

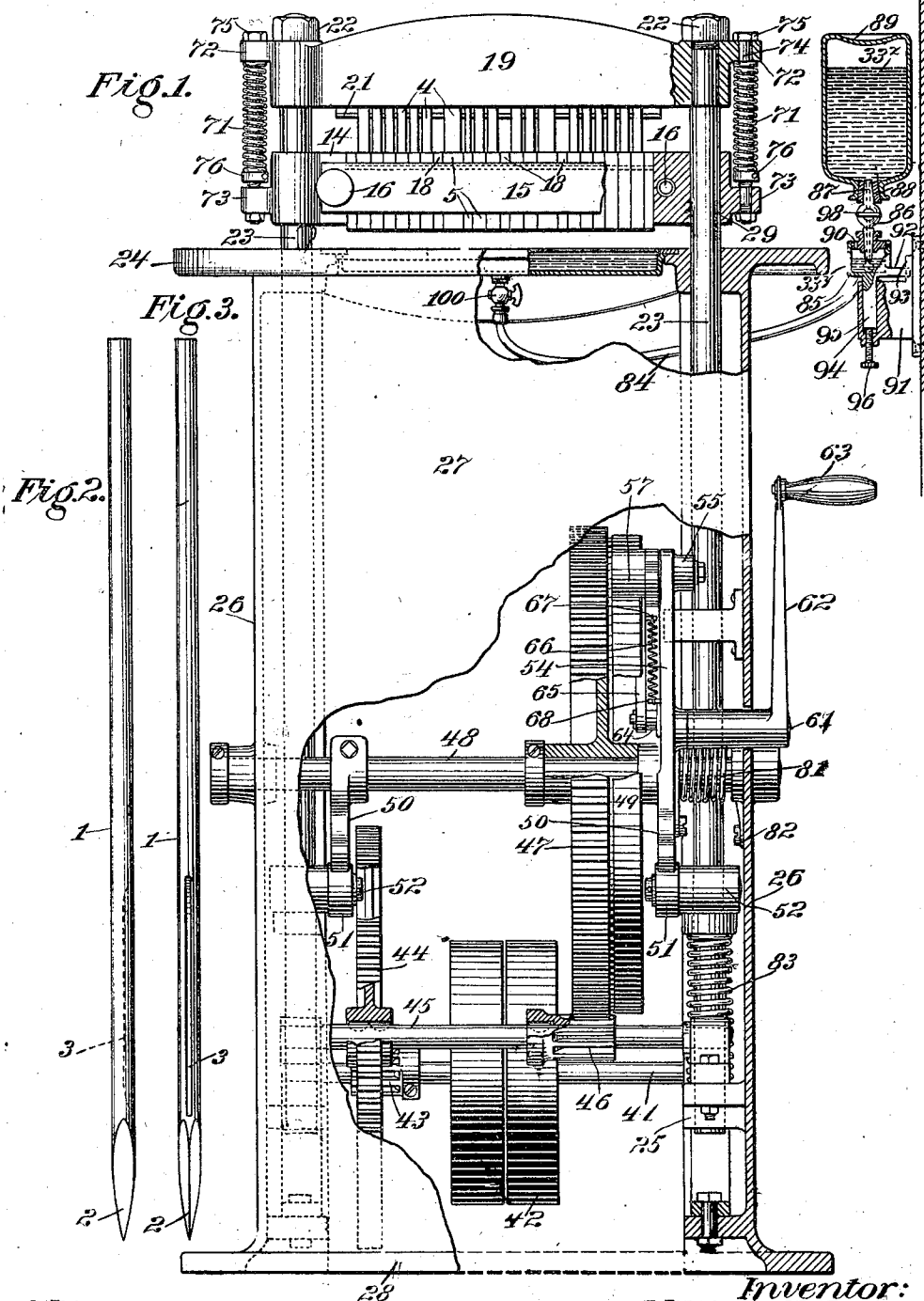
No. 847,578.

PATENTED MAR. 19, 1907.

W. H. HUDSON.
PERFORATING AND MARKING MACHINE.

APPLICATION FILED DEC. 31, 1901.

