

B. NADALL.
 VISE FOR MACHINE TOOLS.
 APPLICATION FILED NOV. 26, 1898.

NO MODEL.

4 SHEETS—SHEET 1.

Fig. 1.

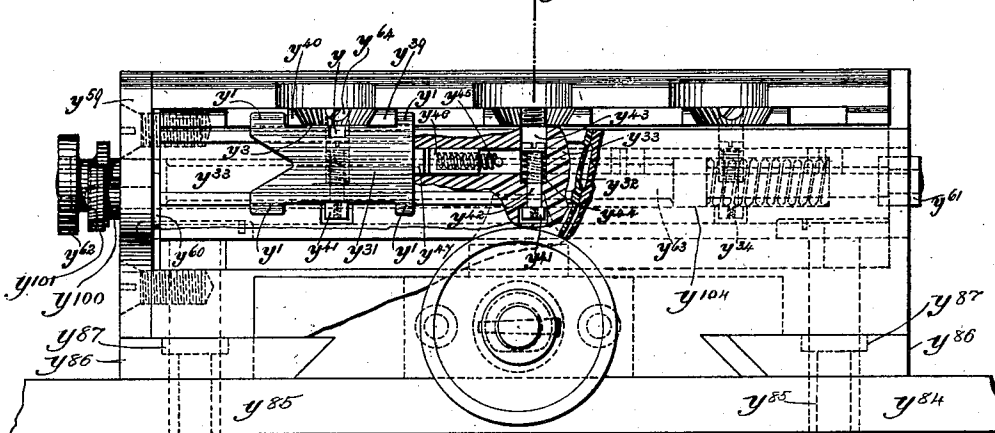
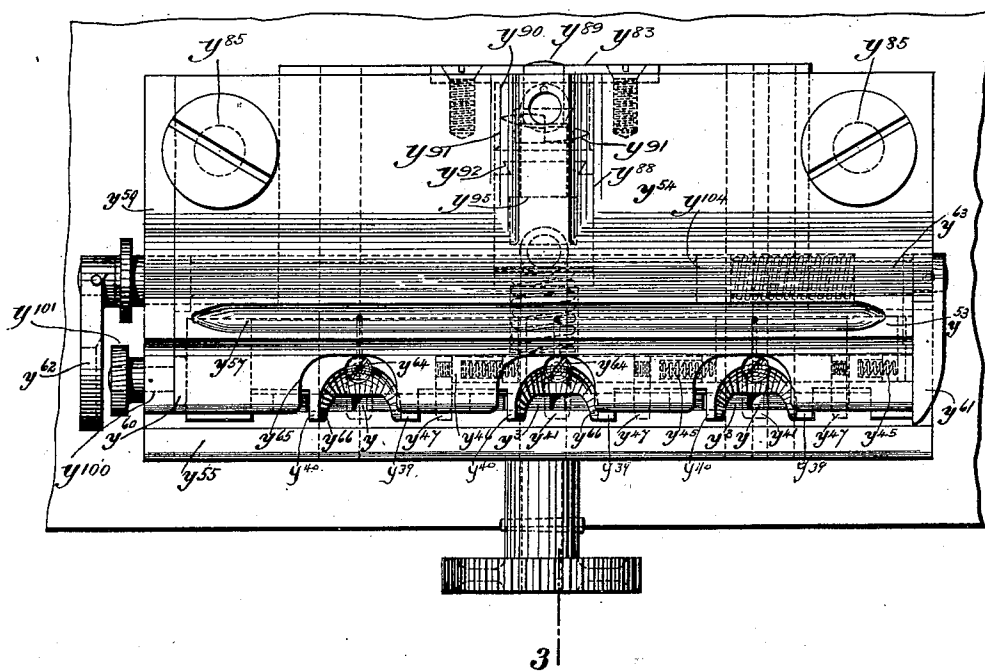


Fig. 2.



Witnesses.

