D. Bruce, Jr.

Type Mach.

No. 631

Patented Mar. 10, 1838.

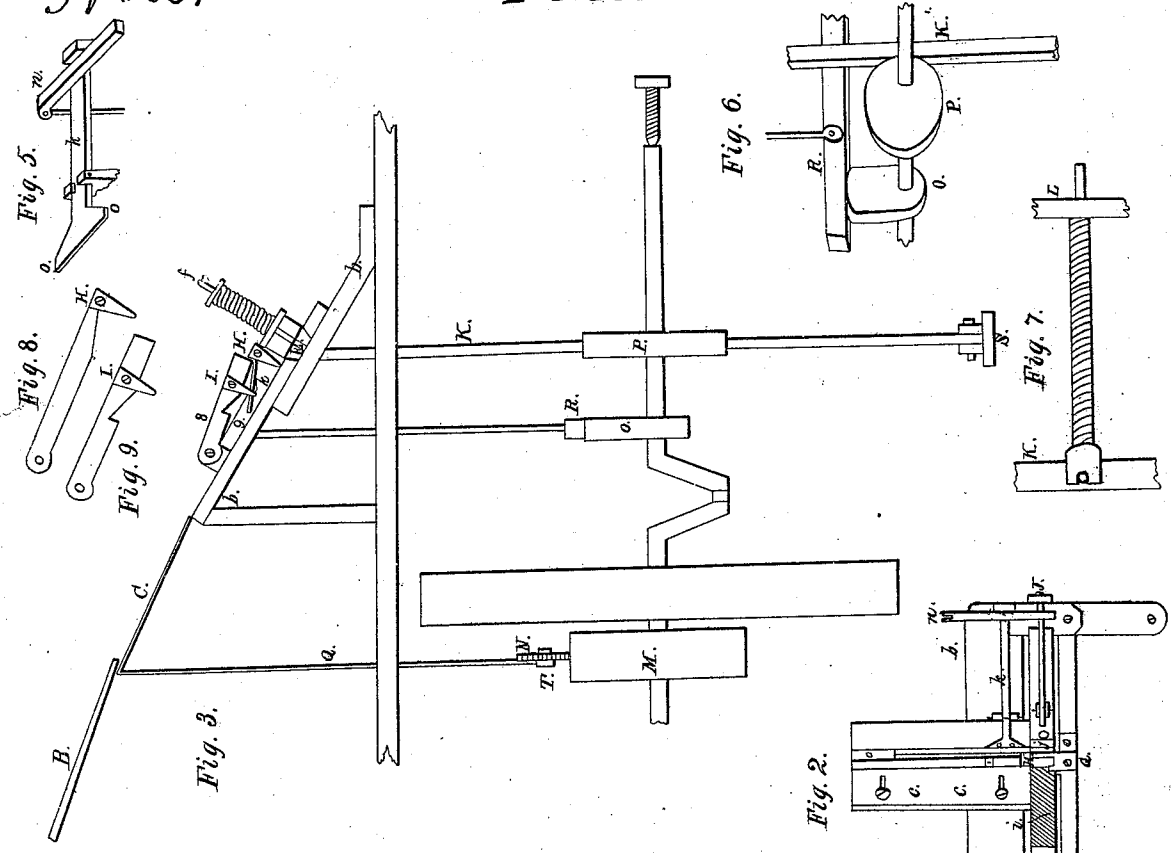

Fig. 3.

Fig. 5.

Fig. 8.

Fig. 9.

Fig. 6.

Fig. 7.

Fig. 2.