3 SHEETS—SHEET 1.



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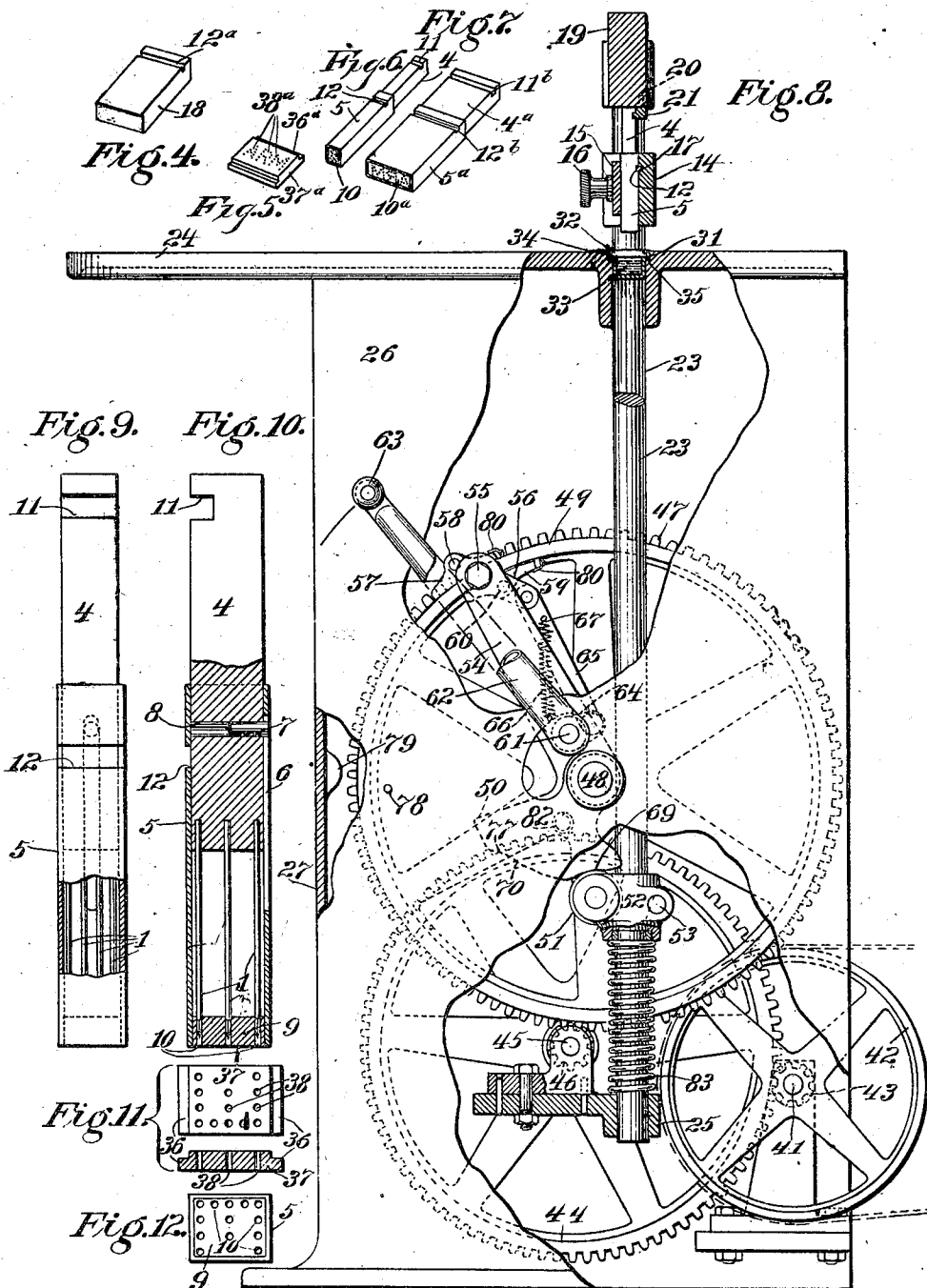
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