Philip C. Hawless
 Harry L. Cox

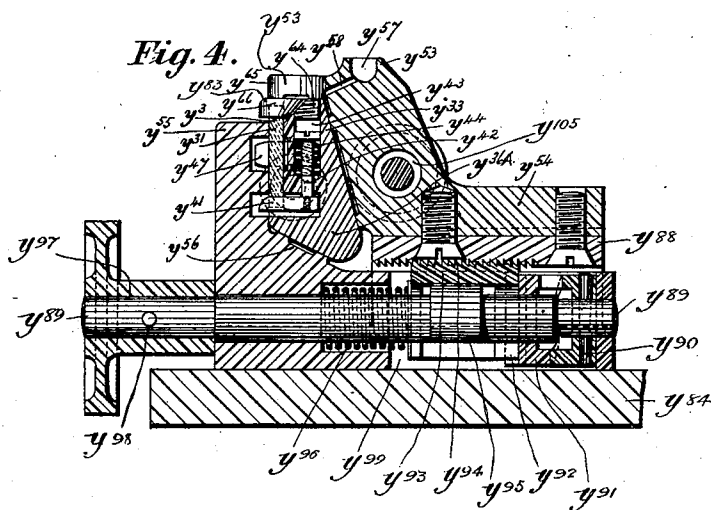
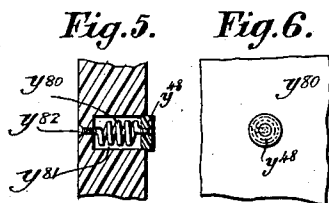
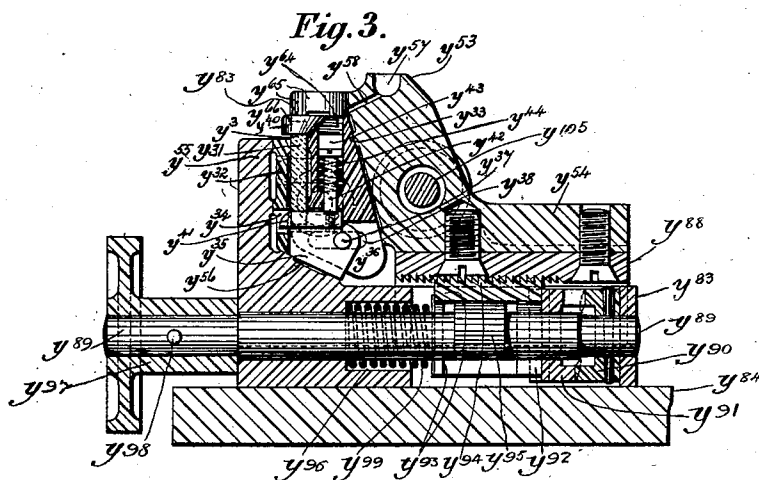
Inventor:

Berne Nadall,
 per Chas. Woodroffe
 Attorney.

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4 SHEETS—SHEET 2.



Witnesses.

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 Harry L. Bot.

Inventor:

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4 SHEETS—SHEET 3.

Fig. 7.

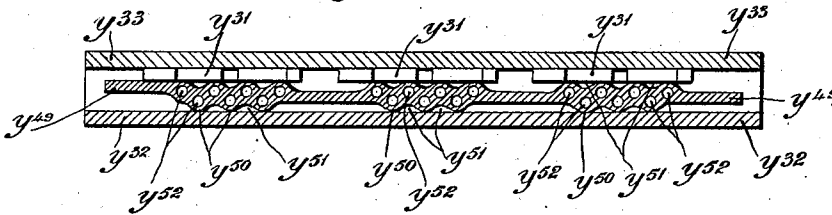


Fig. 8.

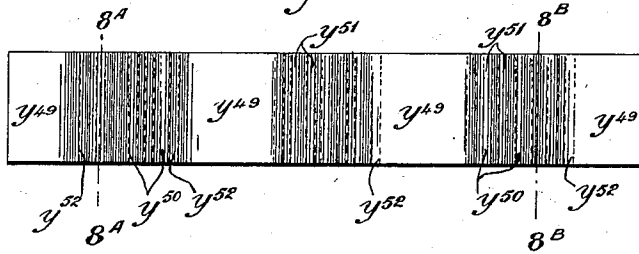


Fig. 8^A.

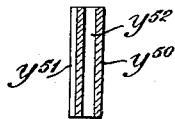
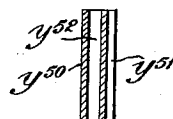


Fig. 8^B.



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4 SHEETS—SHEET 4.

