(No Model.) 3 Sheets—Sheet 1.

J. M. HEPBURN.

Apparatus for Manufacturing Types.

No. 243,044. Patented June 14, 1881.

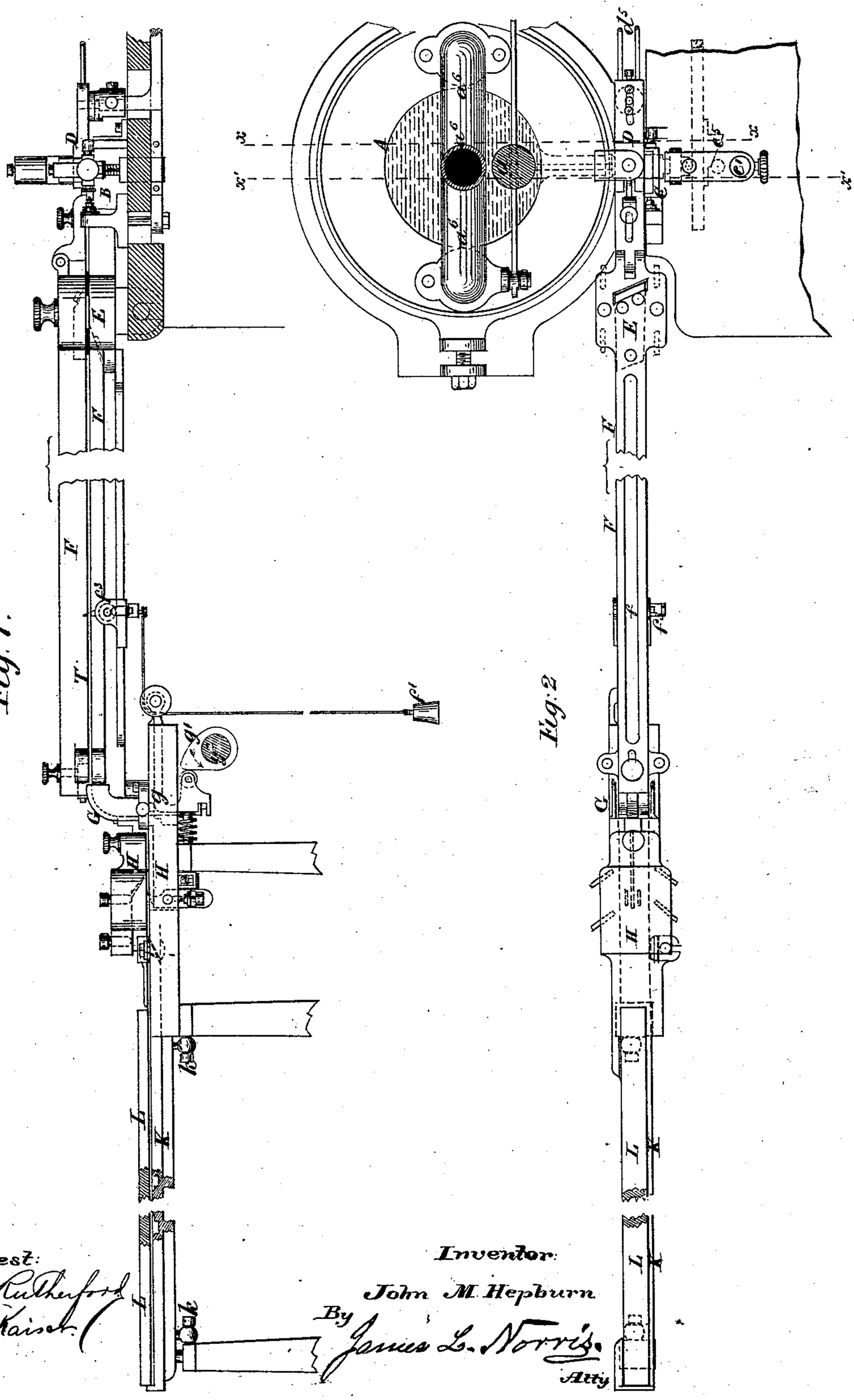

Fig. 1.