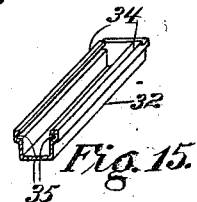
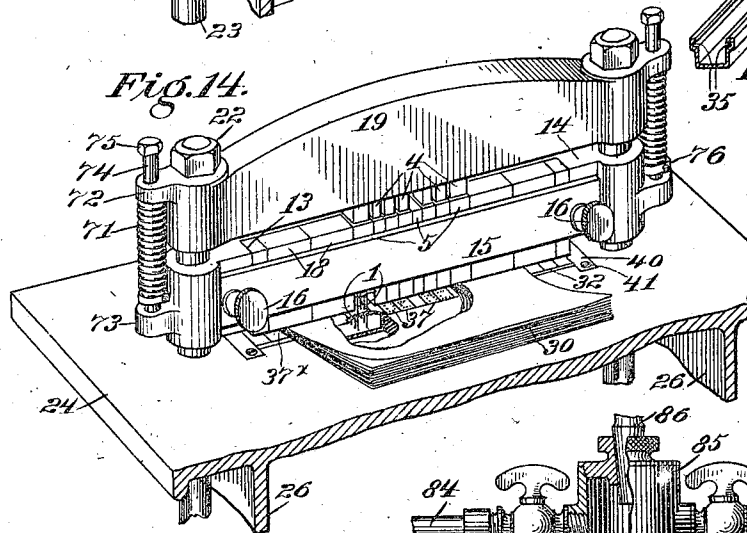
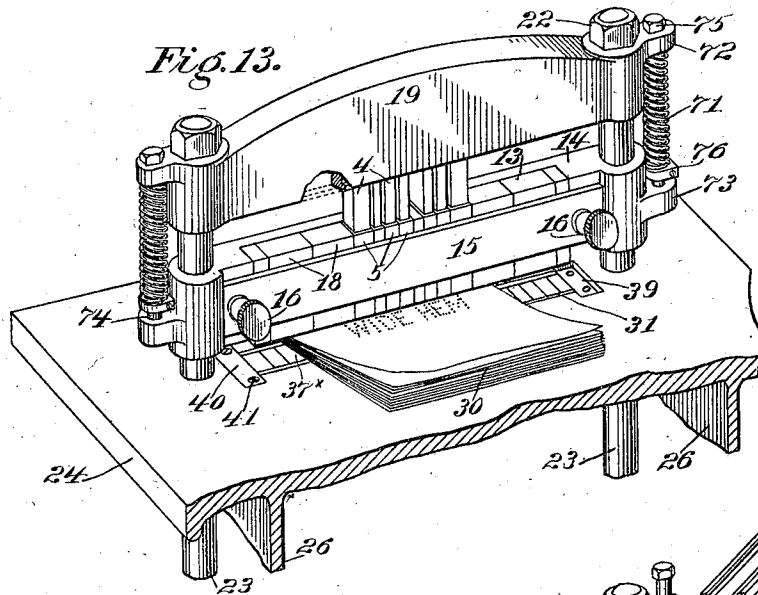
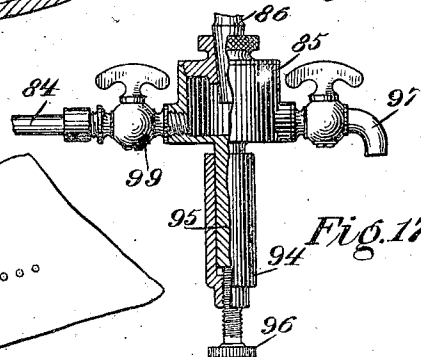
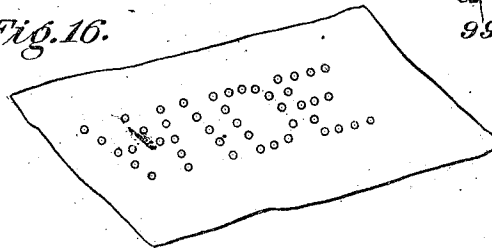


Fig. 16.



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UNITED STATES PATENT OFFICE.

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PERFORATING AND MARKING MACHINE.

No. 847,578.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed December 31, 1901. Serial No. 87,936.

To all whom it may concern:

Be it known that I, WILLIAM H. HUDSON, a citizen of the United States, residing in Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Perforating and Marking Machines, of which the following is a specification.

This invention relates chiefly to a machine for making perforations in groups so as to form one or more letters, characters, or words in paper, cloth, or other material and coloring the perforations, or, in other words, for printing by means of perforations.

In United States Letters Patent granted to me August 20, 1901, No. 681,121, are shown groups of perforating-needles in combination with means for coloring the perforations, and some of the features of said patent are used in connection with the improvements herein disclosed.

