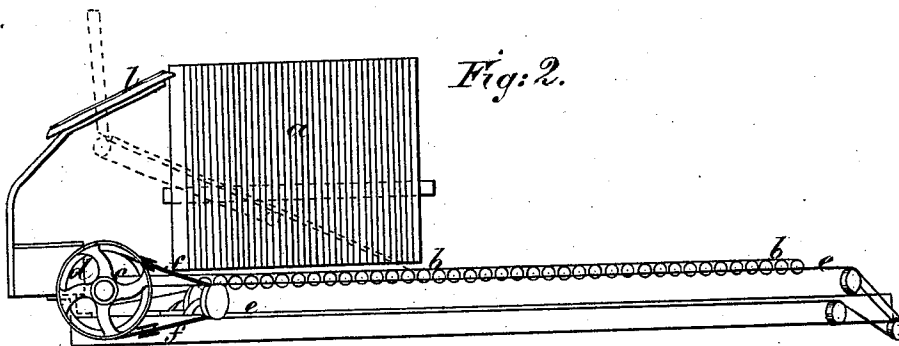
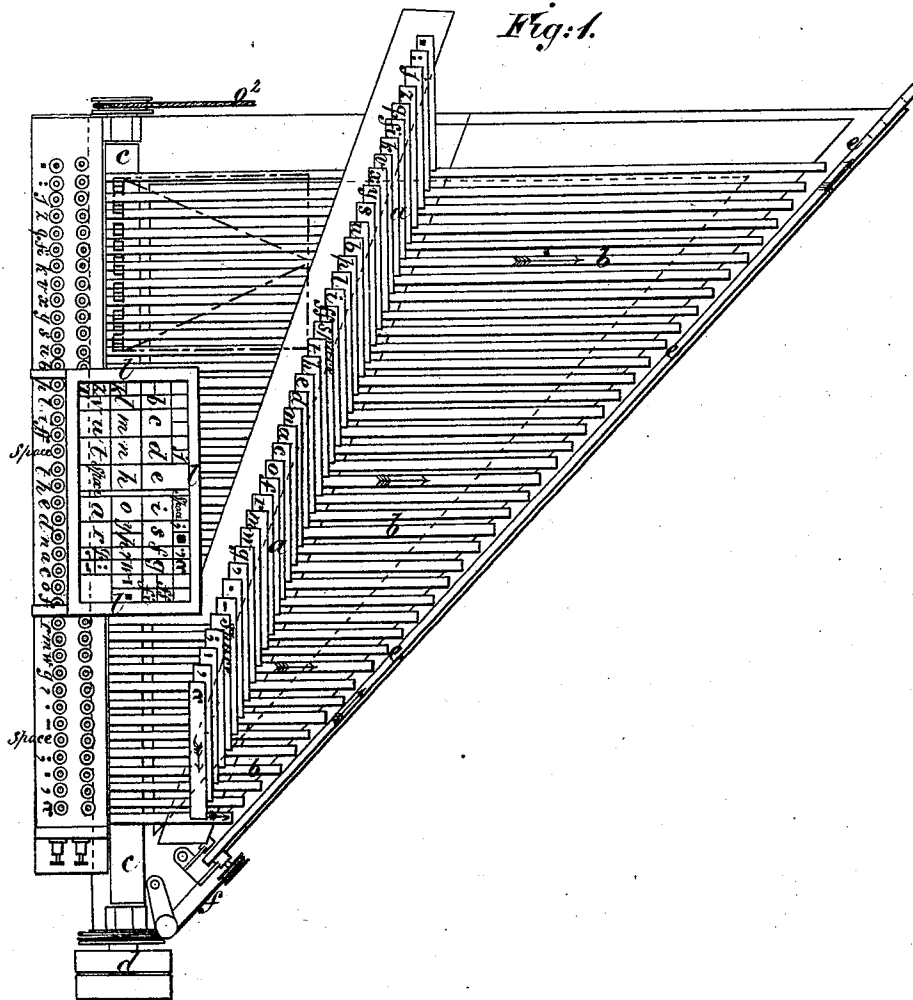


J. HOOKER.
TYPE-SETTING MACHINE.

No. 170,372.

Patented Nov. 23, 1875.



Witnesses
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Fig: 1.