Fig. 2

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Apparatus for Manufacturing Types.

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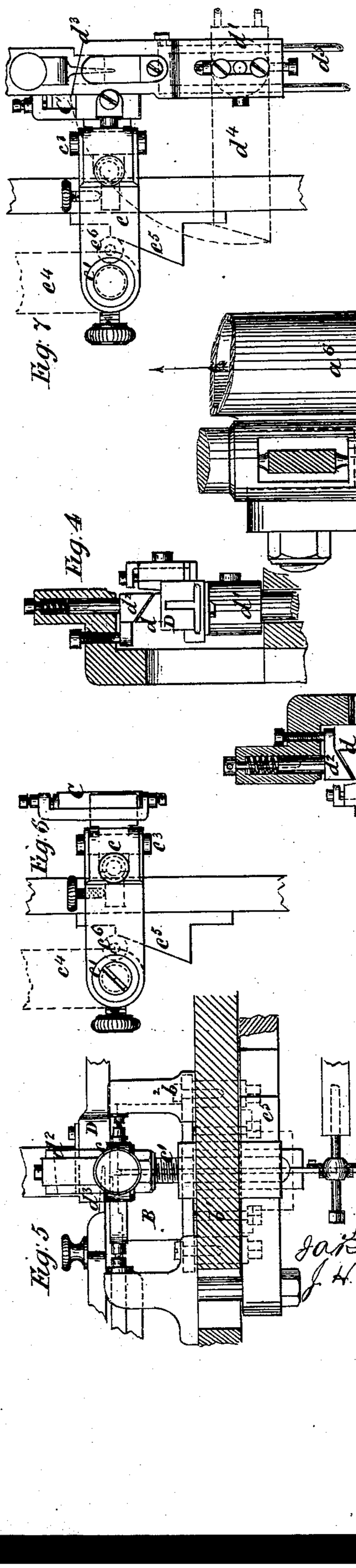

Fig. 7

Fig. 4

Fig. 6

Fig. 3

Fig. 5

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Apparatus for Manufacturing Types.

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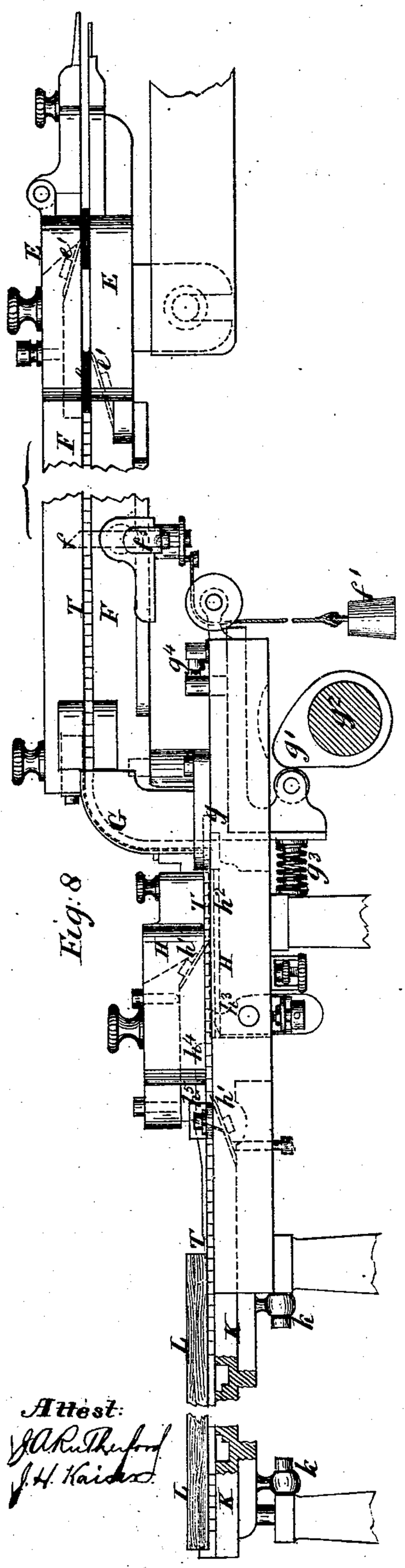