The objects of my present invention are to enable the lowermost as well as the uppermost sheets in a package to be thoroughly punctured by the needles; to improve the distribution of ink in the perforations, so as to more fully and uniformly color the same; to reduce the liability of blotting or smearing the sheets; to supply variable quantities of coloring fluid or ink according to the character of the work and thickness of the material; to automatically continue the supply of ink as it is exhausted by the needles; to enable the workman to see how far the supply of ink is depleted; to improve the construction of the needles, particularly as to the means thereon for transferring ink to the material; to facilitate resetting or refitting the machine for marking different words or combinations of words or characters; to enable a great variety of words or combinations to be produced by means of a relatively small number of needle groups; to improve the means for mechanically stripping the paper from the needles; to improve the mounting of the needle groups in the machine; to enable a larger number of needle groups to be used simultaneously than practicable heretofore; to expedite the sheet-perforating operation, as well as to reduce the labor thereof; to enable the machine to be operated with rapidity without undue risk of injury to the needles or material, and, further, to avoid the necessity of combining individual needle

groups in cases where it is desirable or necessary to reset the machine frequently for printing the same word or group of letters, characters, or words. Other objects will hereinafter appear.

In carrying out my present invention I preferably employ a font of movable individual needle-types from which I make a selection of such types as in combination make up or assemble a word or series of words, figures, or characters. After one job of printing is done the same types or some of them may be used in a new combination or combinations together with other types. Each of the types I preferably provide with a stripper, whose function is to press or hold the work or material upon the work-table both when the needles are puncturing the material and also when they are being withdrawn from the same. In making the machine ready I assemble or compose the stripper needle-types in a frame or head. I place below the strippers and needle groups through a single long perforated plate or a succession of short movable plates, preferably inserted in the work-table and flush therewith. These plates may be selected and combined in like manner with the needle-types and to correspond with the same and assemble upon the work-table, so that their perforations register with the needles sustained thereabove. Thus the needles register with and are guided by both the perforations in the strippers and also those in the table-plates, the work being clamped between said strippers and said plates during the entire time that the needles are in the material. By suitable means I force the needles through the strippers, the material, and the table-plates, and also cause them to dip into an ink-pool supported beneath the work-table, some of the ink or coloring fluid being taken up by the needles and deposited in the perforations as the needles are withdrawn from the material, so as to ink all of the sheets in the package, thus in a sense printing by perforation, although the needles may be otherwise supplied with ink and the perforations otherwise inked or colored. Some of the present improvements are not restricted, however, to machines in which inking or coloring is performed.

In the drawings forming part of this specification, Figure 1 is a front view of one form of my improved perforating and mark-

ing machine shown partly in section, and portions of the front of the framework being broken away so as to exhibit the combined mechanism. Figs. 2 and 3 are enlarged views of a perforating-needle. Fig. 4 is a perspective view of a spacing-block used in justification of needle-types. Fig. 5 is a perspective of a movable plate perforated to permit of its penetration by the needles and adapted to support the work, hereafter in some cases called the "sleeve." Fig. 6 is a perspective of a stripping needle-type. Fig. 7 is a perspective of a logotype. Fig. 8 is a side view of the machine, shown partly in section, part of the side frame being broken away so as to disclose the mechanism within. Fig. 9 is an enlarged rear view, and Fig. 10 is an enlarged side view, each partly broken away, of a shell needle-type. Fig. 11 shows a plan and cross-section of a movable platen-section. Fig. 12 shows an end of a perforated block or needle-type. Fig. 13 is a perspective of a portion of the machine above the operating-table and showing a package of sheets as having been perforated and colored, the mechanism being in normal position. Fig. 14 is a view similar to Fig. 13, but showing the parts in working position. Fig. 15 is a perspective of an end fragment of an ink-trough. Fig. 16 shows a fragment of a perforated and marked sheet. Fig. 17 is an enlarged side view of an ink-reservoir.

In the several views, similar numerals of reference indicate similar parts.