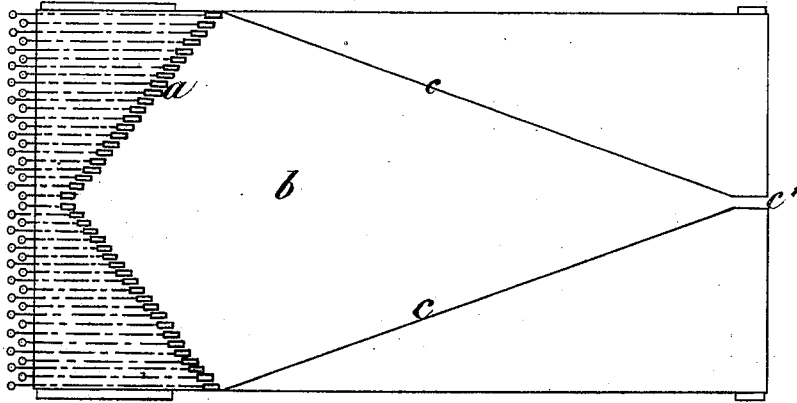


Fig: 3^a.

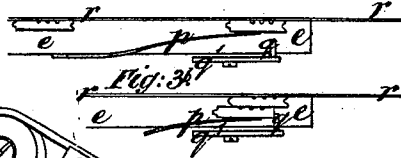


Fig: 3^b.

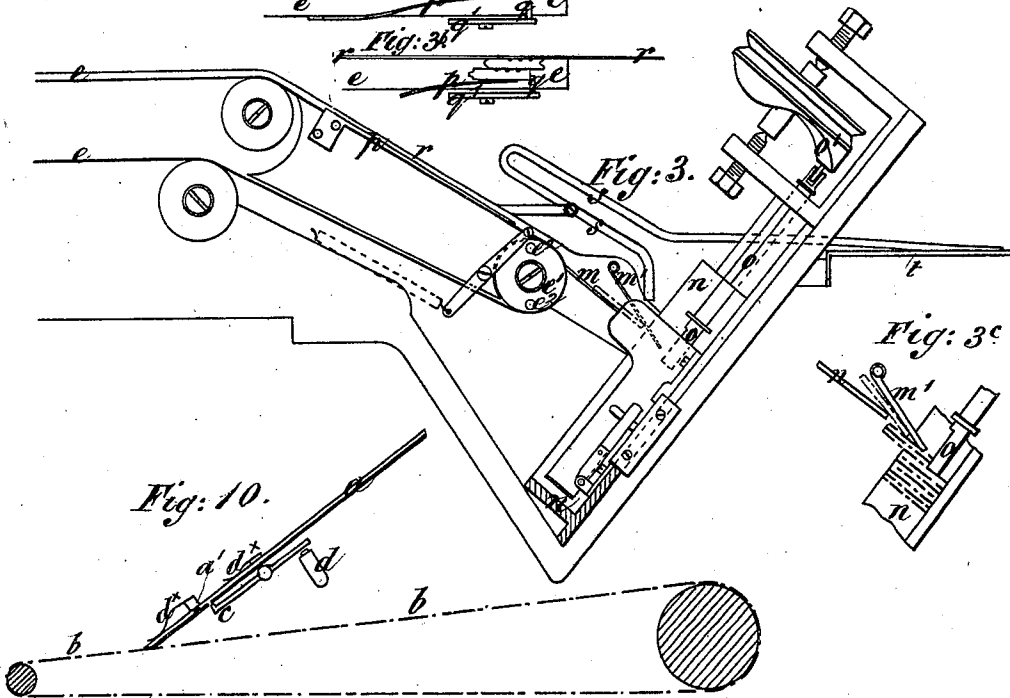


Fig: 3^c.

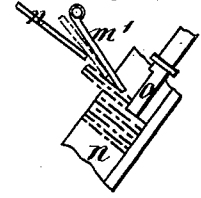
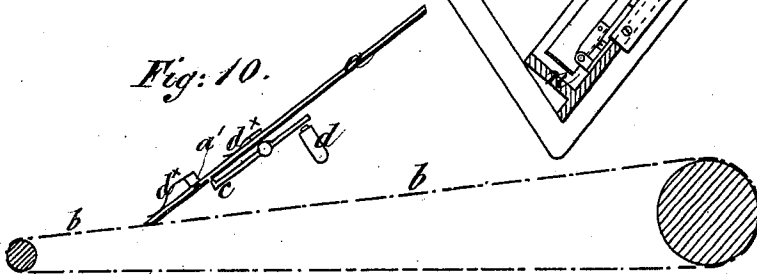


Fig: 10.



