2 Sheets—Sheet 1.

J. L. DUNCAN.

Rotary Type Rubber.

No. 5,420. Patented Jan. 25, 1848.

Fig 9.

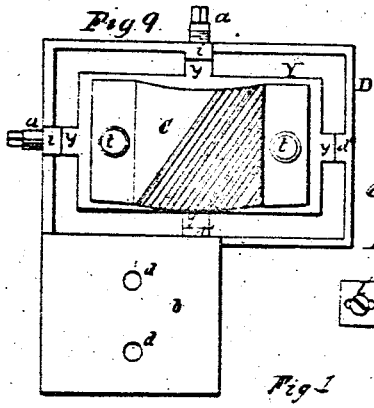


Fig 13.

Fig 12.

Fig 10

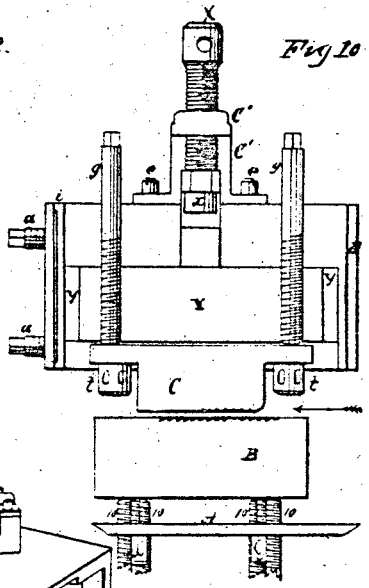


Fig 14

Fig 1

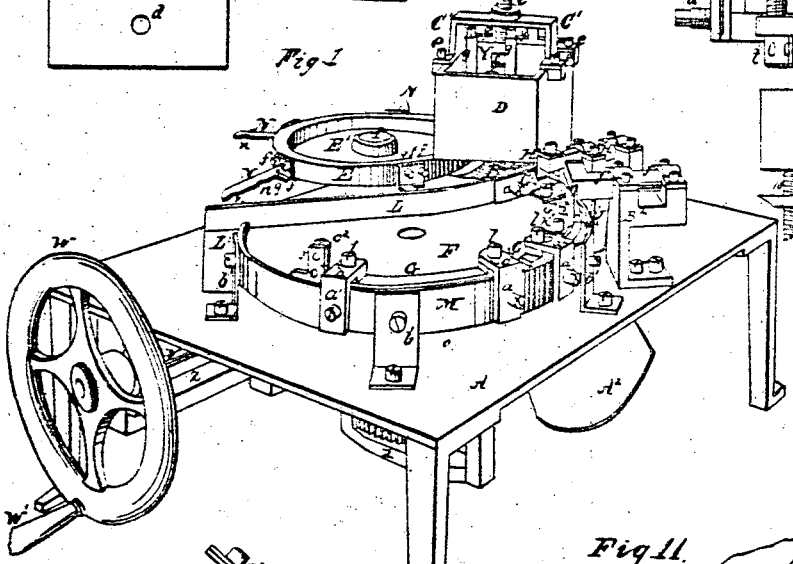
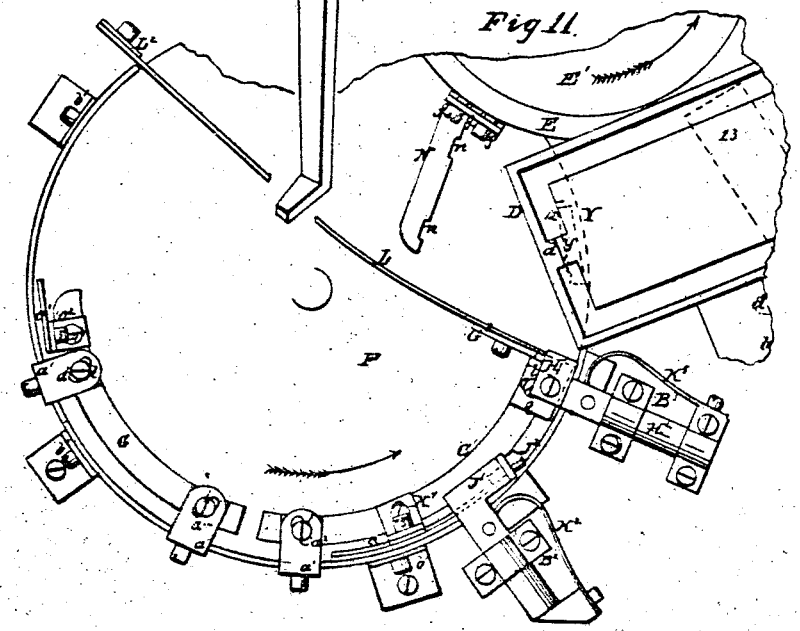