I mount a series of perforating-needles 1, each preferably having a triangular spear-like point 2 and being provided with a longitudinal ink-groove 3 near said point, Figs. 2 and 3, in the end of a bar or shank 4, the latter being rectangular in cross-section and the needles being soldered or otherwise secured to or in the end of said bar and projecting longitudinally therefrom. The arrangement of the needles corresponds with the form of the desired letter, digit, or character, so that the perforations produced thereby may be easily read. The shank 4 is preferably inclosed at one end in a right-angled tubular shell or sleeve 5, which has a longitudinal slot 6 for receiving a locking-pin 7, projecting from a hole 8 in the shank 4, so as to enable a relative play of the sleeve and shank equal to the length of the slot, while preventing the sleeve from being separated from the shank. At its lower end the sleeve is plugged with a plate or block 9, which has a series of perforations 10 for receiving the needles. Normally the points of the latter stand within the perforations, as at Fig. 10. The closed end of the sleeve is intended to clamp or press the paper to be perforated and also to afford a close-fitting accurate guide for the needles as they enter the paper, so that they may drive straight through the latter without liability of bending or snap-

ping. At its upper end the rear face of the shank 4 is provided with a positioning-nick 11, and the sleeve is also provided with a nick 12, consisting of a transverse slot formed in its rear side.

A series of needle-types may be set side by side in a recess 13, formed in a head 14 and retained therein by a front clamping or locking bar 15 and thumb-screws 16, the head having a key or spline 17, upon which fits the nicks 12 in the sleeves. Words or letters may be separated and blank spaces in the composing-head may be filled by spacing-blocks or quadrats 18, which also have nicks 12^a, Fig. 4, for engaging the rib 17.

Over the type-head I arrange a forcing-head 19, to the under surface of which is secured by screws 20 a key or spline 21, adapted to the nick 11 in the type-shanks 4, the head 19 being adapted to bear directly upon the upper projecting ends of said shanks, so as to push them down and thrust the needles through the paper. Head 19 is clamped at its ends by means of nuts 22 upon the upper ends of a pair of draw-bars 23, which pass down through a work-table 24 and are guided at their upper ends in the table and at their lower ends in lugs 25, projecting inwardly from opposite sides 26 of the framework, said sides and said table preferably being cast integral with a front side 27 and a base 28. These draw-bars 23, which are preferably cylindrical, pass freely through holes 29, formed in the ends of the head 14, so that they may move the forcing-head independently of the head 14, the principal function of said rods being to clamp the strippers upon the package of material 30 and to force the needles therethrough.

Below a transverse opening 31, formed in the table below the head 14, is supported a trough 32 for holding a pool of ink 33. The trough is provided along its upper edge with opposite flanges 34, (seen clearly at Fig. 15,) grooved at 35 for receiving rabbeted top and bottom edges 36 of plates 37, which cover the trough and are flush with the top of the table and support the portion of the material subjected to the action of the needles. Each plate is perforated (see 38, Fig. 11) in conformity with the grouping of the needles in the type suspended thereover, these perforations or apertures being, however, preferably sufficiently large to allow the needles to pass through them easily, so as to minimize the jamming and breakage of the latter, which might occur if they should deviate from their true course in descending. I may also make these apertures in the platen slightly larger at the top, so as to prevent the needles from missing them in coming down. The plates may be adjusted by sliding them along the grooves 35 until they register with the needle-type in the type-head, so that as the latter descends each needle may enter its ap-

erture 38. Blank plates 37^x, Figs. 13 and 14, may be provided to correspond with the quadrats 18, so as to fill in the blank spaces between and beside the perforated plates 37, in conformity with the spacing of the needle-types. At each end of the trough the table is provided with a large cut-away 39, which permits the insertion or withdrawal of the perforated plates 37 and blank plates 37^x. Said openings 39 are filled by keepers 40, which are made, preferably, flush with the top of the table and secured thereto by screws 41 or otherwise, thereby locking all the plates in the grooves 35, so that accidental displacement is prevented and damage to the needles avoided.