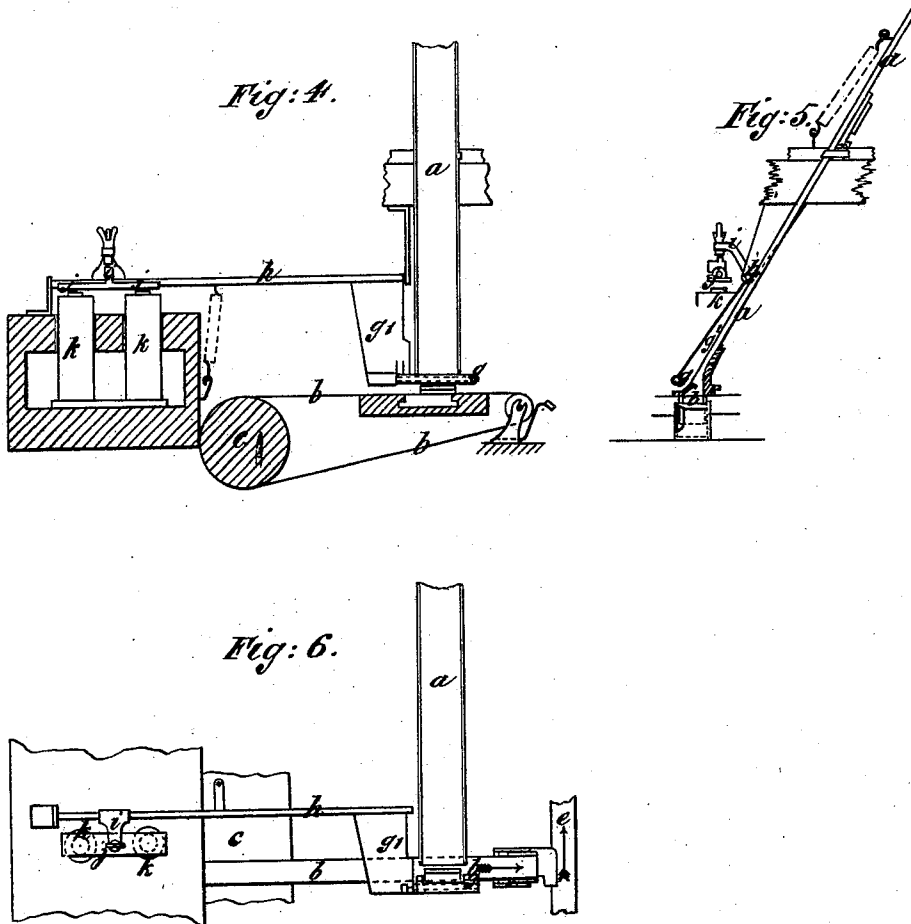
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Fig: 8.