Fig 11.

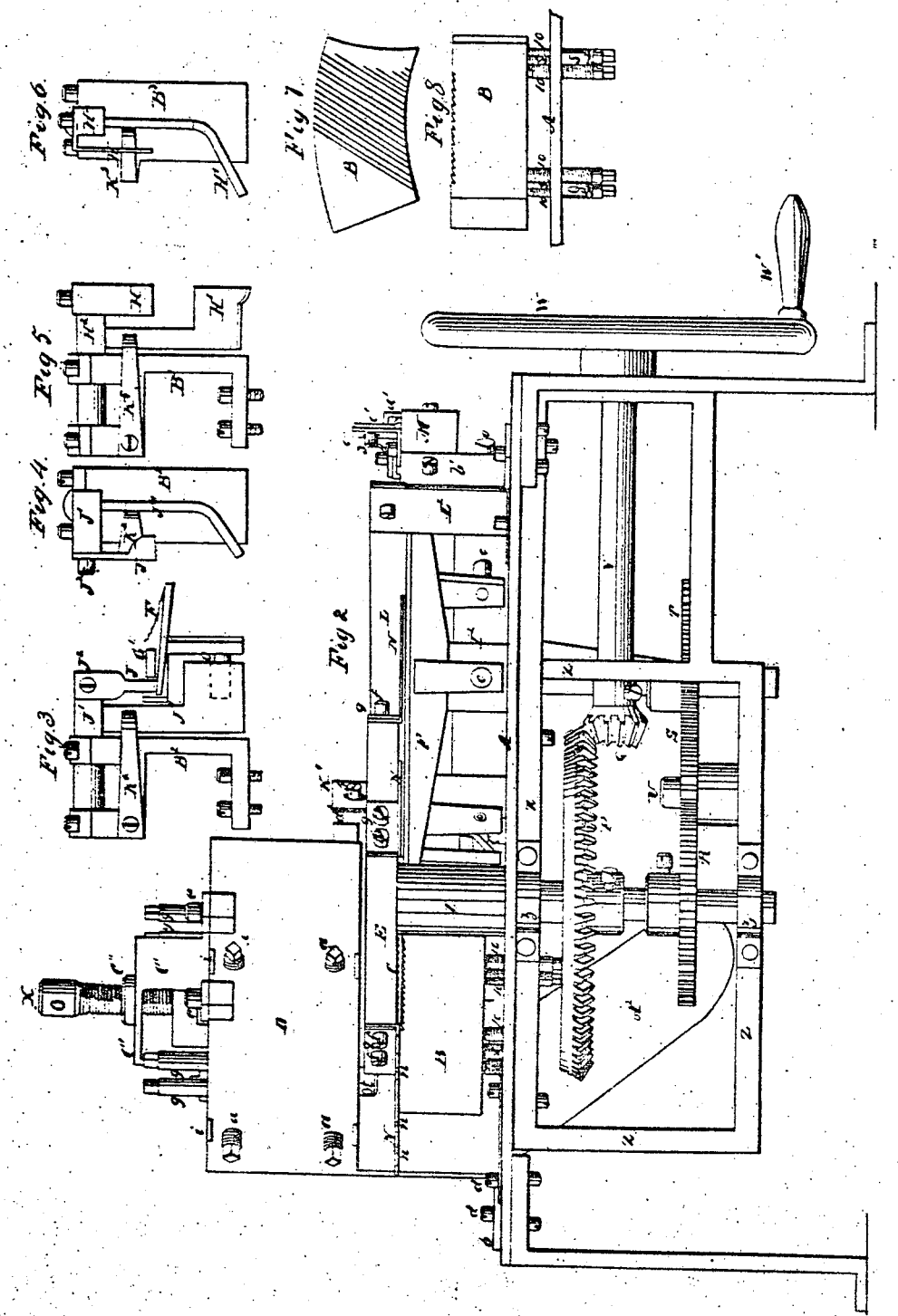


2 Sheets—Sheet 2.

J. L. DUNCAN.

Rotary Type Rubber.

No. 5,420. Patented Jan. 25, 1848.



UNITED STATES PATENT OFFICE.

JAMES L. DUNCAN, OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR RUBBING TYPES.

Specification forming part of Letters Patent No. **5,120**, dated January 25, 1848.

To all whom it may concern:

Be it known that I, JAMES L. DUNCAN, of the city, county, and State of New York, have invented a new and useful machine for taking off the projections and roughnesses from the body of type and cleaning them, called "Duncan's rotary type-rubber;" and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification.

Figure 1 is a perspective view of the front side and top of the machine. Fig. 2 is a view of the left side of the machine. Fig 3 is a side view of the stop, (drawn to full size.) Fig. 4 is a back view of the same. Fig. 5 is a side view of the gate at the end of the gutter next the cutters. Fig. 6 is a back view of the same. Fig. 7 is a top view of the under cutter detached from the plate. Fig. 8 is an edge view of the same. Fig. 9 is a view of the upper cutter as arranged in the box. Fig. 10 is a side view of the same and of the under cutter. Fig. 11 is a top view of the feed-plate, segmental feed-gutters, cutter-box, radial fingers, stops, gates, and guards; Fig. 12, a perspective view of the guard O′ at the entrance of the gutter. Fig. 13 is a perspective view of the guard d^2. Fig. 14 is a plan of the guard q at the end of the gutter next the cutters.

Similar letters in the several figures refer to corresponding parts.