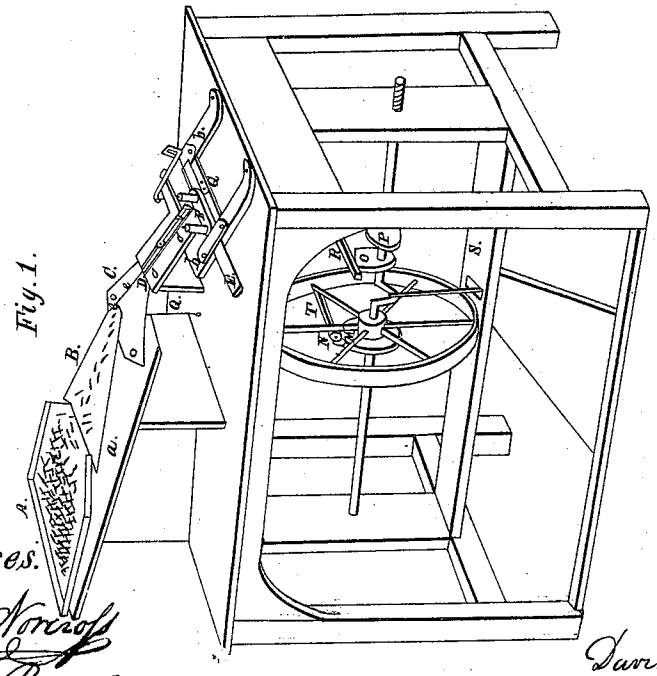

Fig. 1.

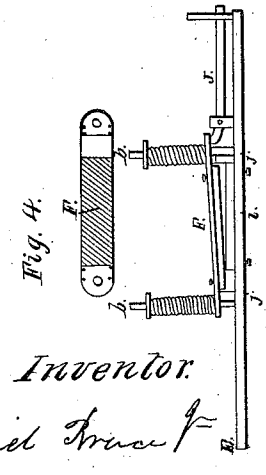

Fig. 4.

Witnesses.

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DAVID BRUCE, JR., OF MANSFIELD, NEW JERSEY.

MACHINE FOR SMOOTHING THE SIDES OF TYPE.

Specification forming part of Letters Patent No. **631**, dated March 10, 1838.

To all whom it may concern:

Be it known that I, DAVID BRUCE, Jr., of Mansfield township, Burlington county, State of New Jersey, have devised, constructed, and fully tested a new Machine for the Purpose of Smoothing the Sides of Type—a process known in the business of type-founding by the name of "rubbing type"—by which machine much greater expedition is acquired, the quality of the work much improved, and the unhealthiness of the process much reduced, of which the following is a specification.

It may first be premised that all type as they are turned out of the mold are cast with some unavoidable roughnesses upon them, which must be smoothed off upon two sides to admit of their being set up in lines preparatory to their further examination and final finish. The extreme delicacy of the face of type and their liability to receive injury from rough handling render it necessary that this operation should be carefully performed.

Figure 1 exhibits a perspective view of the machine, all its parts being connected and arranged within and upon a substantial table. Upon the top of the table may be seen an inclined plane, *a*, sustaining upon its surface three plate-tin receptacles for type, the whole being connected and having a gentle inclination downward. The lower plate, *c*, is connected with the upper edge of an inclined cast-iron frame, *b b*, which contains the essential mechanism of the machine. The upper tin receptacle, A, may be called the "shelf," as it contains the parcel of type intended to be smoothed. Its edges are turned up, excepting that overhanging the second plate, B. The second plate, B, I call the "forwarder." It is in shape somewhat triangular, is of a regular and gentle guttering concavity of surface down to its lower end or spout, which overhangs a third plate, C, also of a triangular form, but of an even surface. This plate C has a strip of brass, *e e*, reaching from the spout of the forwarding-plate down to the commencement of the gutter D upon the cast-iron frame. This last plate C is called the "guide-plate." This brass strip *e e* is so secured upon the guide-plate as not to be parallel with the gutter D, although, in fact, a continuation of one of its sides; but its upper end inclines back about half an inch. The purposes of the upper plate, A, as before stated, is to hold the parcel of type, small quantities of which are drawn over upon the forwarding-plate B, which, from its concavity of surface and a gentle vibratory motion which it constantly receives, and which will be hereinafter explained and described, the type has a tendency to separate and move down toward the spout. Passing down the spout, they land by this time almost individually upon the guide-plate C, which inclines at a still greater angle than the forwarder; they slide against the strip of brass *e e*, before described, and descend in a line down into the gutter D of the machine.