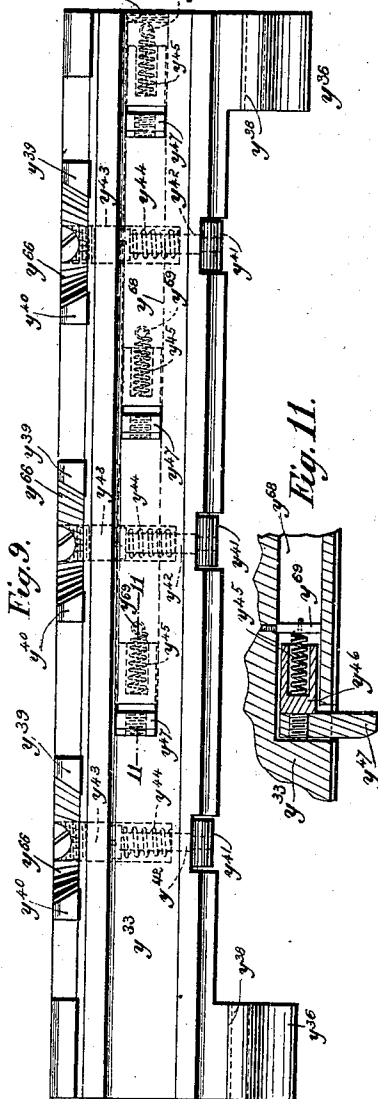
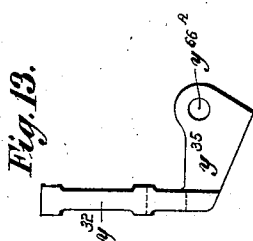
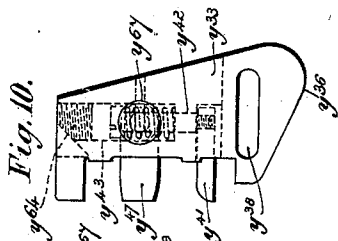


Fig. 12.

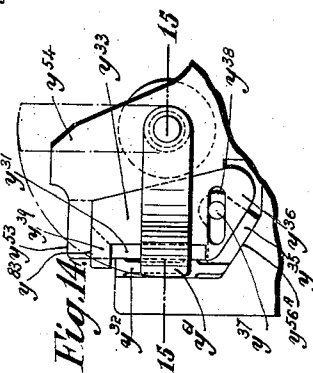
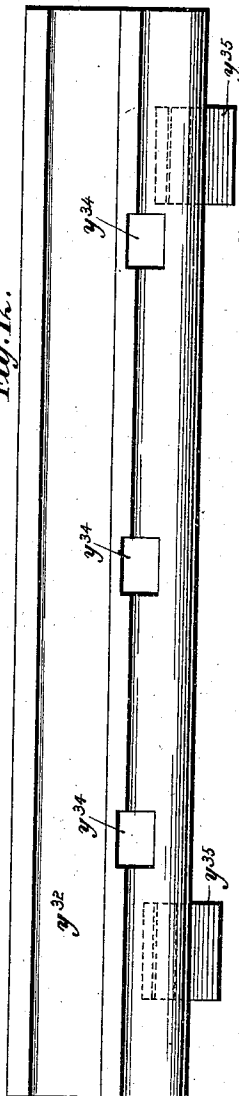
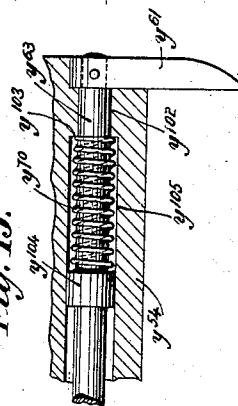


Fig. 15.



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UNITED STATES PATENT OFFICE.

BERNE NADALL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LINOTYPE COMPANY, LIMITED, OF LONDON, ENGLAND.

VICE FOR MACHINE-TOOLS.

SPECIFICATION forming part of Letters Patent No. 725,760, dated April 21, 1903.

Application filed November 26, 1898. Serial No. 697,557. (No model.)

To all whom it may concern:

Be it known that I, BERNE NADALL, of No. 6118 Princeton avenue, Englewood, Chicago, in the State of Illinois, (at present residing at No. 19 Stockport road, Altrincham, in the county of Chester, England,) have invented certain new and useful improvements in Vises for Machine-Tools; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to improvements in vises for holding a series of pieces while each of the latter is being subjected to the action of a machine-tool. It has been developed with particular reference to the engraving-machine described in the specification of British Letters Patent No. 11,938 of 1895 when used to engrave the formative cavities of the matrices of the well-known Mergenthaler linotype-machine. The blank of such a matrix is a rectangular piece of metal having a rectangular notch in one side edge of it, in the bottom surface of which notch—i. e., the surface of it which is parallel with the side edge above mentioned—must be cut the formative cavity in which will eventually be cast the face of the respective character on the printing edge of the linotype. It has also four rectangular lugs, one projecting from each corner. The engraving-machine referred to is shown in the above-mentioned specification as fitted with three rotary cutters; but no special means for holding the respective three matrix-blanks in their respective positions are shown. They have hitherto been held in a vise in which each one stands in a sunk and rigid bed and requires and receives special adjustment to the respective cutter independently of the other blanks in the vise. It should be understood that a matrix-blank even when it is standing in the vise with its side edge at right angles with the axis of the cutter may be in a wrong position and may require adjustment in respect of being either too high or too low, too much to the right or to the left in the direction of the length of the matrix edge, or too much to the rear or to the front in the direction of the width of that edge. If it is