My machine consists of a square or oblong bed-plate, A, of cast-iron, about two feet square and half an inch thick, having four legs, upon which it is supported at a suitable height for the operator to attend the machine conveniently. This bed-plate contains a circular opening to admit the axle of a circular concave disk called the "revolving feeding-plate," and an opening to admit the axle of a circular rim, to which radial fingers for forcing the type between the cutters are affixed, and an opening to admit the discharging trough or spout, and perforated with various apertures to admit set-screws for adjusting the bottom cutter to the face of the feeding-plate and for admitting various screw-bolts that confine certain knees, flanges, and suspended frames or hangers containing the boxes of the axles and other parts hereinafter to be described.

B is the bottom cutter, attached to the bed-plate by two screws, *s s*, or other means. This cutter is a cast-steel segment-block, dressed or fluted on the upper face in parallel furrows, forming cutting-edges running at an angle of about fifty degrees with its convex and concave sides. The parallel furrows are made with a file or by a plane in the form of the dress of a burr-stone of a grist-mill, showing flat bands of about one-third the width of the channels. About one-half of the face of the steel block is thus channeled or dressed for the purpose of cutting off the projections from the sides of the type and for preventing them getting into the furrows by causing the type to pass over the furrows obliquely, the smooth portion of the block serving as a polisher or rubber to polish the sides of the type after being dressed, as above stated.