Fig. 8

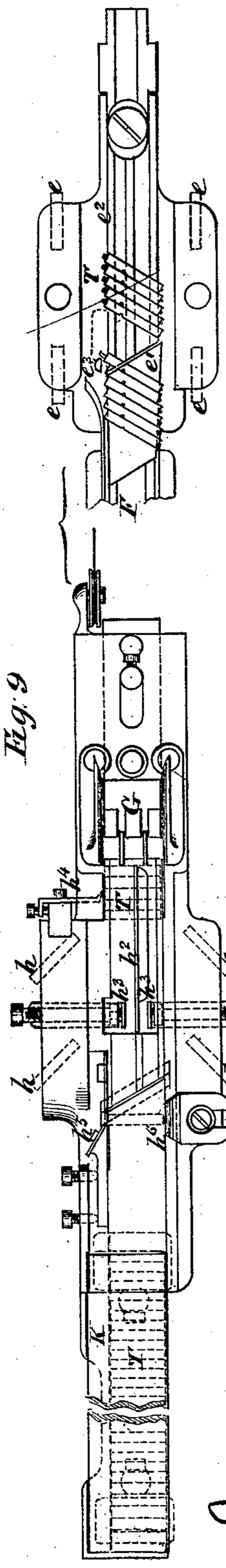

Fig. 9

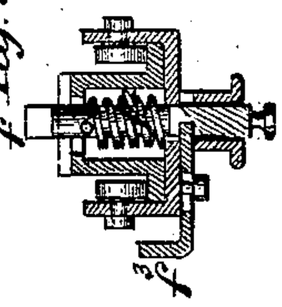

Fig. 13

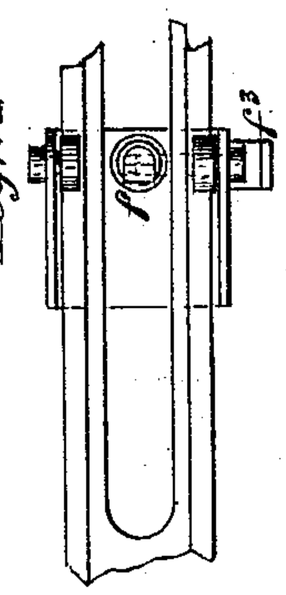

Fig. 12

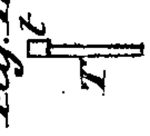

Fig. 11

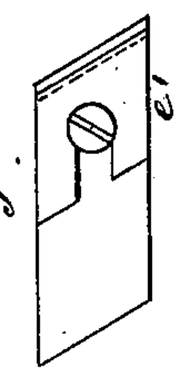

Fig. 10

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UNITED STATES PATENT OFFICE.

JOHN M. HEPBURN, OF LONG ACRE, COUNTY OF MIDDLESEX, ENGLAND.

APPARATUS FOR MANUFACTURING TYPES.

SPECIFICATION forming part of Letters Patent No. 243,044, dated June 14, 1881.

Application filed September 4, 1880. (No model.) Patented in England February 27, 1880.

To all whom it may concern:

Be it known that I, JOHN MAIR HEPBURN, of Long Acre, in the county of Middlesex, England, have invented a new and useful Improved Apparatus for Manufacturing Types, (for which I have obtained Letters Patent in Great Britain No. 864, bearing date February 27, 1880,) of which the following is a specification.