too high, the formative cavity will be cut too deep, and not deep enough if it is too low. If it is too much to the right or to the left in the direction of the length of the matrix edge, the formative cavity will not hang from the right “hanging” line, by which term is meant the imaginary transverse line from which the letters of a font are assumed to hang. If it is too much to the front or to the rear, the formative cavity will be nearer to one side of the matrix than to the other.

The objects of the present invention are: (a) capacity for holding the matrix-blanks in position regardless of variations in their thicknesses; (b) easier and quicker operation of the vise by the operator in charge of the machine-tool than has been possible with other vises hitherto used; (c) positive adjustment of all the matrices in the vise at one time by a single operation; (d) capacity for cutting the matrix-blanks after they have been finished in all other respects and also for leaving them true in all their dimensions.

The two side edges of the blank above described and the two edges of the lugs that face each other are assumed to be truly parallel with each other, respectively, and each pair at right angles with the other pair.

According to the present invention a modified form of vise of the well-known instantaneous-grip type has combined with it a magazine-chuck to hold the series of blanks and to be itself held in a particular way between the jaws of the said vise. This chuck consists of two pieces hinged together at or near their bottom edges and the blanks stand edge up in it. The inner faces of the said pieces are so positioned that when they are closed upon the series of blanks they bear upon their sides and their top edges, at or near each end thereof. That portion of a piece which bears upon the side edge which is to be cut consists of two projections, and these stand between the two lugs on the said edge. One of these projections serves as an abutment for one of the said lugs. Each blank is held up to the projections, as well as to the abutment just described, by spring-pressure. The magazine-chuck having been filled with blanks is inserted in the vise and the latter closed upon it. The proper fit of the front

and rear pieces of the said chuck up to the blanks, in spite of the varying thicknesses of the latter, is provided for by making one of the said pieces capable of sliding to and from the other piece on the pivots that hold them together. The front piece of the magazine-chuck may be dispensed with, in which case the front jaw of the vise bears directly upon the blanks. The back jaw of the vise overhangs the magazine-chuck to serve as an abutment for it, and the respective faces of both vise and chuck are so beveled that as the vise is closed upon the said chuck the latter is forced up against the overhanging abutment above described.

Referring to the accompanying drawings, which are to be taken as part of this specification and read therewith, Figure 1 is a sectional front elevation of the vise and magazine-chuck after some of the front portions of each have been broken away to show the interior. Fig. 2 is a plan of the vise and magazine-chuck. Fig. 3 is a transverse section taken along the line 3 3 of Figs. 1 and 2. Fig. 4 is likewise a transverse section illustrating a modification. Figs. 5 and 6 are respectively transverse section and rear elevation of a packing-stud. Figs. 7 and 8 are respectively sectional plan and elevation, and Figs. 8^A and 8^B sections on the respective lines 8^A 8^A and 8^B 8^B of Fig. 8, all illustrating the use of a substitute packing-plate. Fig. 9 is a front elevation, on an enlarged scale, of the back piece of the magazine-chuck. Fig. 10 is an end elevation of Fig. 9 from the right hand of it. Fig. 11 is a section plan taken on the line 11 11 of Fig. 9. Fig. 12 is a front elevation of the front piece of the magazine-chuck. Fig. 13 is an elevation of Fig. 12 from the right hand of it. Fig. 14 is a detail elevation from the right hand of the vise and magazine-chuck, showing the clamp and its action; and Fig. 15 is a sectional plan taken on the line 15 15 of Fig. 14.

The figures show the invention as made to take three blanks y^{31} , only one of which is shown in Figs. 1 and 2. y is the rectangular notch in one side edge y^3 of it, in the bottom surface of which the formative cavity is cut, as already explained, and y' y' y' y' are the four rectangular lugs already mentioned.