The two screws *s s*, Figs. 2, 8, and 10, for confining the cutter B to the plate A, have milled heads and pass up through the bed-plate from the under side thereof and screw into the cutter, by which it is lowered or drawn downward upon the points of the screws 10. The four screws 10 10 10 10 are for the purpose of adjusting the face of the cutter so as to be level with the face or upper edge of the concave disk or feeding-plate. These screws also pass up through the bed-plate from the under side thereof, turning in female screws therein and having their points bearing against the under side of the cutter. The two confining-screws *s s*, that pass up through the bed-plate A and enter the cutter-block B, for holding the cutter down upon the points of the adjusting-screws 10, are placed between said adjusting-screws 10, having their shoulders turning against the under side of the plate A.

C is the top cutter. This cutter is made of cast-steel in the same manner as the lower cutter, the furrows being filed in an oblique direction across the steel block, so that when the furrowed face of the upper cutter is brought opposite and over the face of the lower cutter the furrows or cutting-edges will cross each other nearly at right angles or at any suitable angle, and the upper cutter will be suspended above the lower cutter to a follower, Y, a distance above the lower cutter equal to the thickness to which the types are to be dressed, changeable at pleasure, the follower being sus-

pended to the lower end of a screw, X, arranged above it to suit any thickness of type to be dressed. The cutter C is suspended to the under side of the follower Y by means of two milled screws, *t t*. The face of the upper cutter (except the mouth of it, which is made slightly flaring to admit the type to enter) is brought parallel to the face of the lower cutter by means of four vertical set-screws, 9 9 9 9, passing down through the follower and bearing against the back of the upper cutter near its four corners. In adjusting the cutter the milled screws *t t* aforesaid may be loosened, if required, when the upper opposite screws, 9 9 9 9, are tightened, and vice versa.

The screw X, before mentioned, that suspends the follower to the gallows C′ C′, is connected with the head of the follower by a swivel-joint, *x*, and turns in a female screw or nut, C″, in the middle of the gallows C′, having a milled head, by which it is turned to the right or left for raising or lowering the follower, to which the cutter is affixed. The follower has a perpendicular rib or tongue, *y*, on each of its four sides, two of which press against corresponding bearings, *d′ d′*, on two of the sides of the box, and two are pressed against by thin plates or gibs *i i* by set-screws *a a a a*, passing through the sides of the box and pressing the said gibs against the tongues. The object of using these gib-plates and set-screws is for the purpose of obtaining a square bearing on the opposite sides of the follower for keeping the follower always firm and steady and causing it to rise perpendicularly, which is necessary in order to retain the faces of the cutters parallel. The box D is fastened to the bed-plate by means of a right-angled flange, *b*, and screws *d*. The gallows C′ is fastened to the box D by means of flanges and screws *e*.

E is a horizontal cast-iron revolving circular plate carrying any convenient number of radial fingers N for forcing the type flatwise between the cutters for smoothing them, called the "rotary finger-plate." This plate is cast with an axle, I, projecting down from the center of the same and passing through the bed-plate, reduced in diameter by turning or otherwise, forming a shoulder which is to turn upon the top of the hanging frame Z, fastened to the under side of the bed-plate A, said shaft I being kept in its proper bearing by suitable caps or boxes, *z*, screwed to the sides of the hanging frame. The horizontal plane of the under side of the finger-plate must nearly coincide with the horizontal planes of the lower cutter and of the upper surface of the feed-plate, being a little above them in order to leave room for the proper adjustment of the fingers and not to come in contact with the feed-plate. The fingers N, for receiving and forcing the type through between the cutters, are thin flat plates of cast-steel made broad at one end, which is turned up at right angles and cut down in vertical parallel grooves from the top to near the base for the purpose of allowing them to be raised or lowered over the shanks of set-screws *f*, let into the periphery of the finger-plate E, in order to set the fingers so as to receive the type properly and pass with it in the arc of a circle between the cutters without said fingers touching them, a clamp-plate, *g*, being placed between the heads of the screws *f* and the grooved or turned-up ends of the finger-plates through which the set-screws pass for the purpose of holding the fingers firmly in their required positions without the danger of dropping or slipping down. The edges of the fingers are notched or recessed at *n* for the purpose of admitting the tails of the letters that project over the edges of the type to lie therein securely, so as to protect them from injury by coming in contact with the edges of the fingers, which would, if not recessed, break the letter and bend the type in forcing them against the cutters. The upper surface of the finger-plate is reamed out and made hollow for the purpose of reducing its weight, as seen at E′. The periphery of the finger-plate at the points where the vertical portions of the fingers are screwed to it are filed off flat, so that the backs of the fingers may have an even and flat bearing, as seen more clearly in Fig. 11.