Fig. 2 exhibits a downward view of the cast-iron frame *b b* of the machine. Here will be seen the gutter D for the type running down the middle of the flat plane of the machine and terminating at the cutters. One side of the gutter *c c* is susceptible of a shift to various sizes of type wished to be rubbed. The cutters *i* F are attached to a sliding bar, E, which moves transversely with the line of the gutter, but sliding closely by the bottom of the gutter D, so that the lower cutter will be upon the same plane and at all times closely fit its lower edge. The bar E is here shown with the cutter *i* returned to its place, ready to receive a type. The upper cutter is removed to show the blank end of the cutter for receiving the type, the type lying transversely to the length of the cutter. The lower cutter is attached to the bar. (See Fig. 4.) The upper cutter, F, is attached to a plate, which plate is held with its cutter in a proper position over the lower one by studs *f f*, passing upward through each end, by which means both cutters are made to face each other and move together upon the same sliding bar, E. Each stud is surrounded by a small spiral spring, which presses the plate firmly down to face the lower cutter. To set the cutters a proper distance apart, two types of the parcel intended to be smoothed are rubbed in the usual way and one placed under each end of the plate of the upper cutter, F, upon a seat, *j j*, upon the bar just the thickness of the two cutters. It will be seen that placing a type upon these seats will separate the cutters just the same width apart. This done, all the type passed through the cutters must be smoothed to a corresponding thickness. The cutters are made of cast-steel, are about one inch and a quarter wide, three inches long, and one-third

of an inch in thickness. The faces are cut after the manner of a float-file—that is, its teeth is unlike a common file, inasmuch as it is scored but one way to form the teeth. From the depth and truth required to form these teeth it is found best to cut them with a file. Fig. 2 will show a piece of metal, *g*, reaching across the cutter, forming a continuation of and foot to the gutter. This piece of metal is of the thickness of thin saw-blade, and one end is secured to the plane of the cast-iron frame *b b*, and the other is secured to a bracket rising from the brace stretching parallel to the sliding bar. This piece of metal G, I denominate the "rest," as its office is to hold the type while the cutters F and *i* are drawn transversely past it upon both sides. It is necessary that this rest G should in all instances be thinner than the type intended to be smoothed.

The sliding bar E, to which the cutters are attached, is of an equal thickness throughout. It is about one inch and a quarter wide, one-quarter of an inch thick, and fifteen inches long, and slides in seats in each limb of the cast-iron frame *b b*. The bar is prevented from rising out of its seats or sockets by iron plates screwed over each seat. (See Fig. 2.)

I shall proceed to explain the method by which the type is made to enter between the cutters at the proper instant of their return. As the cutters having an alternating rectilinear movement, it can receive a type only at the space of time occupied in the change of motion. To effect this purpose it is necessary that checks or stops must be made to operate upon the column of type descending in the gutter D, which will let a type pass into the cutters at a proper time and hold back the remainder of the column from descending and becoming injured. Fig. 3 shows the stops I and H used to effect this purpose. They are secured to two thin plates of metal, Figs. 8 and 9, placed together, and whose edges range vertically above the edge of the gutter D, and which have their centers of motion upon the same bracket near the upper end of the gutter and their lifting ends reaching nearly down to the cutters. The lower stop, H, is secured to the back lifting-plate, Fig. 9, and its foot crosses the gutter D close to the entrance of the cutters. (See H, Fig. 3.) The upper stop, I, is attached to the front lifting-plate, Fig. 9, the distance of the length of a type and a half from the lower one, and crosses the gutter D in like manner. (See I, Fig. 3.) The effect of these stops is as follows: Suppose the gutter D filled with type, and the cutters F and *i* in a position to receive one, and the whole column resting against the lower stop, H, (the upper stop, I, being raised,) the upper stop now descends and rests firmly upon the middle of the second type from the bottom, thereby holding back the remainder of the column. The lower stop, H, then rises and lets pass the only type it now holds, which, being released, slides in between the cutters I H and is held by the rest G, and the cutters immediately move past it, as before described. During the movement of the cutters the lower stop, H, descends and the upper stop, I, rises, letting the whole column of type slide down against the lower stop, as before. By this time the cutters have returned to receive another type, and the same movement of checking the column by the upper stop, I, and releasing the lowest type is alternately going on, thereby letting a type pass in between the cutters at proper intervals of time.

It will be proper here to state that the upper cutter, F, is made to rise simultaneously with the lower stop, H, to enable the type to pass in between the cutters, and descends before the cutters begin to move.

Having described the purposes and effect of these stops, I will next describe the method of raising the stops and the upper cutter.

Fig. 4 shows the small lever J for lifting the upper cutter, F, ranging lengthwise of the sliding bar E. This lever may be seen again in Fig. 2 with its fulcrum or center of motion upon the bar E, also the steadiment for its extreme end. Fig. 4 shows its operation.

