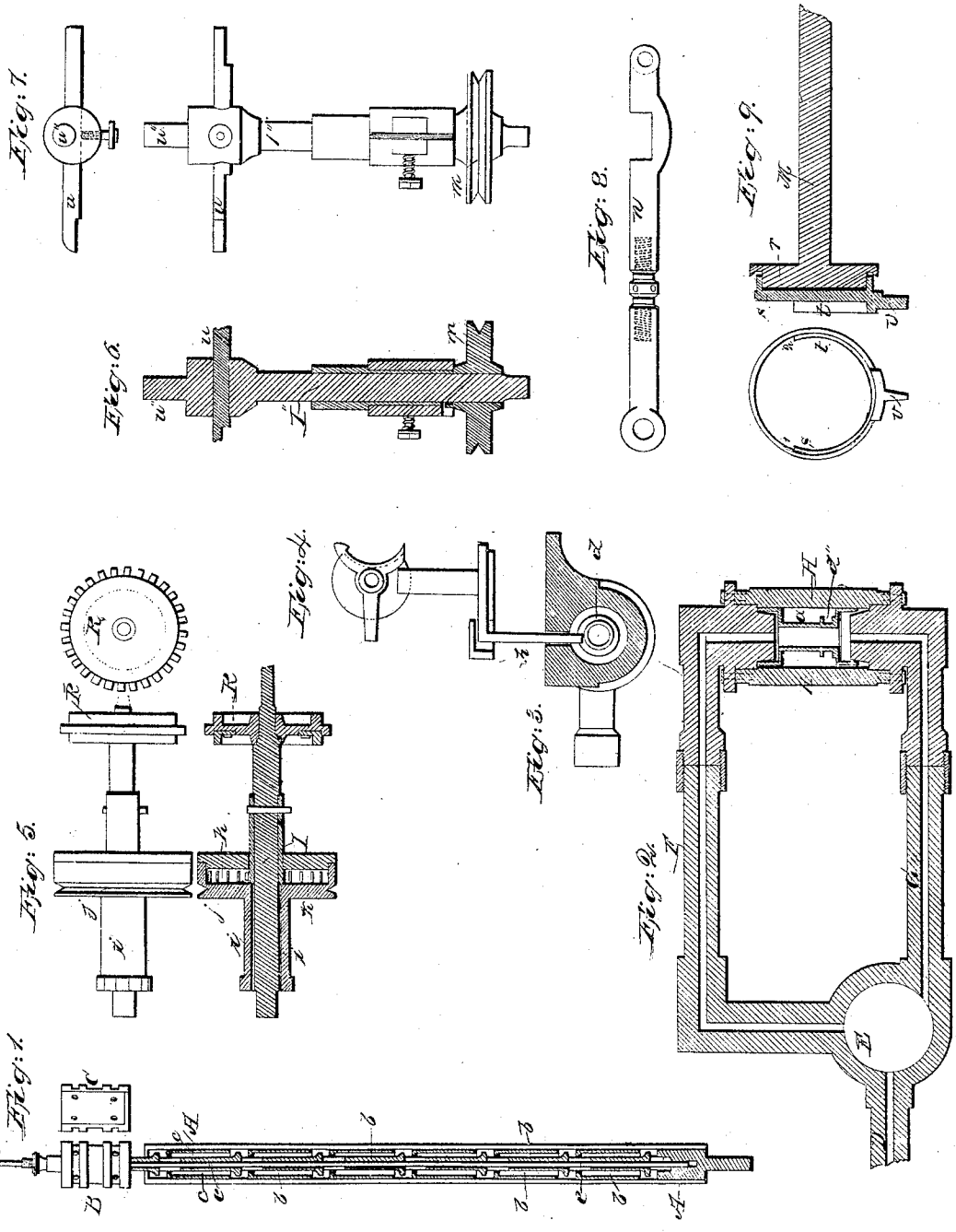

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Fig. 10.

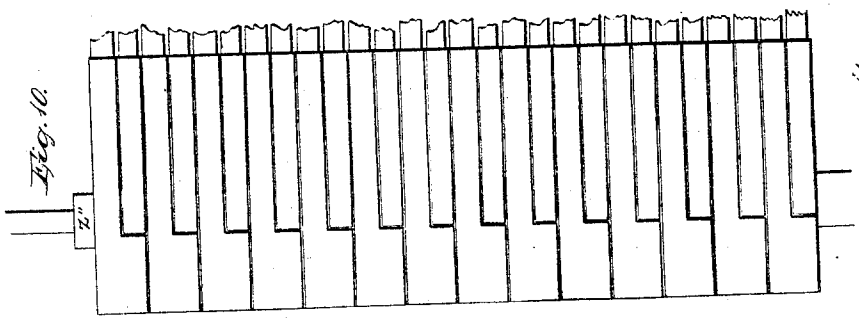


Fig. 11.