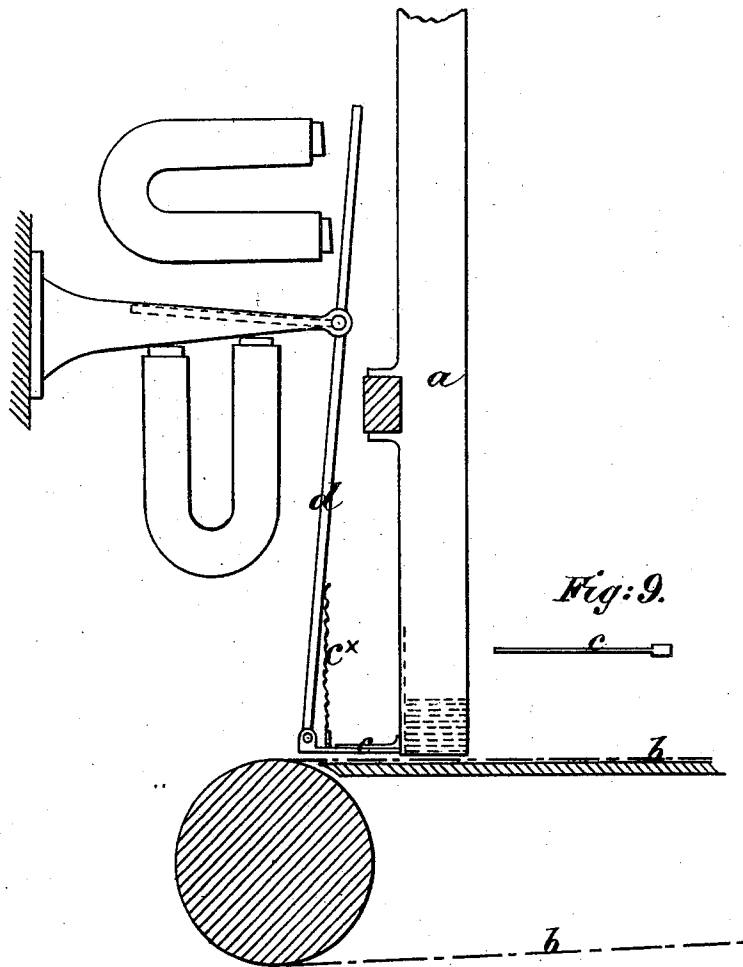


Fig: 9.



Witnesses

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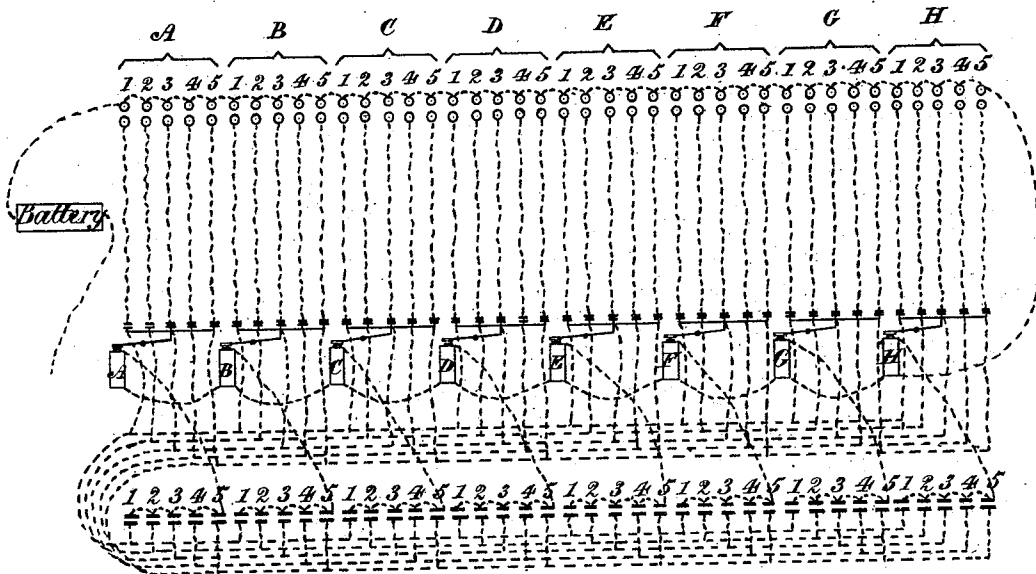
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Fig: 11.



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UNITED STATES PATENT OFFICE.

JOHN HOOKER, OF ISLINGTON, ASSIGNOR TO WILLIAM MOORE, OF BECCLES,
AND WILLIAM C. K. CLOWES AND WILLIAM CLOWES, JR., OF LONDON,
ENGLAND.

IMPROVEMENT IN TYPE-SETTING MACHINES.

Specification forming part of Letters Patent No. **170,372**, dated November 23, 1875; application filed September 11, 1874.

To all whom it may concern:

Be it known that I, JOHN HOOKER, of 1 Essex street, St. Peter's street, Islington, in the county of Middlesex, England, a subject of the Queen of Great Britain, have invented or discovered new and useful Improvements in Type-Setting Machines; and I, the said JOHN HOOKER, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

The object of this invention is to facilitate the setting up of type by means of machinery.

In type-setting machinery the type are ordinarily contained in inclined or vertical reservoirs, there being a separate reservoir for each letter or type, and as any letter or type is required it is pushed out from the bottom of one or other of these reservoirs by means of a pusher worked by the depression of a finger-key. By this arrangement the several finger-keys must either be in a straight line, corresponding with the row of type-reservoirs, or, if the keys are otherwise placed, the connections between them and the pushers become complicated. The finger-keys have also to be depressed with considerable force to overcome the friction of the lever-connections and to expel the bottom type from out of a reservoir.