The magazine-chuck consists, substantially, of two pieces hinged together at or near their bottom edges. y^{32} is the front piece, and y^{33} is the back piece. The details of this chuck are shown best in Figs. 9, 10, 12, and 13. The back piece y^{33} has a forwardly-projecting lug y^{36} at each end, and the front piece y^{32} two rearwardly-projecting lugs y^{35} y^{35} so positioned on it as to stand just within the lugs y^{36} y^{36} when the two pieces y^{32} y^{33} are brought together, as a comparison of Figs. 9 and 12 will clearly show. The back face of this back piece y^{33} is inclined to the front, as shown in Figs. 3 and 4. The bottom edges of the lugs y^{35} y^{35} are declined from the front face of the piece y^{32} at an obtuse

angle therewith, as shown in Figs. 3 and 13. A pivot y^{37} , Fig. 3, is passed through each hole y^{36A} in the lugs y^{35} y^{35} and the horizontal slot y^{38} in the respective lug y^{36} , so that the two pieces y^{32} y^{33} are both hinged together and are also capable of a rectilinear motion to and from each other by reason of the pivots y^{37} y^{37} sliding along the respective slots y^{38} y^{38} . Further, the inner faces of the said pieces y^{32} y^{33} are so positioned and stand in such a relation to each other that when they are closed upon the blanks y^{31} the said faces bear upon the front and rear sides of those blanks. The back piece y^{33} carries on its top edge pairs of rectangular projections y^{39} y^{40} . (Shown best in Figs. 1 and 2.) These projections are adapted to bear upon the edge y^3 of each blank y^{31} between the pair of lugs y' on that edge when the magazine-chuck is closed upon them. Each projection y^{39} serves as an abutment for the right-hand lug y' on the top edge y^3 of the respective blank y^{31} and each pair y^{39} y^{40} for the entire edge y^3 of the said blank, as clearly shown in Fig. 1. Each blank y^{31} is held up to the bottom faces of the said abutments y^{39} y^{40} by a spring adapted to press centrally against or to pull centrally upon its opposite side edge. The holding-up device illustrated consists of a horizontal finger y^{41} (shown best in Figs. 1, 3, 4, and 10) and having its front top corner convex to facilitate the motion of the matrix-blank y^{31} over it when it is being put into the vise-chuck; a headed pin y^{42} , standing in a vertical cavity y^{43} in the back piece y^{33} , and made fast by its nose to the rear end of the finger y^{41} , and a spiral spring y^{44} , surrounding the shank of the pin y^{42} and compressible between the head thereof and the bottom of the cavity y^{43} . The top of the cavity y^{43} is closed by a screw y^{64} . There is a hole y^{34} in the front piece y^{32} opposite each finger y^{41} to clear the convex ends thereof when the magazine-chuck is closed upon the matrix-blanks y^{31} . Each matrix-blank y^{31} is further held up to the right-hand face of the respective abutment y^{39} by a spring adapted to push against the adjacent end of the blank y^{31} , which end is in the case of a Mergenthaler linotype-matrix the foot of the matrix. y^{68} is a longitudinal bore or recess in the back piece y^{33} . y^{45} y^{45} y^{45} are the springs in question. Each is made fast to a pin y^{69} , Figs. 9 and 11, fixed across the bore or recess y^{68} and from which it pushes a slider y^{46} , fitting within the bore y^{68} . Each slider carries a finger y^{47} , fast to its opposite end and projecting at right angles with the direction of the spring's push through the front face of the piece y^{33} , as shown in Figs. 2, 10, and 11. Its front corner on the left-hand or matrix-blank side of it is convex to facilitate the motion of the matrix-foot past it, for the same reason that the top front corner of the finger y^{41} is convex. Consequently the insertion of a matrix-blank y^{31} in the matrix-chuck involves only the pressing backward of the two springs y^{44}

y^{45} . As soon as a fresh matrix-blank is inserted the said springs extend and press it into its theoretically correct position up against two surfaces equally true—namely, the bottom faces of the two abutments y^{39} y^{40} and the right-hand face of the abutment y^{39} . The open end of the groove y^{63} is closed by a screw-plug y^{67} .