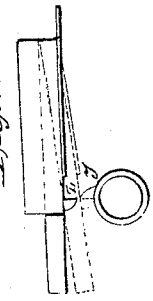


Fig. 12.

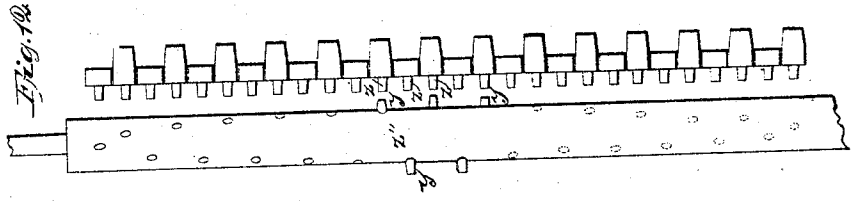


Fig. 13.

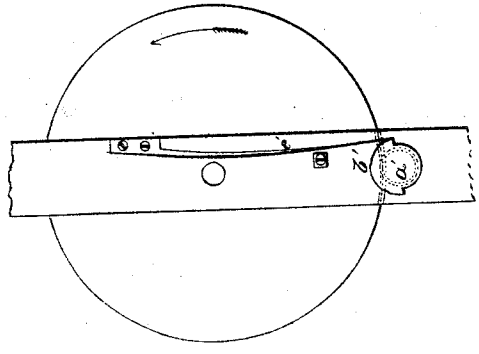


Fig. 15.

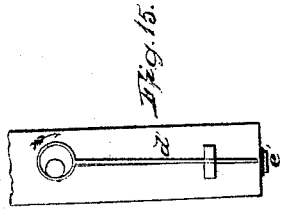


Fig. 14.

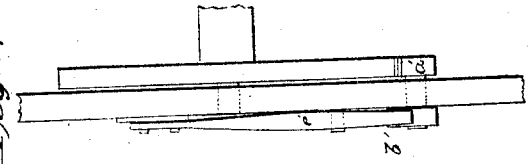
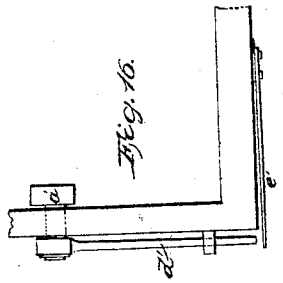


Fig. 16.



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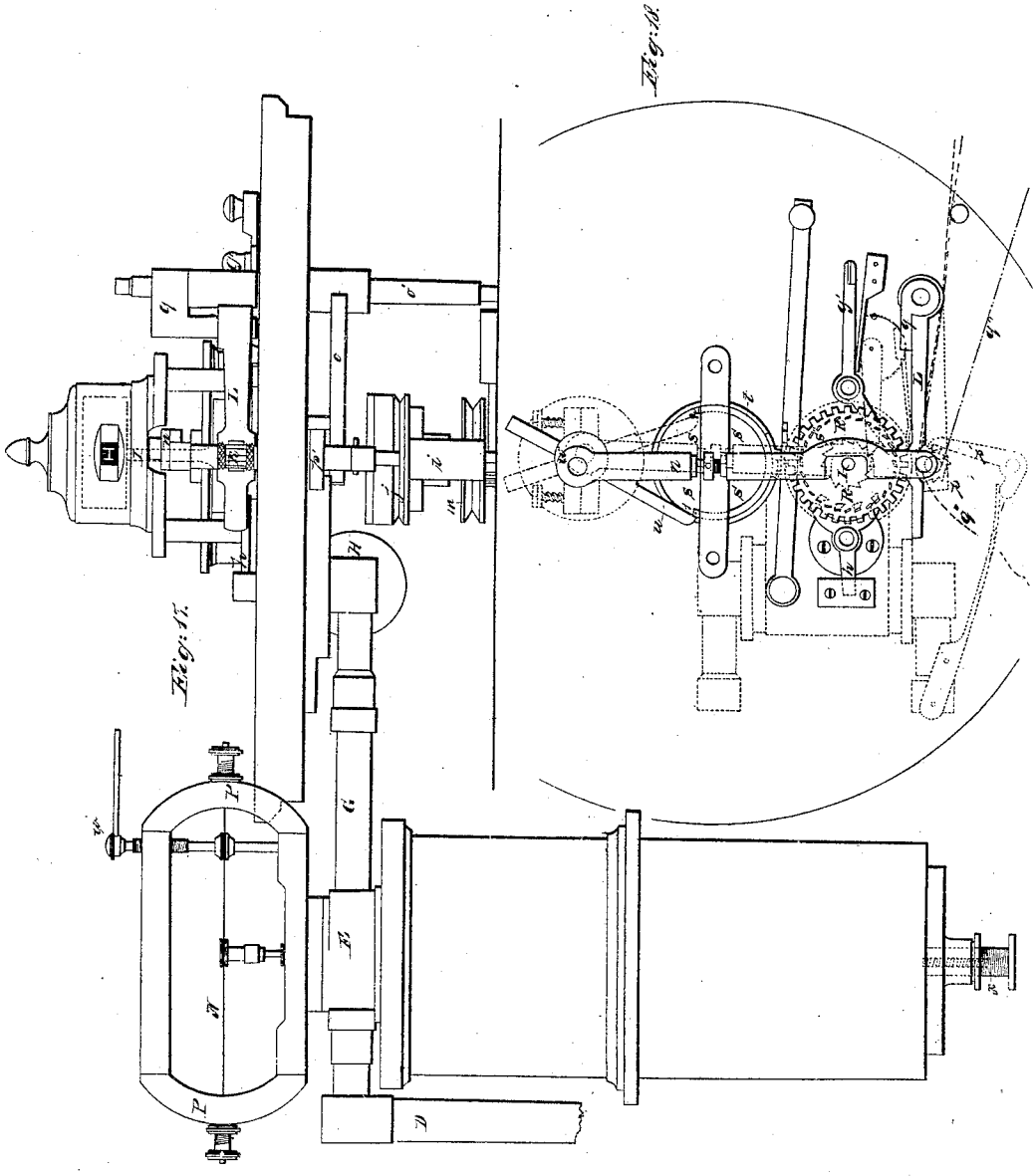