My invention relates to apparatus for the manufacture of types—that is to say, the casting of the types in a mold and the subsequent operations of dressing or rendering true and smooth the sides and ends of the types. The apparatus employed for these purposes may be separate—that is to say, one set of apparatus for casting the types and another set for dressing them; or the casting and dressing apparatus may be combined, so that each type is cast and has the successive dressing operations performed upon it, finally leaving the type in a finished state, ready for use.

Apparatus of the kind referred to have for a number of years been in use separately and also in combination, and it is to improvements in the construction of various parts of such apparatus, and in the arrangement of the stages of operation which they perform, that my invention is directed, the objects which I have in view being to simplify those parts, to facilitate their delicate adjustment, and to render them more readily accessible for inspection, cleansing, and repairs.

I will describe these improvements, referring to the accompanying drawings.

Figure 1 is a front view, and Fig. 2 a plan, of combined type casting and dressing apparatus. The other figures represent, to a large scale, parts of the apparatus, as follows: Fig. 3 is a transverse section through the melting-pot and mold, mainly on the line *x x* of Fig. 2. Fig. 4 is a part transverse section on line *x x* of Fig. 2, looking toward the mold in a direction opposite to that in which it appears in Fig. 3. Fig. 5 is a part longitudinal section in the plane indicated by line *y y* of Fig. 3 through the mold-table, showing, in front view, the matrix-holder. Fig. 6 is a top or plan view of a portion of Fig. 5, and Fig. 7 a plan of the said Fig. 5 and of the mold in their relative position for casting a type. Fig. 8 is a front view, and Fig. 9 a plan, of the dressing part of the apparatus. Fig. 10 is a plan of one of the dressing-cutters. Fig. 11 is a side view of a type as it is cast before its runner-tail is removed. Fig. 12 is a plan, and Fig. 13 a transverse section, of the catch for advancing the types after their first dressing-stage.

In order to simplify the description I have omitted from the drawings several well-known parts of type casting and dressing apparatus to which my invention does not relate, retaining only those parts to which my improvements apply.

Throughout the several figures the same parts are marked by corresponding reference-letters.

For casting each type a jet of molten metal is forced by a pump into the mold.

A is the melting-pot, *a* the pump-piston or plunger, and *a'* the passage for the molten metal from the pump to the mold.

Instead of the ball-valve used in this pump, as hitherto constructed, I employ the conical thimble-valve a^2, resting on the screw-plug a^3 in the end of the piston. As the piston makes its upstroke the valve is floated up from its lower seat, rising in the molten metal around and above it, and allowing molten metal to pass down into the pump below the piston. When the piston makes its downstroke the valve a^2 prevents escape of the metal which is forced along the passage *a'* and caused to jet into the mold. I arrange the pump in the melting-pot A in such a position that the flame a^4 plays directly upon it and the passage *a'* from it to the mold, so as to keep the metal in those parts at a suitable heat, and I provide at the sides of the melting-pot refractory linings a^5, whereby the flame and products of combustion are caused to circulate round the pot, as indicated by the arrows, on their way to the chimney a^6, the heat being thus fully utilized, and considerable economy being effected in the expenditure of the gas used for melting the metal. I provide an adjustable screw, a^7, to form a stop for the melting-pot when it is drawn forward in the usual way by the screw a^8, the screw a^7 being adjusted so that the nozzle a^9 cannot injure the mold by undue pressure.

The side blocks of the mold B are usually

of cast-iron faced with steel pieces, fitted and screwed to the blocks. For these I substitute blocks of malleable cast-iron having their faces case-hardened, thus obtaining a solid mold without separate facings.