To obviate these inconveniences I employ electro-magnets to give motion to the pushers at the bottom of the several reservoirs. One end of the coil of each magnet I couple to one end of the battery, and the opposite end to a fixed metal plate. The several plates thus coupled to one end of the several coils are insulated from another, and may be ranged in any positions desired. I, by preference, arrange them in the form of an ordinary compositor's case or tray of type. The operator, wishing to deliver a letter from one or other of the reservoirs, simply touches the metal plate corresponding to this letter with the end of a wire coupled to the opposite pole of the battery, so making the electro-magnet and expelling a type by the pusher worked by it.

The contacts for passing a current through the coils of any one or other of the electro-magnets may, however, if desired, be made by depressing finger-keys or by other suitable means.

The manner in which the electro-magnets are arranged to work the pushers for expelling the type from the reservoirs may be considerably varied. I prefer, however, to cause the pushers to push the type out sidewise, and to work the pushers by arms carried by axes, in the manner hereinafter described; but in place of forming finger keys or arms at the opposite ends of these axes, as heretofore, when the pushers have been worked in this manner, I shorten the arms and mount upon each of them an armature, and below each armature I place an electro-magnet, which is caused to attract the armature whenever a type is to be pushed from the bottom of the reservoir.

As the types are pushed from the reservoirs they may be carried away by endless traveling tapes and delivered onto one tape, which is inclined to the row of reservoirs, in the manner now well known, and as is hereinafter more fully described.

In order to collect the type into line from this traveling band I cause the delivery end of the band to incline somewhat downward, and deliver the type, tail foremost, onto a short inclined chute, from which they pass on to the top of a column of type previously collected in a receiver. This receiver passes downward approximately at right angles to the inclined chute, so that the uppermost type in it shall be at such an angle that, as a fresh type comes down, this fresh type is free to slide along, by gravitation, to the back of the receiver, and so come into a line with the other type previously contained therein. As the types are received into the receiver they are pushed downward along it by a pusher, which acts on their tail end, and this pusher, at each forward stroke, moves the type downward in the receiver a sufficient distance to allow of two or three type entering the receiver before the pusher has to make a fresh stroke. In order to permit two or more type thus to en-

ter the receiver, even during the time that the pusher is forward, the distance between the side of the pusher and the end of the inclined chute is made sufficient to allow the head of the type to drop clear of the chute when its tail end is resting against the side of the pusher. The receiver, after passing downward a short distance in the direction above mentioned, is curved round and led away horizontally, or nearly so, to the front of the machine, and the type are taken away from it, from time to time, in lines to be justified.

In order to prevent two types from passing, side by side, from the traveling tape into the receiver, I place above the delivery end of the tape, where it inclines downward, as before stated, a light spring, to guide the type up to a fixed guiding-surface along one side of the tape. If, however, two types are being carried forward, side by side, upon the band, this spring is pushed aside, and the type farthest from the guide-surface above mentioned is arrested by a stop, which is carried by a short lever, to which a vibrating motion is imparted, so as to move back this type in a contrary direction to that in which it was before traveling, while the other type is carried forward by the tape, and passes into the receiver. The type which had been arrested is then pressed by the spring up to the guide-surface at the side of the tape, and away from the stop, and is, in its turn, conveyed away by the tape into the receiver.

The above improvements in apparatus for collecting type into a receiver from a traveling band or inclined plane are applicable to other type-setting machines.

In place of employing a number of traveling bands of different lengths to convey the types from the reservoirs to a collecting band or receiver, I employ one broad band, with inclined guiding-plates above it, to guide the type to one point at the delivery end of the band. In this case the type-reservoirs, in place of being in a line at right angles, or nearly so, to the band, are ranged in a line or lines inclined to it, so that each type shall take the same time to reach the point of delivery.

In place of the type being pushed out sideways from the receivers by the means above described, they might be pushed out lengthwise by them onto the traveling bands, the pushers in this case being worked by vertical levers carrying armatures, to work with magnets in a similar manner to that above described.

This arrangement would allow of the type-reservoirs being placed much closer together than in the other arrangement. The pushers also, in this case, may be caused to make their return stroke below the bottom of the reservoirs, so that the weight of type in the receiver may not be resting upon them in the return stroke.

In order that the space between the bottom of each reservoir and the endless traveling

band may be of the proper height to allow of one type only being pushed from it at each movement of its pusher, whatever may be the thickness of the type contained in such reservoir, I regulate the distance by means of one of the type themselves interposed between an arm projecting from the reservoir and the support by which the weight of the reservoir is carried.