A horizontal bevel-wheel, P, is fixed on the vertical shaft I of the finger plate below the bed-plate, into which is geared a bevel-pinion, Q, on the driving-shaft V, on which there is a fly-wheel, W, for equalizing the motion of the machinery.

W′ is a crank-handle inserted into the rim of the balance-wheel for turning the shaft V.

R is a spur-wheel, through the center of which the shaft I passes and to which it is keyed fast, for imparting motion to the circular feeding-disk through an intermediate cog-wheel, S.

F is a concave circular feeding-plate or revolving disk for conveying the type to the fingers between segment-guides G G′ and a rim, M, forming the segment-gutter. This plate is cast concave or dish-shaped on top and convex on the bottom, with a vertical axle, I^2, extending down from the center thereof, having shoulders formed on it, in the manner above described for the axle I, which turns upon the horizontal side or face of the hanging frame Z^2, being held to its bearing by suitable boxes and having a spur-wheel, T, of the same diameter as wheel R aforesaid, keyed to it and geared with wheel R by an intermediate cog-wheel, S, turning on an axle or stud, U, fixed in an arm projecting horizontally from the hanging frame Z. On the under side of the feed-plate, near the outer edge of the same, are cast as many projections, and at equal distances apart, as there are fingers, of a length nearly equal to the space between the feed-plate and bed-plate. Into each one, near their lower ends, is inserted a radial pin, *o*, for striking against curved hanging arms of vibrating shafts of a stop and gate, designed to hold and stop the type and prevent more than one from entering between the cutters at a time.

M is a segment rim or curb encircling about

two-thirds of the circumference of the feeding-plate and rising above its outer edge about a quarter of an inch to form the outer side of a segment of a circular gutter through which the type are conveyed to the cutters, and by which the type are prevented from falling from the revolving feeding-plate, which forms the bottom of said segment circular gutter. This segment-curb nearly touches the circumference of the feeding-plate and is supported in its required position by means of perpendicular standards b', screwed to it, havin horizontal feet or flanges fastened to the top of the bed-plate by screws. The inner side of the aforesaid feeding-trough or segment-gutter is formed by two segment-plates, G G', suspended over the rim of the circular feeding-plate by means of right-angled plates a' and screws, the vertical limbs of said plates being screwed to the outside of the curb M aforesaid and the horizontal limbs having oblong mortises a^2, through which screws l are passed, that are screwed into said segment-plates G G', the oblong mortises being designed for the purpose of allowing said segment-plates to be brought nearer to or removed farther from the inner side of the curb M in order to increase or diminish the width of the segment feeding-gutter, according to the size of the type that are to be conveyed through the same by the circular revolving feeding-plate F aforesaid.