In fixing the mold to the table of the machine I employ adjusting-screws b' pushing it upward, and screws b^2 pushing its flanges downward, so as to determine its exact height. For adjusting the matrix C, which forms the front of the mold, I fix it in a frame, c, which is mounted on a pillar, c', and which has setting-screws, as shown in Figs. 3, 4, 5, 6, and 7, for giving lateral and longitudinal adjustment to the matrix, and part of which can be turned on horizontal trunnions c^3, so as to give the matrix angular movement in the vertical plane. The pillar c' can also be adjusted vertically, and the matrix-frame c can be turned on it as on a pivot, thus giving angular movement in the horizontal plane, and enabling the matrix-frame to be turned so far round, as indicated by the dotted lines c^4 in Figs. 6 and 7, that at any time the matrix can be inspected and cleaned without removal or alteration of its other adjustments. The matrix-frame c is moved from the mold by the action of an incline, c^5, on the lining-bar on a roller, c^6, at the base of the pillar c', and may be moved up to the mold by hand, thus dispensing with the separate cam and lever usually employed for giving this movement.

I mount the block D, which forms the top piece of the mold, on a column, d', similarly to the matrix-frame, and in order to determine its exact position when it is moved over the mold I make its upper side, d, correspondingly shaped, which, as the top piece is advanced over the mold, enters an adjustable dovetail-guide, d^2, that determines its accurate movement. Like the matrix-frame, this top piece, D, of the mold can be turned on the column d', as on a pivot, as indicated by the dotted lines d^4 in Fig. 7, so that it can be cleaned and inspected without removal from its support.

When the dressing apparatus is combined with the casting apparatus I utilize the forward stroke of the top piece, D, for advancing the types T through their first dressing or rubbing stage. For this purpose they are pushed by a steel edge, d^3, fixed to the front of the top piece, D, which is kept cool by the circulation of cold water or cold air through it, admitted to holes bored in it, and emitted from them by pipes d^5. The steel-edge d^3 is oblique, so as to force the types T in an inclined attitude, as shown in Fig. 9, between two plates, E E, which are adjusted to the thickness required in the types by interposing between them four types, e e, already finished to gage, and screwing the top firmly down thereon.

In each of the two plates E E is fixed an oblique cutter, e', provided with a guard-plate like a plane-iron, as shown at Fig. 10, the one cutter being fixed in advance of the other, so that as the types T advance through the space between the plates E E they are dressed or rubbed first on the one side and then on the other. For special types, requiring to be kerned, the cutters e' are so shaped as to effect the kerning during the operation of rubbing. The break or tail t of each type, which constituted the runner of the metal into the mold, is cast a little deeper than the set of the type, as shown at Fig. 11, thus forming a shoulder, which, moving along on edge c^2 in the lower plate, E, acts as a guide while the type is being pushed along between the cutter-plates. The tail t is broken off by coming in contact with a stationary stud, e^3, past which the types are pushed so as to advance in a row between two horizontal bars or rails, F F. From time to time the attendant inserts into this row a self-acting catch, f, acted on by a weight, f', which pushes the row of types in front of it onward toward the next part of the dressing apparatus. The catch f employed for this purpose, as shown by the plan and section, Figs. 12 and 13, is made retractile and urged by a spring, f^2. When the operator pinches its case, forcing in a sliding part, f^3, which bears against the inclined side of a slot in the spring-bolt f, the bolt is retracted, and when the pressure on f^3 is relieved the catch f is protruded by the force of the spring f^2, and its upper knife-edge enters between two types of the row T. This catch arrangement, with its weight f', may be dispensed with, the row of types T being advanced step by step by the stroke of the cover-block D of the mold, as already described.