The proper fit of the front and rear pieces y^{32} y^{33} of the magazine-chuck up to the blanks y^{31} , in spite of the varying thicknesses of the latter, is effected by the rectilinear motion of the piece y^{32} up to the back piece y^{33} , along the slots y^{38} , as already described. To further accommodate varying thicknesses of matrix-blanks y^{31} , either front piece y^{32} or rear piece y^{33} of the magazine-chuck may be fitted with spring-seated and spring-protruded packing-studs y^{48} , adapted to bear upon the respective side faces of the blanks y^{31} , as illustrated in Figs. 5 and 6, in which y^{81} is a recess at right angles with the face of the respective piece y^{32} or y^{33} , as the case may be, and y^{80} a spiral spring supported in the recess y^{81} by having one end of it, y^{82} , made fast to the bottom of the recess, as shown in Fig. 5. The opposite end of the spring y^{80} has the stud y^{48} fast on it. The stud y^{48} is of such a size that it will move back into the recess y^{81} before pressure is applied to its outer face. The spring y^{80} is compressible in the recess y^{81} and is long enough to hold the outer face of the stud y^{48} projecting beyond the said piece y^{32} or y^{33} so long as no pressure is applied to the said stud. The spring-protruded studs y^{48} just described may be replaced by a spring packing-plate. This is illustrated in Figs. 7 and 8. It consists of a steel bar y^{49} , having vertical grooves leaving vertical projecting bands y^{50} . These bands have vertical grooves y^{51} and perforations y^{52} extending through them from one edge to the other, in virtue of which they possess a sufficient degree of resilience. The packing-plate stands in the magazine-chuck in front of the row of matrix-blanks y^{31} with its grooved and perforated bands y^{50} bearing upon them and the front piece y^{32} of the said chuck, respectively, as clearly shown in Fig. 7.

The front piece y^{32} of the magazine-chuck may be dispensed with, in which case the front jaw of the vise next described bears directly upon the blanks y^{31} , as illustrated in Fig. 4, and for the two lugs y^{36} of the back piece y^{33} there is substituted a single piece y^{36A} , extending the whole length of the said piece y^{33} . This single piece has no slot y^{38} and no pivots y^{37} .

As already explained, the vise in which the improved magazine-chuck is held is of the well-known instantaneous-grip type. The construction of it is clearly illustrated in Figs. 1 to 4, more especially in Figs. 3 and 4. Thus y^{54} is its base; y^{54} , the back jaw held fast thereto by screws y^{55} y^{58} and having a forwardly-inclined face for the back face of the back piece y^{33} to slide over; y^{55} , the front jaw,

capable of a sliding motion upon the base y^{54} to and from the back jaw y^{54} in a transverse double-V groove formed by a pair of strips y^{56} y^{56} , held on the base y^{54} by screws y^{57} y^{57} ; y^{58} , the rack-piece fast on the back jaw y^{54} ; y^{59} , the spindle turning in front and back bearings in the bottom portion of the front jaw y^{55} ; y^{60} , a cam pinned fast on the spindle y^{59} ; y^{61} , a second cam facing the cam y^{60} , loose on the spindle y^{59} , and connected by a vertical double V-groove y^{62} to the bridge-piece y^{63} , which straddles the spindle y^{59} ; y^{64} , a rack on the top of the bridge-piece y^{63} ; y^{65} , a cam fast on the spindle y^{59} and adapted to raise the bridge-piece y^{63} to engage its rack y^{64} with the rack-piece y^{58} on the back jaw y^{54} ; y^{66} , a spiral spring surrounding the spindle y^{59} and resilient between the bridge-piece y^{63} and the front jaw y^{55} ; y^{67} , the spindle-knob bearing against the front jaw y^{55} and held fast to the spindle y^{59} by a pin y^{68} , and y^{69} a chamber in the bottom portion of the front jaw y^{55} to receive the cams y^{60} y^{61} y^{68} , bridge-piece y^{63} , and spring y^{66} . The rise of the cams y^{60} y^{61} is not less than the closing motion of the jaw y^{55} .

According to the present invention the top of the back jaw y^{54} has a forward continuation y^{53} , which projects to the front far enough to overhang the improved magazine-chuck when the latter is gripped in the vise. The inner surface y^{53} of the continuation y^{53} serves as an abutment for the top of the magazine-chuck to bear against, as shown in Figs. 3, 4, and 14. As both the said under surface y^{53} and the top of the magazine-chuck are parallel with each other, the bearing of the latter against the former provides for the top edges y^3 of the matrix-blanks y^{31} being held in the theoretically-proper plane. The inner face of the front jaw y^{55} of the vise and the outer face of the front piece y^{32} of the magazine-chuck are both practically vertical and parallel with each other; but the outer face of the back piece y^{33} of the said chuck and the respective face of the back jaw y^{54} are both inclined to the front at the same angle and are parallel with each other, as shown in Figs. 3, 4, and 14.