By employing electro-magnets to work the pushers for expelling type from the bottom of the several reservoirs, as hereinbefore described, a type-setting machine may, if desired, be worked by an operator at a distance from the machine. Several machines might also, if desired, be worked from one keyboard, or other contact-making apparatus, and so set up several sets of type at the same time. Whole words or sentences might also be set up by one movement; for example, if the operator makes the contacts by touching metal plates with a wire coupled to the battery, some of these metal plates may be coupled by wires to other small metal plates ranged in a row and insulated from one another, so that by sweeping the point of the battery-wire along this row the several letters represented by these plates will be delivered from their reservoirs, and in the order required. In cases, also, where the type-setting machine is at a distance from the contact-making apparatus, the number of insulated wires passing from the one to the other may be reduced by so arranging the several contacts that a current must be passed from the battery through two or more of the wires to pass a current through the coil of any one of the electro-magnets, and by using combinations of the various wires a great number of pushers may be worked with but few insulated wires.

In order that my invention may be fully understood and readily carried into effect, I have shown in the drawings hereunto annexed type-setting machinery constructed as above described.

On Sheet 1 of the drawings, Figure 1 shows a plan view, and Fig. 2 a side elevation, of a type-setting machine constructed in the manner hereinbefore first described. The apparatus for collecting the type into line is not shown in these figures, but is shown at Figs. 3, 3^a, 3^b.

On Sheet 2, at Figs. 4, 5, and 6, I have shown separately views of one of the type-reservoirs, and of the mechanism for expelling the type one by one from its lower end, as required.

In these views, *a* are the type-reservoirs. *b* are the traveling tapes onto which the type are received when they are expelled from the lower ends of these reservoirs. These tapes all pass over the roller *c*, which is driven continuously by a belt passing over the pulley *d*, and which may be driven by a treadle or other means. By this means all the tapes are driven continuously at one uniform surface-speed. *e*

is the tape onto which the several tapes *b* all deliver the types which they receive from the reservoirs, and which conveys them all to the apparatus for setting up the type into line. This tape is driven at a greater surface-speed than the tapes *b* by means of an endless cord, *f*, as shown.

So far the construction of the machine is similar to machines heretofore constructed. *g g*, Figs. 4, 5, and 6, are the pushers for expelling the type one by one from the lower ends of the reservoirs. These pushers and the parts connected with them are not shown in Figs. 1 and 2, in order that other parts of the machine may be seen more clearly. The pushers *g* are carried by lever-arms *g'* from axes *h*, as heretofore; but, in place of these axes having at their opposite ends long lever-arms projecting from them to form finger-keys, by which a partial rotation may be given to the axes, I provide the axes with short lever-arms *i*, which carry armatures *j*. These armatures are suspended just above fixed electro-magnets *k*. One end of the wire coil of each magnet is coupled up to a wire passing to one pole of a battery, and the other end of the wire coil is coupled up to one or other of the several metallic plates which are set in the frame *l*, and which are insulated from one another. The letters, spaces, &c., with which the several metallic plates in this frame correspond, are marked upon them in Fig. 1, and they are arranged in the same order as the ordinary divisions of a compositor's case or tray.

To expel a letter or space from one or other of the reservoirs, the operator has simply to touch one or other of the metallic plates in the frame *l* with the end of a wire which is led from the opposite pole of the battery to that with which the coils of the electro-magnets are permanently connected. This causes the corresponding electro-magnet to attract its armature and cause the pusher connected with it to expel a type from its reservoir.

If it be desired to increase the range of the machine, so that it may be capable of setting up capitals, numerals, and such like, in addition to the letters, spaces, &c., as marked upon the several reservoirs in Fig. 1, a supplementary apparatus may be added to it, as indicated by dotted lines in this figure, to deliver such letters, &c., onto one or other of the bands or tapes *b*. This apparatus may either be of the construction above described or (as is indicated by the dotted lines) of the modified arrangement of it which is hereinafter more fully described.

I will now describe more fully the apparatus by which the type, as they are conveyed away by the tape *e*, are set up into line. The delivery end of the tape *e* is, as shown at Fig. 3, Sheet 4, caused to incline downward and deliver the type onto an inclined plate, *m*, from which they slide onto the top of a column of type previously collected in the receiving-channel *n*. The end of the channel *n* in which

the type are received inclines downward, as shown, at right angles, or nearly so, to the inclined plate *m*, and, after passing down a short distance in this direction, it is bent round and led away in a horizontal direction, or nearly so.