Fig. 5 shows the rocking shaft *k* for raising the lifting-plates 8 9. This shaft lies parallel to the sliding bar E, and extends from the edge of the gutter D to the end of the cast-iron frame *b b*. To one end is secured a plate of metal, which passes under the lifting-plates. (See 8 and 9, Fig. 5.) The other end is crossed by a small rod of metal, *n*, which is firmly secured to it. (See Fig. 5.) This rod I denominate the "finger," as part of its office is to press down the small lever J, before described, for raising the upper cutter, F. The other end of this rod reaches over the cast-iron frame *b b* and receives motion from below, hereinafter described. The position of this rocking shaft *k*, with its journals, may be seen in Fig. 2.

Figs. 8 and 9 show the lifting-plates separately, and Fig. 3 shows them united and the plates of the rocking shaft beneath them. It will be seen that the rocking of these plates *o o* raises and lowers alternately the stops I and H, and yet, from the manner in which the lifting-plates 8 and 9 are cut out, one stop does not attempt to rise before the other is fairly down—a motion which is very necessary to prevent the type from escaping past in their change of motion. It will be seen that at the same time the plates *o o* of the rocking bar are raising the lower stop, H, the finger *n*, before described, is by the same movement pressing down the small lever J, before mentioned, upon the sliding bar E, thereby raising the upper cutter, F, simultaneously with the rising of the lower stop, H. By returning the rocking shaft *k* to its former position the lever J is permitted to rise, the lower stop, H, drops, and the upper stop, I, is lifted.

I will next describe the manner in which the sliding bar E is moved and how the rocking shaft *k* is made to move in unison with it. Fig. 1 shows under the table-top a crank-shaft, fly-wheel, a small drum or pulley, and

two cams upon the shaft. Fig. 3 shows an edge view of all these and their position upon the shaft to effect movements originating from them upon the top of the table. The form of the cams O and P will be seen in Fig. 6. Cam O is seen with a bar lying horizontally upon its edge. This cam is for giving motion to the rocking shaft *k*, before described. This bar has its center of motion upon the back stretcher of the table. A rod reaches vertically from it and unites with the upper end of the finger *n*, before described as giving motion to the rocking shaft. The oval cam P, as will be seen by Figs. 3 and 6, has a bar resting against it vertically. This vertical bar K has its center of motion upon the lower cross-stretcher of the table S, and reaches upward through the table-top into a mortise-hole in the sliding bar E. This vertical bar K is for giving motion to the cutters by the revolving of the oval cam P. It will be seen by the position the two cams hold upon the shaft and the position of the two bars K and R they move that their motion will be alternating and not simultaneous—that is, the horizontal lever R will not be lifted until the vertical bar K is at rest or the vertical bar K attempts to move until the horizontal bar is down. It will be seen that much depends upon the correct formation and adjustment of these two cams to produce a harmonious alternating action of all the motions emanating from them and allowing the greatest portion of time possible at the return of the cutters for the reception of the type. The following proportions of the oval cam P will be found to answer all the required purposes. The length of the cam may be one-fourth more than its breadth, and the end through which the shaft passes should be so formed as to allow the vertical bar K, which it moves, to be at rest nearly half a revolution of the crank-shaft. The remainder of the cam should be an easy-turned oval. Cam O, as will be seen in Fig. 6, is placed at a right angle with cam P. The end through which the shaft passes should be a semicircle, and the periphery of the lifting end should be part of a perfect circle of suitable dimensions, and its breadth at this end should be sufficient to hold up the bar all the time of rest given to the vertical bar K, and should descend the instant the vertical bar K is prepared to move. Upon these two cams depend all the movements of the cutters and the stops before mentioned.

It must be here stated that, as the oval cam has only the effect of throwing the vertical bar one way, I use a spiral spring, Fig. 7, to keep the bar K up against the cam, thus forcing the bar to follow the cam back and return to its state of rest. Fig. 7 shows the arrangement of the spring, one end of the stock or barrel upon which it is wound pressing against the vertical bar, and the other end passing through the back stretcher of the table L, through which it slides as the bar is thrown off and again recedes as the bar is pressed back. This spring presses horizontally in a line with the edge of the cam.