The bottom faces of the two lugs y^{35} y^{35} or the bottom face of the single piece y^{36A} , described above as made use of when the magazine-chuck has no front piece y^{32} , are declined from the front, as illustrated, respectively, in Figs. 3 and 4. The opposite face of the bottom portion of the front jaw y^{55} is likewise declined from the front at the same angle, and the magazine-chuck rests upon it. The said opposite face may be either a plane surface y^{56A} , as indicated in Fig. 14, or a pair of ridges y^{56} , as shown in Figs. 3 and 4. The plane of contact between the magazine-chuck and the bottom jaw is at an angle of about forty-five degrees with the horizontal and the plane of contact between the back jaw y^{54} , and the magazine-chuck meets the plane just mentioned at an acute angle along a line behind

and beneath the bottom of the magazine-chuck, so that the closing of the front jaw y^{55} of the vise upon the said chuck forces it backward against the front face of the back jaw y^{54} and upward against the surface y^{88} , described above, and makes it meet the said front face and surface y^{88} , respectively, at the same moment, the relative positions of the parts being adjusted accordingly.

10 The forward continuation y^{53} of the back jaw y^{54} of the vise and the top of the magazine-chuck are both cut away laterally, as shown at y^{65} and y^{66} , respectively, (see Figs. 1, 2, 3, 4, and 9,) to expose as much of the top edges y^3 of the matrix-blanks y^{31} as may be necessary to meet variations in the positions of the formative cavities lengthwise of those edges.

20 There is a groove y^{57} for oil in the top of the back jaw y^{54} of the vise, and suitable conduits y^{58} lead from it to each exposed portion of the edges y^3 of the matrix-blanks, so that the supplies of oil to all the cutters shall be constant and equal.

25 The mouth of the vise is on one side of it, because of the overhanging continuation y^{53} , already described, and a fixed abutment y^{59} on the other side of it. This abutment is fixed to the back jaw y^{54} . (See Figs. 1 and

30 2.) The position of this abutment y^{59} is such that it corresponds with a known position of the matrix-blanks y^{31} in the magazine-chuck with reference to the respective cutters of the engraving-machine above mentioned. In that machine the pattern-holder has not any horizontal motion—only a vertical one to and from the tracer-rod. Therefore when the magazine-chuck is up to the abutment y^{59} a certain point in some exposed portion of an edge y^3 corresponds with the center of the pattern. If the magazine-chuck always fits home in the vise to one position, the centers of all the formative cavities will coincide with the center of that pattern. Now it sometimes

15 happens that there is a demand for a font of matrices having the centers of their formative cavities farther along the edges y^3 . To meet such a demand, there is provided a series of trued filling-pieces y^{60} , adapted to stand up against the said abutment y^{59} and to hold the matrix-blanks y^{31} as much to one side of their normal position as is necessary to get the formative cavities cut in the desired positions relatively to the top ends—the ends opposite the feet in linotype-matrices—30 or, in other words, relatively to the hanging-line. Each filling-piece is held in position by a shank y^{100} , fast to it, which is passed through a hole in the abutment y^{59} , and a nut y^{101} , screwed from the outside of the abutment y^{59} onto the screw-threaded and projecting end of the shank y^{100} , as shown in Figs. 1 and 2. This series of filling-pieces is preferred to any micrometer-screw gear as being 35 simpler and less likely to mislead the operator when he is in doubt as to the cause of any inaccuracy in the position of the formative

cavities, for there may be some doubt about either the position or the action of a micrometer-screw, but there cannot be any as to the presence between the abutment and the magazine of a certain filling-piece.

y^{63} is a spindle turning in bearings y^{102} in each side of the back jaw y^{54} , as shown in dotted lines in Figs. 1 and 2 and more clearly by 75 full lines in Figs. 3, 4, and 15. Both ends of the said spindle y^{63} project beyond the back jaw y^{54} . The end that projects past the open side of the vise—i. e., the one through which the magazine-chuck is slid in—has a finger y^{61} fast to it and projecting from it at a right angle far enough to bear fairly upon and across the adjacent end of the magazine-chuck. The opposite end of the spindle y^{63} has a finger-lever y^{62} fast upon it to turn it 85 with.

y^{70} is a spiral spring surrounding the spindle y^{63} , lying within a bore y^{105} in the jaw y^{54} and compressed between an abutment y^{103} , part of the back jaw y^{54} , and a collar y^{104} , fast 90 on the said spindle y^{63} . The spindle is longer than the back jaw y^{54} in order that the spring y^{70} may always be able by pushing against the collar y^{104} to pull the finger y^{61} up to the magazine-chuck with strength enough to hold 95 it steady against the abutment y^{59} or the filling-piece y^{60} , as the case may be.