As the type leaves the inclined plate *m* it comes against the light hinged plate *m'*, which not only serves to arrest the forward movement of the type, but also to press downward its tail end, so that the tail end of an oncoming type shall slip along the surface of the uppermost type in the receiving-channel *n*. As the type collect in the receiving-channel they are pushed downward along it by the pusher *o*, to which a to-and-fro motion is given by the cam *o'*, which is driven continuously by means of an endless cord, *o''*. The to-and-fro motion of the pusher *o* is in a line at right angles, or nearly so, with the inclined plate *m*, and is at such a distance from the end of this plate that even if two or three type happen to be delivered from the plate *m* into the receiver *n* during the time the pusher is in its forward position, as indicated by Fig. 3^c, these type can fall clear of the end of the plate *m*, and when the pusher recedes they will slip into their proper position in the receiver.

The mechanism I employ for preventing two type being simultaneously delivered side by side from the plate *m* onto the receiver *n* is shown at Figs. 3^a, 3^b. It consists of a light metal spring, *p*, and a reciprocating stop, *q*. If the type are being conveyed forward one by one upon the tape *e*, as indicated by Fig. 3^a, the spring *p* only serves to insure that the type shall lie correctly against a fixed metal fence or guide, *r*, which is at the edge of the tape *e*; but if two type are being conveyed forward side by side upon the tape, as indicated at Fig. 3^b, the type which is farthest from the tape is arrested by the stop *q*, while the type which is next to the metal fence *r* is carried forward by the tape, and when it has been carried forward beyond the type which was arrested, this latter type is pressed inward by the spring up to the metal fence, and is so moved clear of the stop, and is again carried forward by the traveling tape. The stop *q* is carried by the lever *q'*, and has a reciprocating to-and-fro movement given to it by pins *e''* on the wheel *e'*, around which the tape *e* passes. By thus giving a reciprocating motion to the stop a type, when arrested by it, is moved backward, and enables the spring *p* to sooner press it up to the metal fence *r*, and clear it from the stop.

This arrangement of machinery for setting up type into line is not only applicable to the electro-magnetic machine above described, but to other constructions of type-setting machines.

In order that the action of the machine may be at once arrested if, from any cause, the type collect too quickly in the upper part of the receiver, the light plate *m'*, if its end is raised too high by type collecting below it,

comes against the end of a lever, *s*, and turns this lever on its axis, so lifting the opposite end of the lever away from the plate *t*, upon which it previously rested, and thereby disconnecting one pole of the battery from the machine, and arresting the delivery of any more type from the reservoirs. Any suitable contact-making apparatus may for this purpose be carried by the lever *s* and plate *t*.

At Fig. 7 I have shown a diagram plan view of a modification of the type-setting-machine above described. In this modification one broad band is employed to convey the several types from the type-reservoirs to a collecting-band, which deposits them into the receiver. In this figure, *a* are the type-reservoirs; *b*, the broad endless traveling band. *c c* are inclined guiding-plates above the band, which guide the type to the narrow exit-opening *c'*, through which the type pass on to an inclined endless traveling band, by which the type are deposited into a receiver in a similar manner to that hereinbefore described.

In the arrangement shown in the drawing, the type are expelled sidewise from the type-reservoirs onto the band by pushers worked by electro-magnets, as in the arrangement shown at Figs. 1 and 2; but when a single broad band, *b*, is employed, the type-reservoirs may be brought closer together than when several narrow bands, one for each reservoir, are used. If it is desired to contract the width of the machine as much as possible, then, as before stated, the pushers, instead of acting sidewise upon the type, might be caused to expel them endwise from the reservoirs. Such an arrangement is shown at Fig. 8. In this figure, *a* is a type-reservoir; *b*, the endless band; *c*, the pusher jointed to the lower end of the lever *d*. The upper end of this lever carries an armature in front of an electro-magnet.

The upper arms of the levers may, as shown, be at different angles, so as to obtain sufficient room for the electro-magnets, as indicated by the drawing.

In order to reduce the amount of friction upon the pushers in their backward movement, each pusher-blade is carried by a stem of less width than the type, as shown at Fig. 9, which, when the pusher has completed its forward movement, is pressed down by the weight of the type through a slot in the bottom of the reservoir, so that when the pusher is again drawn back, it passes below the bottom of the reservoir, and when the backward stroke is completed, it is again drawn up into position for expelling another type by means of the spring *c'*.