The forcing-head 19 may be operated by either hand or power in any suitable way, but I prefer to employ power, thus saving labor, expediting the work, and increasing the output of the machine. In order to guard against accident to the needles, my device is so built as to place the application of the power positively under the control of the operator at all times, especially when the needles are penetrating the material. A driving-shaft 41 is mounted transversely in the base and has fast and loose pulleys 42 and a pinion 43, the latter meshing with a large spur-wheel 44, fixed upon a parallel shaft 45. Upon the latter shaft I provide a pinion 46, which drives a large spur-wheel 47, mounted loosely upon an upper parallel shaft 48, all of said shafts being suitably journaled in the framework, and the object of the described train of gearing being to cause the wheel 47 to rotate slowly. Any other speed-reducing means may be employed, and in some cases the wheel 47 and its associated parts may be otherwise actuated. Rigid with the spur-wheel 47 is a clutch-ring 49, by means of which the normally stationary shaft 48 may be caused to turn when desired, said ring 49 being in constant rotation. To shaft 48 are fixed near its ends cam-arms 50, projecting downwardly and adapted to bear down upon rollers or bearers 51, mounted upon split collars 52, adjustably fastened upon the draw-bars 23 by means of bolts 53, so that as the shaft 48 is turned and the cam is rocked said rollers, collars, and draw-bars may be carried down so as to operate the plunger-head 19.

Rigid or integral with the right-hand cam-arm 50 I provide an upwardly-extending radius-arm 54, about equal in length to the radius of the clutch-ring 49, and upon the outer end of said radius-arm I pivot at 55 a cross-lever 56, which extends obliquely to the radius-arm 54 and carries at its outer end a brake-shoe 57, pivoted at 58, and at its inner end another shoe 59, pivoted at 60, the former shoe fitting upon the outer periphery of the friction-ring 49 and the latter upon the inner periphery thereof, so that by a single

movement of the arm 56 both shoes may be thrown into or out of action. By means of this clutch the revolving friction-ring 49 is caused to carry around said radius-arm 54, together with the rock-shaft 48 and the cam 50, so as to operate the draw-bars 23 and needle-head. To the base of said radius-arm I pivot at 61 a lever 62, which may extend upwardly and be provided with a handle 63, and I connect a short arm 64, formed upon said lever 62, to the shoe-lever 56 by means of a link 65, so that by pulling down the lever 62 the link 65 is thrust outwardly, so as to operate the shoe lever 56 and clamp the shoes upon the ring 49.

In operation the needle-types are selected and set side by side in the needle-head in the proper combination to form the desired word or words, the nicks 11 and 12 enabling said types to hang upon the ribs 21 and 17. If desired, logotypes including a plurality of letters, as seen at Fig. 7, may occasionally be employed to advantage instead of a combination of single types. Spaces or quadrats 18 are inserted between the words and also used for filling up the remaining space in the type-head or justifying the line, the nicks 12^a in the said quadrats enabling them to hang upon the rib 17. The locking-plate 15 is then clamped by the screws 16 against the sleeves 5, thereby holding the latter rigid with the head 14. The type-shanks 4, owing to their engagement with the rib 21, are caused to follow the movements of the forcing-head 19, the types sliding freely in the sleeves. In the table-grooves 35 the plates 37 are inserted in proper combination so as to spell the same word or words as are formed by the needle-types, and by means of the spacing-plates 37^x the plates 37 are adjusted into exact register with the needle-types. Then the locking-plates 40 are inserted in their seats and fastened by the screws 41. The package of sheets 30, which may be either regular or irregular in shape, is then placed upon the table 24 and pushed into position below the type-head 14. The handle 63 is pulled downwardly and forwardly in the direction of the arrow at Fig. 8, thereby vibrating the lever 62 slightly upon its pivot 61, and through the short arm 64 upon said lever thrusting the link 65 upwardly and turning the shoe-lever 56 about its pivot 55 upon the radius-lever 54, thereby throwing the shoes 57 and 59 into contact with the friction-ring 49, which constantly turns in the same direction as that in which the lever 62 is operated, and through the shoes and the radius-arm 54 tends to rock the shaft 48 and cams 50. It is not intended that the shoes shall bite the friction-ring so that the latter may positively drive the mechanism, but rather to maintain a slipping engagement, so that the arm 54 may be given an onward tendency by the rotating ring sufficient to relieve the operator of the