The improved vise and magazine-chuck made as above described are used as follows: The magazine-chuck is taken out of the vise 100 and the proper filling-piece y^{60} , unless the magazine-chuck is to fit up to the abutment y^{59} , fixed to the latter. The chuck is then opened by swinging the two pieces y^{32} y^{33} and charged by a matrix-blank y^{31} being pressed 105 into the back piece y^{33} between each pair of abutments y^{39} y^{40} and the opposite finger y^{41} and between each abutment y^{39} and the respective slider y^{46} . The front piece y^{32} is then closed upon the series of matrix-blanks y^{31} . 110 If there is no front piece y^{32} to the chuck, it is always open, and therefore requires neither opening nor shutting. The finger-lever y^{62} is next swung up or down to move the finger y^{61} from before the vise-mouth above described 115 and the magazine-chuck pushed through the vise-mouth into the vise up to the abutment y^{59} or to the filling-piece y^{60} . The spindle y^{63} is next pushed to the right for the finger y^{61} to clear the magazine-chuck and rocked by 120 the finger-lever y^{62} until the said finger y^{61} stands across and is pulled upon the magazine-chuck, as illustrated in Figs. 2 and 14. The vise is closed upon the magazine-chuck by turning the spindle y^{63} in the right direction by the knob y^{97} . As the said spindle y^{63} is so turned the cam y^{95} makes the rack y^{94} engage with the rack-piece y^{88} , fast on the stationary back jaw y^{54} , and the cam y^{90} , fast to the spindle y^{63} , is moved over the opposite 125 one, y^{91} , and is pushed backward, thereby pulling the knob y^{97} and making it push the front jaw y^{55} up to the magazine-chuck until the latter cannot be moved any farther. As the 13

front jaw y^{55} is moved toward the back one, y^{54} , the decline y^{56} forces the magazine-chuck upward until the top of it bears against the surface y^{53} . As the decline y^{56} forces the magazine-chuck upward the back face of the back piece y^{33} of it slides up the forwardly-inclined face of the back vise-jaw y^{54} , the said back piece being thereby forced forward, and so closed up to the rear face of the matrix-blank y^{31} at the same time that the front piece y^{32} is closed up to the front face thereof by the front vise-jaw y^{55} . When the lever y^{62} has been pulled down into the position illustrated in Fig. 2, the arm y^{61} is opposite the adjacent end of the magazine-chuck, as shown in Figs. 2 and 14, and is caused to push the said chuck up to the abutment y^{59} or to the filling-piece y^{60} , as the case may be, by the spring y^{70} , acting in the way already described.

I claim—

1. The hereinbefore-described combination of magazine-chuck adapted to hold matrix-blanks and to be held between the jaws of a vise and having a horizontal top, a back face inclined upward and toward the front, a bottom face declined from the front; vise having one jaw-face parallel with the said back face of the magazine-chuck and a seating parallel with the bottom face thereof; a continuation of the top of the said jaw having an under surface parallel with the said top of the magazine-chuck; and a mechanism for closing the jaws of the vise upon the magazine-chuck.

2. The hereinbefore-described combination of magazine-chuck having a horizontal top, a back face inclined upward and toward the front, a bottom face declined from the front,

the two thereby standing at an acute angle with each other; one or more pairs of abutments projecting from the said back piece for two edges of as many matrix-blanks to bear against; automatic spring devices to force the said edges up to the respective abutments; vise having one jaw-face parallel with the said back face of the magazine-chuck and a seating parallel with the bottom face thereof; a continuation of the top of the said jaw having an under surface parallel with the said top of the magazine-chuck; and a mechanism for closing the jaws of the vise upon the magazine-chuck.

3. The hereinbefore-described combination of vise having a back jaw, a front jaw, a seating for a magazine-chuck and a top projecting from the back jaw toward the front one and overhanging the seating, the said two jaws, seating and top to hold a magazine-chuck between them, the said vise being open at one end and having an abutment at the other; magazine-chuck adapted to be held between the said jaws, seating and top and up to the said abutment; provision for varying the position of the magazine with reference to the cutters of the respective engraving-machine, consisting of spaces in the top of the magazine-chuck and in the above-mentioned top of the vise; a series of trued filling-pieces; and means for holding the magazine in the selected position lengthwise of the vise.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

BERNE NADALL.

Witnesses:

CHAS. S. WOODROFFE,
THOMAS TAYLOR.