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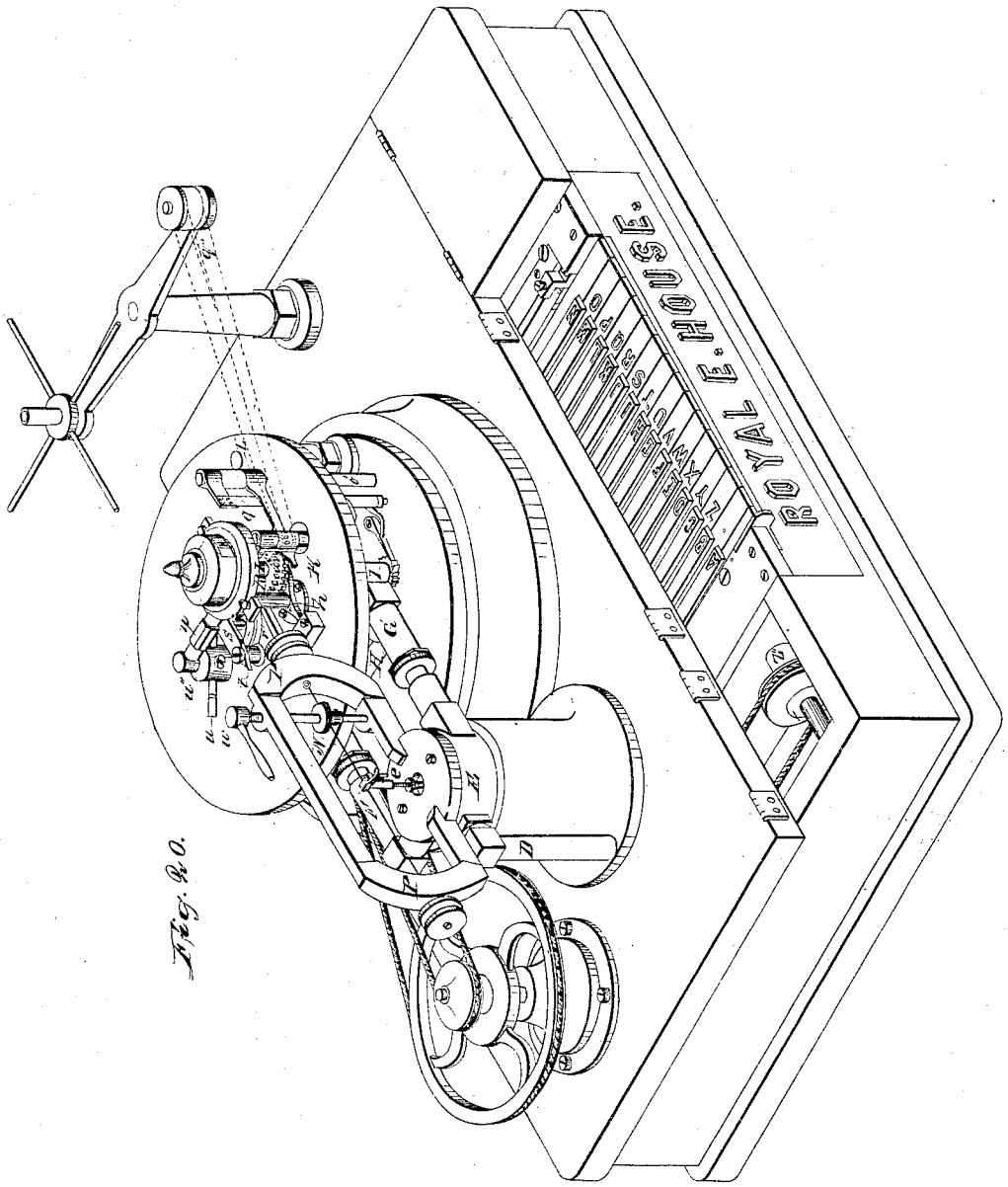