In place of the type being placed upon their side in the reservoirs, and being expelled therefrom by pushers acting against their side or end, the type might be arranged to slide endwise down inclined reservoirs, as shown in the modified arrangement at Fig. 10. In this arrangement the type are arrested by a slight projecting stop, *a'*, near the bottom of the reservoirs *a*, and when a type is to be expelled

from any reservoir, a small pusher, *c*, is, by an electro-magnet, *d*, caused to rise up through the bottom of the reservoir and lift the end of the lowest type clear of the stop against which it was previously resting. The whole column of type in the reservoir will then descend a distance equal to the length of one type, and the lowest type will be expelled onto the traveling tape *b*, by which it will be conveyed away to be set up into line, as hereinbefore described. *d'* are light springs to keep the type in place.

By employing electro-magnets to work the pushers for expelling type from the bottom of the several reservoirs, as hereinbefore described, a type-setting machine may, if desired, be worked by an operator at a distance. Several machines might also be worked from one key-board. Whole words or sentences might also be set up by one movement, as hereinbefore explained.

At Fig. 11 I have shown a diagram view of the contact apparatus hereinbefore described for reducing the number of wires required for working the machine. In this arrangement a current has to be passed through two of the wires to pass a current through any one of the coils of the electro-magnet; but, if desired, the apparatus might be arranged so that to do this it should require a current to be passed through three of the wires, and thus the number of wires required for working the machine would be still further reduced. In the arrangement shown in the diagram, Fig. 11, the type-setting machine is supposed to be constructed with forty different type-reservoirs, which, if each magnet required a separate wire leading to it, would require forty different wires. To avoid the necessity of using so many wires I employ a key-board of forty keys divided into eight sets of five—A, B, C, D, E, F, G, and H. When any one of the finger-keys in the division A is depressed it makes two contacts. The first passes a current from the battery through the coils of the electro-magnet A, making five contacts between five wires leading from the five finger-keys in A and the coils of the five electro-magnets, and the second contact causes a current to pass through one or other of these five wires, so that, for example, if finger-key A' is depressed by a metallic pointer attached to one pole of the battery, magnet A is first put into action, and then a current, either from the same or another battery, is passed through wire 1 of section A to the coils of electro-magnet A', and causes a type to be expelled from the corresponding reservoir 1, section A, but the pushers No. 1 in the sections B, C, D, E, F, G, and H would not be acted upon. By the above arrangement thirteen wires only would be required in place of forty. In a similar manner, also, if there are other numbers of keys in the key-board they may be divided into sets with any desired number in each set.

Having thus described the nature of my in-

vention and the manner of performing the same, I would have it understood that I claim—

1. The combination of the electro-magnet, the axis or rock-shaft actuated thereby, the pusher mounted on the axis, the type-reservoir, across the mouth of which the pusher vibrates to move one type at a time, and the endless apron which receives the type, these members being constructed and operating in combination, substantially as and for the purpose set forth.

2. The combination, substantially as hereinbefore set forth, of the traveling tape, the guide, the spring which presses the type against the guide as it is carried forward by the tape, and a stop, whereby, in case of the attempt of two type to pass simultaneously into the receiver, the outer one would be held by the stop until the inner one had passed, and then be pushed into line by the spring to follow the other.

3. The combination, substantially as hereinbefore set forth, of the traveling tape, the guide, the spring, the stop mounted on the vibratory lever, and a crank-pin on the tape-roller, whereby a backward movement is given to a type out of position to accelerate its return into line.

4. The combination, substantially as herein

set forth, of the inclined chute, the type-receiver, inclined downward at right angles to the chute, and the pusher working at right angles to the chute, and at such a distance from its lower end that type coming from the chute into the receiver and striking against the side of the pusher can drop clear of the end of the chute, whereby two or more type may enter the receiver when the pusher is in its forward position.

5. The combination, substantially as hereinbefore set forth, of a traveling tape, the chute on which it delivers the type, the type-receiver, the pusher acting on the type, and the plate bearing on the type as they pass into the receiver.

6. The combination, substantially as hereinbefore set forth, of the chute over which the type pass, the vibrating plate under which the type pass, and the vibrating circuit-breaking lever, whereby the machine is thrown out of action by the too rapid collection of the type in the receiver.

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