O' is an adjustable gate for preventing the type entering the feed-gutter edgewise and for turning them off to the left when they approach the entrance on their edges, so that they may be turned down on their flat sides in order to enter the trough endwise and flatwise, which is the only position they can enter the gutter when said gate is properly adjusted. This gate is a right-angled plate with a rounded point attached to a right-angled mortised plate, O^2, by a screw, 3, said plate O^2 being also fastened to the inner suspended segment-plate G by a screw, 4, and mortise, by which the gate O' can be adjusted horizontally. (See Figs. 1, 11, and 12.) The screw 3, inserted into the gate O' and oblong mortise in the plate O^2, is for adjusting the gate vertically. It is adjusted and fastened above the feed-plate a distance equal to the thickness of the type to be dressed.

d^2 is a suspended guard placed in the gutter for the purpose of guarding against the danger arising from the type riding over each other in their movement round in the gutter, being suspended at a suitable distance from the revolving feed-plate by a screw, 5, inserted into an oblong mortise in the knee K^4, fastened to the inner segment-plate G', by which it can be raised or lowered at pleasure. (See Figs. 1, 11, and 13.) This guard should be so adjusted by the screw 5 and the oblong mortise in the right-angled knee-plate that its under surface should be suspended above the surface of the revolving feed-plate (which forms the bottom of the gutter) a distance equal to the thickness of the type, so that should the type turn on its edge in the gutter after it shall have passed the gate O' it must be arrested by the guard d' until it be turned down upon its flat side. It performs this office in addition to that of preventing one type riding over another.

q is another guard-plate near the discharge end of the gutter, designed to accomplish the same object as the one just described. It is a horizontal plate secured to the segment bar or guide G' by a screw, l', which passes through a mortise in the plate, and by which it is adjusted. This plate overlaps the segmental channel, and thus reduces the depth of the gutter to the thickness of the type, and thereby prevents the passage of the type edgewise. (See Figs. 1, 11, and 14.)

L is the striking-plate for striking off the pile of type placed upon the revolving feeding-plate in order to prevent the type coming in contact with the revolving fingers, the lower edge of said striking-plate being made convex and arranged below the under side or face of the fingers. The outer end of the plate is fastened to an upright plate, L^2, screwed to the bed-plate A, and its inner end is attached by screws to a vertical flange, G^3, of the inner segment-plate G', forming part of said plate G'.

J is a vibrating stop (see Figs. 3 and 4) for holding back the charge of type in the segment-gutter, so as to prevent more than one type passing into the space between the stop and gate. This stop is a thin plate of cast-steel having a convex heel, J, which fits into the gutter and presses upon the type to hold it fast till raised by one of the radial pins o o of the feed-wheel F aforesaid. The said steel plate is screwed to the enlargede end of a rock-shaft, J', which turns in boxes in the top of a cast iron standard, B^2, by means of a screw, J^3, which allows it to be removed for the substitution of other stops or plates to suit various kinds of types. The end J of the plate J attached to the rock-shaft is held down upon the type by the action of a spring, K^2, attached to the standard B^2, bearing against the curved arm J^4 of the rock-shaft. It is raised at intervals by the radial pins o o aforesaid, which, as the feed-wheel revolves, strike against the back of the curved arm J^4, causing it to vibrate and contract the spring and lift the stop J and remain in contact therewith, keeping the stop elevated until the type are moved round in the gutter and strike the gate H, when the pin leaves said curved arm and the spring K^2 drives it down, and with it the stop J, which strikes upon the second type from the gate, leaving the first type, or that which is next the gate, at liberty to pass the gate, (when that is is lifted,) which takes place immediately upon the descent of the stop J by the radial pin o coming in contact with the curved arm H' of the rock-shaft H^2 of the gate H, which is made, arranged, and operated in precisely the same manner as the rock-shaft J', arm J^4, and spring K^2 of the stop J, as aforesaid, the feed-wheel