UNITED STATES PATENT OFFICE.

R. E. HOUSE, OF NEW YORK, N. Y.

IMPROVEMENT IN MAGNETIC PRINTING-TELEGRAPHS.

Specification forming part of Letters Patent No. **9,505**, dated December 28, 1852.

To all whom it may concern:

Be it known that I, ROYAL E. HOUSE, of the city of New York, in the United States of America, have invented and discovered new and useful apparatus, methods and means of printing as fast as the types are selected by the compositor, which I call "House's Composing Printing-Press;" and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Plate I is a perspective view of the machine. Plate II, Figures 17 and 18 are elevation and plan. Plate III, Figs. 1 to 9 are parts in detail. Plate IV, Figs. 10 to 16 are also parts in detail.

Similar letters will refer to similar parts throughout unless otherwise specially noted.

The nature of my invention and improvement consists in certain machinery for composing and printing at the same time and at one operation, which machinery, when combined with electrical or galvanic apparatus, is capable of effecting the operation of immediately printing any characters which may be selected by the compositor, even though the printing-press be removed to a distance from the composing-machine; and therefore I design by the use of certain electrical apparatus as improved by me to apply, among other things, the said machinery to the publishing messages in ordinary typography, and also signalizing messages at great distances as means of communicating intelligence.

Included in my said composing printing-press are several parts which are described by me in my Letters Patent dated the 18th day of April, 1846, and which I shall include in the following description, and then point out and define the new parts for which I now seek Letters Patent.

My composing printing-press, as adapted and employed to print at a distance from the compositor, for communicating intelligence to distant places by using a current of electricity or galvanism, may be better understood by being described under four general divisions of parts.

The first division consists of machinery and apparatus placed at the station from which the intelligence is to be transmitted, and which is employed in breaking and closing a circuit of electric or galvanic conductors and detaining the same either broken or closed, and which I call the "composing-machine."

The second division consists of electrical or galvanic apparatus for producing a current of electricity or galvanism to connect the composing-machine with a pneumatic apparatus in such manner as to secure an intermittent action of the force of compressed air in the desired direction.

The third division consists of a pneumatic apparatus connecting the electrical apparatus with the printing machinery, and combining the force of compressed air or steam or other like substance with magnetic force.

The fourth division consists of the machinery used for printing, to be located at the station where the intelligence is to be received, and which I call the "printing-machine."

The composing-machine, for greater clearness of description, may be divided into two parts, which I will describe as the first and the second parts of the composing-machine.

The first part consists of a set or system of detaining finger-keys similar to the finger-keys described in my Letters Patent above mentioned, except that I now arrange them in a double row, more like the keys of a piano-forte. Fig. 10, Plate IV, is a plan of the keys, and Fig. 11 is a sectional view of keys and the shaft under the keys, each key having a spring under it to raise it up after being depressed, and each key has a detent-catch, *z*, on its under side. The letters or characters corresponding with those to be printed or represented are formed upon the tops of the keys, (one on each key) as seen in Plate I.

The second part of the composing-machine consists of a shaft, Z″, Figs. 10, 12, and 20, placed under the set of keys, and having projecting from its surface small detent-pins *y*, (one for each key,) which may be arranged in any convenient form upon the shaft; but I prefer arranging them in two spiral rows. On one end of the shaft may be a cog-wheel substantially like that described in my said Letters Patent, containing half as many cogs as the number of letters or characters to be printed or represented, and of course an equal number of spaces between the cogs, making the spaces and cogs together equal to such number of characters or letters, and so adjusted that each space and cog will have a corresponding detent-pin and detaining-key. Said