I will now pass to the small drum or pulley M. (See Figs. 1 and 3.) This drum or pulley should revolve quite truly with the shaft, and may be of wood or metal. Resting upon its periphery is a small spur or toothed wheel, N. This spur-wheel is secured through its center to the side of an iron rod, T, which reaches horizontally from the back stretcher of the table. This rod T allows the wheel N a vertical but not a lateral motion. This arrangement of the spur-wheel, drum, and rod I call the "agitator." From this horizontal rod T arises another rod, Q, passing upward through the table-top until it reaches the under surface of the spout of the forwarding-plate B, which rests upon its end. The effect of this arrangement is to give a gentle continuous vibratory motion to the forwarder by the revolving of the drum and spur-wheel for the purpose of forwarding the type upon its surface downward to fill the gutter, and thereby feed the cutters of the machine.

Fig. 1 shows the arrangement of the fly-wheel, crank, and treadle. The treadle is seen hinged to the front feet of the table. This arrangement is thought to be easy for the foot when light and quick motion is necessary. If the cams are adjusted with proper accuracy, it makes no difference which way the fly-wheel revolves.

Having given a description of its parts, I will add in conclusion some remarks upon its combined operation and the manner of using the machine. The operator places the type he intends to smooth upon the shaft A of the machine, from which he takes two and rubs them in the usual way and places one under each end of the plate of the upper cutter, *j j*, which sets the cutters a proper width apart. With his foot he gives motion to the machine from eighty to one hundred revolutions per minute. With his left hand he draws type in small quantities from the shelf over upon the forwarding-plate B, which forwards them downward upon the guide-plate C, which arranges them lengthwise as they descend into the gutter D of the machine. With his right hand he favors the proper descent of the type when they incline to hang together and choke the entrance of the gutter. If the machine is in good condition, the operator will be able, at a low estimate, to smooth sixty thousand per day.

The following dimensions will be suitable for some of the principal parts of the machine; the rest may depend upon the choice of the maker: Height of table, two feet nine inches; breadth of top, eighteen inches; length, two feet eight inches; spread of cast-iron frame *b b*, twelve inches across the lower limbs; length of the plane of the gutter D, seven inches; length of alternating bar K, fifteen inches; length of guide-plate C, five inches; length of forwarding-plate B, six inches; sweep of crank,

one inch and three-quarters. The obliquity or inclination of the plane of the gutter D is about thirty two or three degrees. The lower cutter, *i*, must be set with requisite exactness to the plane of the gutter D. To effect this purpose, four screws are passed through the bar E from the lower side, whose ends support the cutter at each corner. By these screws the cutters can be adjusted at pleasure, and by two other screws, which pass through the bar into the cutter, the cutter is held firmly into its place upon the ends of the four screws. In like manner the upper cutter, F, is attached to the upper plate. The types used for setting the cutters are held from slipping out of their places at the rising of the upper cutter by four small pins in the upper plate, which surround the seats *j j*, upon which the type is placed. The angle of the teeth of the cutters should be about thirty-five degrees with their edges, and so that when the cutters are facing each other the lines should cross each other. (See F and *i*.)

The parts of the above machine which I claim by right of original invention are as follows:

1. The inclined iron frame *b b*, as before described, its lower limbs secured to the table-top and its upper end supported by an iron or wooden stanchion.

2. The cutters F and *i*, secured to the middle of the metal bar E, so that the seats or sockets upon which the bar moves in the frame *b b* shall be beyond each end of the cutters; also, the method of raising the upper cutter by the small lever J, parallel with and attached to this alternating bar E; also, the method of moving bar E by means of rod K, uniting vertically with it, in the manner before described.

3. The rocking shaft *k* and its appendages, the plate and finger *n*, before described, for raising the stops I and H, and the upper cutter, F, in the manner aforesaid.

4. The method of stopping or timing the descent of the type by the stops I and H, attached to two lifting-plates, 8 and 9, in the manner aforesaid.

5. The method of giving a vibratory motion to the forwarder or hopper B, for the purposes mentioned, by means of a small spur or toothed wheel, F, revolving upon the periphery of a small drum, M, or pulley, in the manner described, also these variations of this principle to produce the same effect. The spur-wheel may be placed upon the shaft, and the drum or plain wheel may be attached to the rod T and be moved by the spur-wheel.

6. The combination of these several parts, in the manner before described, to effect the purpose of smoothing type by machinery.

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Witnesses:
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