F, revolving without cessation, carrying the said type round to the front of the cutters B C, where it is met by one of the revolving fingers N, which turns horizontally over the rim of the feed-wheel F and carries it off from the feed-wheel between the cutters, where the roughnesses are removed therefrom, and, continuing to move round in the arc of a circle, bringing the type between the blank places of the cutter-blocks, where it is rubbed smooth, and, the finger continuing to move round in the same direction, the type is carried off at the ends of the cutter-blocks and falls down upon the inclined trough, which conveys it to a proper receiver placed below the bed-plate. The gear of the machine may be so adjusted that the gate shall commence to rise to let a type pass through when the finger is on a straight line passing through the center of the finger and feed-plates, or nearly so, both gate and finger moving simultaneously, the former rising vertically in the arc of a circle to let the type pass through and the latter moving round horizontally in the arc of a circle and taking hold of the type just as it arrives opposite the ends of the cutters, between which it is carried flatwise and sidewise, the gate falling as soon as the type is carried beyond it and just before the finger touches it by the radial pin *o* passing from beneath the back of the curved arm H′ of the vibrating shaft H^2 and the action of the spring against the front of the curved arm. The front end of the upper cutter, being made slightly flaring or open, will admit the type to pass in between the upper and lower cutters freely and be carried over the furrows obliquely without turning over upon the edge, the cutters being held stationary by the aforesaid screws, as seen in Fig. 10.

The spout A^2, for conducting the type to the receiver, is inserted into an opening in the bed-plate below the rear ends of the cutter-blocks, and is screwed to the bed-plate. It is covered with paper or other soft material to prevent the type from becoming bruised or otherwise injured in falling from the cutters down upon the spout.

The dotted lines 12 (see Fig. 11) indicate the position the type will assume beneath the end of the box of the upper cutter the moment the radial finger N strikes it to carry it between the cutters, and the dotted lines 13 show the position of the opening in the bed-plate A, into which the conducting spout A^2 is inserted for conveying the type to the receiver as they fall from the cutters after being properly dressed.

The gearing may be made and arranged in the manner described and represented, or in any convenient way, and the propelling power may be manual, horse, steam, &c., applied to the shaft in any manner preferred.

The machine being put in motion, the type to be rubbed and smoothed are put upon the concave revolving feed-plate near the center, to which they have a tendency to descend on account of its dish shape. The plate L strikes the type on top and prevents them from rising above the level of the fingers N. The feed-plate conveys them around in concentric circles to the entrance of the gutter, where they enter singly, flatwise and lengthwise, being prevented from entering in any other way by the guide or guard *o′* at the entrance, which is set for that purpose. When they arrive at the gate H, they are arrested, and no more can enter until the type that entered first shall have passed the gate. The feed-plate, which forms the bottom of the gutter, continuing to revolve, causes the type to strike the end of the last type that entered the gutter, or that which remains under the guide or guard *o′*, and be turned off toward the center of the plate. The stoppage of the advance of the type toward the revolving fingers and cutters is but momentary. The stop J and gate H being caused to rise and fall alternately in quick succession by the radial pins *o o* and springs K^2 K^5 in the manner above described, the type are carried forward singly to the revolving fingers and cutters, where the operation of removing the roughnesses from their flat sides and smoothing them takes place, as above described. The type then descend upon the inclined spout A^2 to the receiver, there being a constant supply of type kept upon the concave feed-plate and a continuous row in the segment-gutter, prevented from riding over each other by the guard d^2, arranged above them.

I do not claim rubbing and smoothing type by machinery, as this has been done by means of a combination of inclined vibratory feeding-troughs and reciprocating slide-cutters and other modes; but

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

1. My peculiar mode of rubbing and smoothing type by means of the combination of the stationary adjustable cutters B C, revolving feed-plate F, rotary fingers N, segment-guides M G, forming the curved gutter-guards *o′* d^2 *q*, vibratory stop J, and gate H, constructed, arranged, and operated substantially as set forth.

2. Operating the stop and gate alternately by the combination of the radial pins *o*, projecting from the feed-plate F, and curved arms H′ J^4, attached to the vibrating shafts of the stop and gate, and springs K^2 K^5, bearing against the arms, substantially as set forth.

JAMES L. DUNCAN.

Witnesses:

WILLIAM P. ELLIOT,

A. E. H. JOHNSON.