wheel forms one pole of the circuit of conductors, and the other pole is connected with the cogs of said wheel, so that the pole of the conductor connected with the cogs will alternately come in contact with each cog and pass through or over each space between the cogs as the shaft and wheel revolve. This part of the apparatus may be varied by having on the end of the shaft a cog-wheel adapted to carry a pinion and shaft on which is a segment of a wheel connected with one of the poles of the circuit of conductors. Fig. 12 is a front elevation of the shaft, showing the spiral rows of detent-pins. Fig. 13 is an end view of the cog-wheel, pinion, and segment of a wheel, a' being the pinion, and b' being the segment of a wheel. Fig. 14 is a plan of the same, together with the end of the circuit of conductors c'. This cog-wheel and pinion are so made that the pinion and its shaft, and consequently the segment, will revolve fourteen times while the key-shaft and its wheel revolves once and the pole of the conductor c' is made to slightly spring and come into contact with the segment each time it revolves, and thus the circuit of conductors will be broken fourteen times and closed fourteen at each revolution of the key-shaft. Another way of arranging the apparatus for breaking and closing the circuit is to attach to the pinion-shaft above described, by an eccentric joint, a rod, d', Figs. 15 and 16, and the opposite end of the rod to come in contact with the pole of the conductor e', so that as the pinion a' revolves the rod is brought into contact with the pole e' and separated from it, the pole e' being provided with a spring for the rod to act against.

The object of this composing-machine is to produce a continuous and uniform breaking and closing of the circuit, and also to enable a compositor or operator to detain the circuit in a broken or closed condition at his option. This object is accomplished in the manner described in my before-mentioned Letters Patent, or by means of the modifications shown in Figs. 13, 14, 15, 16, which are mechanical equivalents for this arrangement.

The second general division consists of a circuit of insulated electric or galvanic conductors, a galvanic battery or other known generator of electricity or galvanism, an electro-magnetic apparatus, which I call the "combination electro-magnet," and a valve, which I call the "balance-valve." The new parts of this division consist of the construction and use of the combination electro-magnet and the balance-valve. A A of Fig. 1, Plate III, is a section of the combination electro-magnet, which is constructed thus: Within a case, A A, which may be a tube, and made of any suitable material, except such as will become magnetized by a current of electricity or galvanism, fix a series of hollow cylindrical pieces of iron, c—say about three-quarters of an inch long and of such diameter as to set snug in the case. These I call the "fixed magnets." They should be a short distance apart—say about half an inch—and about one-tenth of an inch thick. One end—say the upper end—of each of these fixed magnets should be partially inclosed by an end piece, leaving a small hole in it to admit a rod, e, of any suitable material which will not become magnetized by a current of electricity or galvanism. This rod extends through the whole series of these magnets, and is prolonged beyond them at the upper end of the case, and on it are strung other pieces of iron, b, which I call the "movable magnets." They are of a cylindrical form, enlarged at the bottom, forming a flange, as shown in the drawings, and are fixed tightly upon the rod e in such positions that when the rod descends each lower end of these movable magnets may come in contact with an upper end of a fixed magnet. Strung upon the rod between the movable magnets are washers, separating them and covering those parts of the rod which pass through the upper ends of the fixed magnets. These washers should consist of material not susceptible of becoming magnetic by a current of electricity. When thus constructed and arranged the case A is to be placed within a helix or coil of insulated wire, substantially in the usual manner of making the coil around iron to form an electro-magnet. The rod carrying the movable magnets is to play easily up and down. Thus finished, it will be obvious to those acquainted with the science that such a magnet combines repulsion and attraction. Thus, when a current of electricity or galvanism traverses the coil or helix of wire, both the fixed magnets and the movable magnets become magnetized, when the lower enlarged ends of the movable magnets and the upper ends of the fixed magnets will attract each other, and also that these forces—attraction and repulsion—both act in the proper direction to cause the movable magnets to approach the upper ends of the fixed magnet; and hence, by this combination magnet, of which I claim to be the first inventor and discoverer, I secure a great advantage in the acquisition of power. To the end of the rod e extending above the case is attached a fixture which I call a "circular balance-valve," of which B is a front view and C a vertical section. This valve is made in the form of a short hollow cylinder, having three narrow grooves cut in the outer circumference, as clearly shown, and with holes through its side from the bottom of each of the two end grooves, as shown. This valve moves in a cylindrical case within the valve-chamber E.