The rails F F, along which the types are advanced, lead to a quadrant, G, down which they are guided, so that they are successively turned into an attitude at right angles to their former attitude, the sides that were formerly horizontal now being vertical and the sides that were formerly vertical now being horizontal. At the bottom of the quadrant G there is a horizontally-reciprocating pusher, g, moved in the one direction by a cam, g', on a shaft, g^2, that revolves in time with the shaft of the molding-machine and moved back by a spring, g^3, against an adjustable stop, g^4. The upper part of the pusher-slide is an edge, g, which is adjusted to the body of the type, and which, coming against the side of each type successively as it reaches the bottom of the quadrant G, pushes it forward into the space between another pair of plates, H H, adjusted, as previously described in respect of the plates E E, by interposing between the plates four types, h h, already finished to the desired gage. The types, as they pass between the plates H H, are guided by a bar, h^2, which fits the nick cast in the side of each type, said bar being in practice adjustably secured in place by any suitable means—as, for instance, by set-screws. By means of two oblique cutter-knives, h', the types as they pass between the plates H H are dressed on the sides. They are also nicked, if

required, by vertical cutters h^3, adjustable in position vertically and horizontally by setting-screws, and they are cut out at foot by an adjustable side cutter, h^4. The types are finally adjusted for height to paper by an adjustable side cutter, h^5, which acts on the bases of the types, while their faces bear against an adjustable buffer, h^6, of lignum-vitæ or other suitable material, that will give sufficient resistance without injuring the character on the face of the type. The types are thus gaged from the face instead of from the nick, as they are usually gaged, their uniform height being determined by their passage between the cutter h^5 and the buffer h^6. The types T, now being in a finished condition, pass from between the cutter-plates H H onto a rail, K, which is mounted on trunnions k k at its ends. When this rail is charged with a row of types a wooden stick or rail, L, is placed by the attendant over them, and the two rails, while they are held together with the types between them, are canted over to an inverted position, turning on the trunnions k k. The types are thus lodged on the stick L, on which they are removed, and the rail K is restored to its former position to receive a fresh row of finished types.

By the use of a combined casting and dressing machine, as above described, finished types can be produced with great economy and rapidity, and can be delivered directly from the machine into the cases or tubes used for composing. Fresh matter can thus be composed always from fresh types without the trouble and expense involved in breaking up the forms and distributing the types which have been already used, and which can be remelted to furnish material for the fresh types produced by the machine.

Having thus described the nature of my invention and the best means I know of carrying it out in practice, I hereby declare that I make no general claim to the casting of types by forcing a jet of molten metal into a mold, nor to the dressing of types by causing them to pass over stationary cutter-blades; but I claim, in respect of type-manufacturing apparatus in which these operations are performed, the following improvements:

1. The matrix-frame c, mounted on the adjustable pillar c', and having trunnions c^3 and setting-screws for horizontal, vertical, and angular adjustment of the matrix C, as herein described.

2. The top piece, D, of the mold, mounted on its pillar d', and having the dovetailed guides d d^2, and sloped pushing-edge d^3, as and for the purposes set forth.

3. The types having the shouldered runner-tail t, whereby they are guided through the cutter-plates E E, as described.

4. The combination of the plates H H, the cutters h' h^3 h^4 h^5, the guide-bar h^2, and buffer h^6, as and for the purposes set forth.

5. The combination of the plates E E and their cutters e' e', guide-rail e^2, and breaking-stud e^3, with the rails F F, the quadrant G, the pusher g, the plates H H, and their cutters h' h^3 h^4 h^5, guide-bar h^2, and buffer h^6, rail K, and its trunnions k k, as and for the purposes set forth.

6. The combination of the melting-pot A with its pump, the mold B, the matrix C, and its frame c, the top piece, D, of the mold, with the plates E E and their cutters e' e', guide-rail e^2, and breaking-stud e^3, with the rails F F, the quadrant G, the pusher g, the plates H H, and their cutters h' h^3 h^4 h^5, guide-bar h^2, and buffer h^6, rail K, and its trunnions k k, as and for the purposes set forth.

In testimony whereof I, the said JOHN MAIR HEPBURN, have signed my name to this specification in the presence of two subscribing witnesses.

JOHN MAIR HEPBURN.

Witnesses:
OLIVER IMRAY,
H. E. HOPKINS.