The third general division, which I call the "pneumatic apparatus," consists of cylinders, pipes, or tubes, piston, escapement, and air-pump, arranged as a means of using the force of air in any system of transmitting intelligence. These parts (except the air-pump, which may be of an ordinary form, and which is too well known to require a drawing) are best shown by Figs. 2 and 3, Plate III. A pipe, D, to conduct air, extends from an air-pump and enters the valve-chamber E, and pipes F and G ex-

tend from either side of the valve-chamber and communicate with the ends of a cylinder, H. This contains a light hollow piston, *d*, made as shown in Figs. 2 and 3, and having a groove, *d''*, around it to receive the end of a lever, *h*, attached to an escapement, which it moves. The manner in which these several parts are connected is more clearly shown in Plates I and II, and the operation of this apparatus will be that the piston in the cylinder H will be made to move back and forth by the air passing through F and G, those pipes being rendered alternately injection and exhaust pipes by the action of the valve in E in a manner common to reciprocating engines. The operation of the escapement as acting on the type-wheel is the same as set forth in my Letters Patent before quoted.

The fourth general division is descriptive of the printing-press, and for greater clearness may be described in three parts.

The first part consists of a type-wheel, signal-disk, spring-pulley, &c. The type-wheel is constructed substantially as described in my said Letters Patent, except that the escapement-teeth are formed upon a flange, which is attached to the wheel to admit of being more easily replaced when worn out. The type-wheel is shown at R in Fig. 5, and the position it occupies in the machine is shown in Figs. 18 and 20. Toward the end of the shaft on which the type-wheel revolves is a sheath, *i*, Figs. 5 and 17, through which the type-shaft runs, and on this sheath is a pulley, *j*, to which the power is applied which propels the type-wheel. Within this pulley is a spring, *k*, similar to a clock-spring, one end being attached to the shaft I and the other end resting against the inside of the pulley, and so adjusted that the type-wheel and its shaft is carried only by the friction of the detached end of the spring bearing against the inside of the pulley, and that when the motion of the type-wheel is arrested the spring will acquire greater tension and accelerate the starting of the wheel when it shall be again liberated. The shaft I is prolonged above the table or stand, as represented by the dotted lines in Fig. 17, and on it, near the top, is placed a disk, as is also represented by dotted lines in said Fig. 17, with letters, blank, and period on the outer circumference corresponding with the letters, blank, and period on the type-wheel. This disk may be covered by a cap or case with a hole in the front, through which a letter—as, say, H—is shown, as in Figs. 17 and 20.

The second part of the fourth general division is that portion which causes the paper to approach and recede from the types at the proper times, and the paper also to advance after each letter is printed, together with the apparatus for supplying the coloring-matter, and which is propelled by a power distinct from the other parts. This part consists of the upright shaft I'', Figs. 6 and 7, with its friction apparatus, connecting-rod with its eccentric, toothed cylinder and its several springs, ratchet-wheel and pawls, and the endless band and fixtures for supplying the coloring-matter. A portion of the shaft I'' is inclosed in a sheath carrying a pulley, *m*, to which the propelling power is connected, so that the shaft I'' is moved by the friction of the sheath in the same manner as described for carrying the type-wheel. This shaft extends a short distance above the table, having an eccentric, *w''*, on its upper end, as shown in Figs. 7, 18, and 20. To this eccentric one end of a connecting-rod, *n*, Figs. 8, 18, and 20, is attached. The other end extends horizontally across and beyond the type-wheel and operates upon the shaft upon which the small upright toothed cylinder K plays, as shown in Figs. 17 and 20. This toothed-cylinder shaft is supported at the lower end by an arm, *o*, Fig. 17, attached to a vibrating post, *o'*. By this arrangement it will be observed that the toothed cylinder K is caused to approach and recede from the type-wheel at each revolution of the shaft I'' and eccentric *w''*. On the toothed cylinder K, near the lower end, is a ratchet-wheel, *p*, (seen in dotted lines in Fig. 18,) with a suitable pawl, *p'*, and spring, to cause the toothed cylinder to revolve the distance desired to have left as a space between the letters to be printed at each advance and recession of the toothed cylinder K. The modes of arranging the ratchets and springs are so various and simple as to require no detailed description. The toothed cylinder K must be slightly fastened where the letters are printed. For this purpose an arm, L, Figs. 17, 18, 20, is placed in a horizontal position, turning on a joint sufficiently to vibrate a short distance. The detached end comes between the toothed cylinder K and the type-wheel, a slot being cut through the said arm opposite the types sufficient to admit a type through. On the side of this arm opposite the toothed cylinder is a spring, *q*, to hold the arm up to the toothed cylinder, the arm having, in addition, two small grooves for the teeth to pass through as the toothed cylinder revolves. An endless band, (seen at q^2, Figs. 18 and 20,) charged with plumbago or other suitable coloring-matter, runs around the toothed cylinder K at one end and a roller at the other, the direction being such as to cause said band to pass between the toothed cylinder and the detached end of said arm L. The ribbon of paper on which the printing is to be done is to pass through between the endless band and the said arm, as shown at q^3, Fig. 18. Thus arranged, the arm L holds the paper and band against the teeth of the cylinder, so that as the cylinder revolves the teeth carry forward both the band and paper; and when the cylinder is caused to approach the types, as above described, it carries with it the arm L, the band, and the paper. The paper is thus pressed against the type through the slot in the arm, making a corresponding pressure of the paper upon the prepared band, by which a distinct letter is printed on the side of the paper next the band and opposite the type.

The third part of the fourth general division is the detaining apparatus for regulating the motion or action of the second part of the fourth general division, and consists of a shaft, M, (shown in detail in Fig. 9,) having attached to the upper end a disk, *r*, with flanges projecting up from its outer edges. This disk carries a friction-cap, *s*, which sets in it, the shaft and cap having the position shown in Figs. 18 and 20. This cap has a rim or flange, *t*, on the upper side, extending, say, about two-thirds the distance around the cap. The ends of this rim or flange act as detents, and pins inserted in its upper surface would subserve a similar purpose. The shaft I″, Fig. 7, carries a detent-arm, *u*, Figs. 7, 18, and 20, which acts upon the ends of this flange *t*, so that as the shaft I″ revolves said detent-arm first takes the shoulder 1, Fig. 18, and remains in that position till the friction-cap *s* is a little turned, when it slips off of the shoulder 1 and takes upon the shoulder 2. The shaft M and disk *r* being propelled by means of a pulley, (not shown in the drawings, as it is situated below the table,) its tendency is to carry the friction-cap *s* around so as to hold the detent-arm upon the shoulder 1 and to liberate it from the shoulder 2. A small arm, *v*, projects from the friction-cap, and this extends over the type-wheel, and is acted upon by the row of teeth or pins *s″*, Figs. 18 and 20, on the type-wheel, corresponding in number with the number of letters or characters to be printed or represented. The action of these teeth upon said arm turns the friction-cap, notwithstanding the tendency of the friction to carry it the other way, until the detent-arm *u* is released from the shoulder 1 and takes against the shoulder 2. The cap will then be kept in this position by the same action of said teeth so long as the type-wheel continues to revolve; but on the type-wheel being stopped the cap *s* will be carried back by the friction, the arm *v* falling against the tooth next back of it, immediately liberating the detent-arm *u* from the shoulder 2, and the eccentric-shaft I″ will revolve, carrying the connecting-rod *n* and causing the paper to approach and recede from the type, as before described. The rod *e*, Fig. 1, attaching the movable magnets and valve B, extends up from the air-valve and is attached to a delicate wire thread, N, Figs. 17 and 20, which is stretched tightly in a frame, P, by screws, and the screw *w* is for raising or lowering the wire. To the lower end of the case is attached a screw and nut, *x*, Fig. 17, to raise and lower the case A and fixed magnets, by which means the relative position of the fixed and movable magnets can be easily adjusted. The movable magnets should not be allowed to quite touch the fixed magnets.

In using my said composing printing-press to print at such distances from the compositor, as it can be done by dispensing with electricity and using long pipes to conduct the air, the cogs of the wheel on the key-shaft described above for breaking and closing the circuit of electric or galvanic conductors are made to carry a pinion so adjusted as to revolve fourteen times while the key-shaft revolves once. The valve B is connected with the pinion-shaft by a connecting-rod with either a cam or eccentric. The connection may also be made by clock-work, so as to cause the valve to descend fourteen times and ascend fourteen times every revolution of the key-shaft.

The above modification is to be used when I connect the printing-machine with the valve B by long pipes to conduct the air, and when the valve B is to be near the composing-machine, or in case the printing is to be done at the same place or in the same room where the composing-machine is stationed, the valve B and pneumatic apparatus may, in certain cases, be dispensed with and the key-shaft connected by any suitable mechanical device with the escapement to cause it to vibrate fourteen times each way at every revolution of the key-shaft; or the key-shaft may be connected more directly with the type-wheel by a connecting-rod or other contrivance, so that the type-wheel will be stopped as often as the key-shaft; or the type-wheel itself may be placed upon the key-shaft.

In using steam instead of air in operating my said composing printing-press no essential alteration of the mechanism is necessary, except substituting any known generator of steam instead of the air-pump and connecting therewith the pipe D to conduct the steam into the valve-chamber, when it will pass through the various passages similarly to the air, as described; but from experience I have found the use of air preferable to that of steam.

In operating my said composing printing-press it is necessary that both the type-wheel and key-shaft should start from the same letter or character in order that they may keep time with each other thereafter. I use a blank on the type-wheel and a corresponding detent finger-key and pin on the key-shaft as the starting-points; and in case of printing at distant places as a means of communicating intelligence some means is necessary by which the operators at the respective stations can start their respective machines at these points. For this purpose a spring and key, *g′*, of Fig. 18 is so arranged that by moving the key with the finger it takes into a stop on the type-wheel and stops it at "blank." By pressing down the blank detent finger-key the key-shaft will also be stopped at "blank."

To regulate the machines the operators interchange signals in any preconcerted manner by means of the electric current, and each stops his machine at "blank" by the use of the above-named keys. Both are then librated, first the type-wheel and then the key-shaft, and the machines then run with regularity.

The transmission of intelligence and the printing of it are as follows:

The type-wheel of the distant printing-machine is at "blank," and the key-shaft in electri-

cal connection with it is at "blank" also. Both the type-wheel and the key-shaft are in rotary motion and a current of air is being propelled through the machine from the air-pump, entering by the pipe D. The inking-band q'' and the strip of paper are in order, as described, to receive the pressure of a type when ready to be given. The key-shaft, in revolving, breaks and closes the circuit fourteen times in one revolution; the magnet vibrates a like number of times; the piston d and the escapement h the same, producing one revolution of the type-wheel, when both the type-wheel and key-shaft stand in the same relative positions—viz., at "blank." If, now, the eighth letter, H, of the alphabet is to be printed on the distant machine, press down key H. The key-shaft continues to revolve until the eighth detent-pin comes opposite to the stop. The type-wheel, having kept equal time in its revolution with the key-shaft, stops at the same instant, because the breaking or closing of the circuit immediately arrests the vibration of the magnet, and of course the escapement with it. The place where the type-wheel is stopped is where the letter H is opposite to the shaft K, and consequently just where it should be to give the pressure upon the inked band, and thus produce the impression of H upon the paper, as has been described. At the same instant the disk S slightly vibrates and moves the stop 1 upon it, whereby the lever u is released and flies round by the revolution of I'', the crank w'' moving to such a position as to bring back the shaft n, which carries and forces the cylinder k, moving the paper and inking-band up against the type H, thus making an impression. The moment this is done the disk S moves back to its original position. The lever u flies round and is caught as before. The shaft n carries the paper clear of the type by moving back again the cylinder K. In doing this the pawl p' plays in the ratchet p, moving it round one notch. This carries on the paper and inking-band and spaces the distance apart of the letters. It must be borne in mind that the key must be held down until the letter is formed, not being released until the next key is depressed for the printing of the next letter. If I is to be printed, it will be effected by either breaking or closing the circuit. If H was formed by closing the circuit, then I will be formed by breaking it, and the key will hold the key-shaft so that the circuit-wheel is at a space. The magnet immediately rises—that is, makes one vibration—lifting the air-valve so that air will press upon the opposite side of the piston d and move the escapement one notch, and thus permit the type-wheel to move the distance required to bring the next letter—viz., I—to the place before occupied by H, the impression being given to it as before. If the next to be printed is six letters off, the circuit-wheel moves three spaces and three cogs, thereby breaking and closing the electric current that number of times, producing a like number of vibrations, and each vibration counting for a letter. Thus, if the letter B were printed, and it were necessary to print A next, there would be a number of vibrations equal to the whole alphabet, less one; but from A to B there would be but one.

The printing-machine shown in Fig. 20 is not necessarily connected with the keys in the manner shown, but is connected with another set of keys from a distance. However, as but one conductor is ordinarily used, the keys to each machine operate on both presses. This is useful, as by means of the disk placed upon the type-wheel shaft, having letters printed upon it to match those on the type-wheel, as shown at H, the operator can watch for errors or derangements between the two.

What I claim as my own invention, and desire to secure by Letters Patent, is—

1. The employment of electro-magnetic force in combination with the force of a current of air or other fluid, so that the action of the former governs or controls the action of the latter, for the purpose described.

2. The construction of the electro-magnet, as described—that is to say, a series of fixed magnets in combination with a series of moveable magnets arranged upon a central axis, which axis plays between or through the line of fixed magnets so as to effect a vibratory movement of said axis by a force multiplied by the number of magnets of both kinds.

3. The combination of an electro-magnet with the valve for regulating and directing the force of a current of air or other fluid acting as a motive power upon the piston or other analogous device for producing a vibratory motion, as described.

4. The endless band, in combination with the cylinder K, as an inking-machine for conveying and applying the coloring-matter to the paper at the moment of receiving the impression from the types, as described.

5. The combination of the regulating-bar g' with the type-wheel, for the purpose of regulating the proper position said wheel should have in connection with a given position of the key-shaft at the moment of printing any letters or characters, the whole being combined and operating substantially as herein set forth.

ROYAL E. HOUSE.

Witnesses:
S. H. MAYNARD,
THOMAS H. WOOD.