labor of operating the needle-head and other parts. The speed of the friction-ring may therefore be about double the speed which it is intended to impart thereby to the radius-arm 54. The operator retains a hold upon the handle 63 and gently urges the lever 62 downward, so as to keep it moving always in advance of the radius-arm 54, and is thus enabled to feel his way and control the movement as the needles penetrate the material. It is only necessary in case of accident or obstruction for him to stop the lever 62 in order to release the clutch, the tendency of the clutch mechanism being always self-releasing, or, in other words, any advance of the radius-arm 54 relatively to the operating-lever 62 tends to swing the shoe-lever 56 to an open position, this tendency being augmented by a draw-spring 66, caught upon pins 67 and 68, placed, respectively, upon the outer end of the thrust-link 65 and the inner end of the operating-lever 62. After becoming accustomed to the operation of the machine the operator may secure the most delicate control of the plunger-head by graduating the force applied upon the handle 63, so as to cause the shoes to clasp the friction-ring with various degrees of force, ranging between a bite and a release. This feature is of considerable importance, since the machine with this control is well adapted for both light and heavy work and in the case of the former is enabled to work quickly, while in the case of the latter it can be graduated to operate more slowly and surely without danger of damaging the needles.

The cams 50, which are rigid with the rock-shaft 48 and radius-arm 54, are provided with sharp inclined portions or quick-working surfaces 69, which operate at the beginning of the cam movement for pulling down rapidly the draw-bars 23, said cams acting through the rollers 51 and collars 52, secured upon said draw-bars, and pulling down the plunger-head 19, as well as the type-head 14, until the lower ends of the stripper-sleeves 5 come in contact with the material 30 and hold the latter firmly upon the table or upon the plates 37 and 37*, said plunger-head and type-head moving together until such contact is effected. Further downward movement of the draw-bars is effected by slow surfaces 70 of the cams, which give a very gradual movement to the draw-bars, so that the plunger-head may force the needles slowly through the material, thus overcoming gradually the resistance of the latter and avoiding risk of injury to the needles. During this penetrating movement of the needles the stripper-head 14 remains stationary, although forced against the paper by the action of compression-springs 71, placed between ears 72 upon the moving plunger-head and ears 73 on the stripper-head, said springs sliding upon vertical rods 74, which are fas-

tened on the lower ears 73 and work freely through the upper ears 72. It will be noted that the rods 74 leave heads 75 above the ears 72 for limiting the normal separation of the heads. The springs 71 bear at the upper ends against the ears 72 and at their lower ends against collars 76, which are made adjustable along the rods 74, so as to secure the requisite amount of tension and also to vary the same, when required, for different kinds of work.

The slow cam-surfaces 70 impart sufficient movement to the draw-bars 23 to thrust the points of the needles into the holes 38, formed in the plates 37. Succeeding the slow cam-faces are quick faces 77, which give a final rapid downstroke to the draw-bars 23 and head 19, the needles having now perforated the paper, and hence overcome all substantial resistance, and it being only necessary to thrust them down, so as to enable their points to dip into the coloring fluid. The parts are now in the Fig. 14 position.

A pin-stop 78, Fig. 8, may be provided in the side of the frame for intercepting the operating-lever 62, so as to prevent it from further downward action, and a safety-stop 79 may also be cast in the front wall of the frame for intercepting the outer shoe 57, so as to positively release the clutch at the termination of the downstroke of the draw-bars. This stop 79 will prevent damage to the machine in case the shoes for any reason become caught by the friction-ring and are carried forcibly around therewith, since the operation of said stop is such as to always positively release the clutch. The shoes may be provided with small oil-pads 80 for keeping the working surfaces of the friction-ring clean and slightly lubricated, so as to minimize the danger of the shoes becoming caught thereon.

The rock-shaft 48 and parts rigid therewith are returned to normal position by a spring 81, coiled around the shaft and secured at its ends by screws 82 to the casing and to cam-arm 50, and the draw-bars and plunger-head 19 are returned by compression-springs 83, working between the collars 52 and the lugs 25, which latter receive the lower ends of the draw-bars, said springs also causing the rollers 51 to bear up against the cam-arms 50 and aiding the spring 81 in returning the rock-shaft, &c., to normal position. The springs 71 upon the draw-head hold down the stripper-head 14 and keep the work held down upon the table until the needles are withdrawn therefrom. Then the heads 75 on the rods 74 are raised, and thereby cause the type-head 14 to rise with the plunger-head 19. The spring 66 returns the operating-lever 62 to normal position with reference to the radius-arm 54. The coloring fluid retained upon the needles and in the

grooves 3 is taken up by the paper as the needles withdraw therefrom, thus making distinctly readable printing or marking thereon, as indicated at Fig. 16. A large number of superposed sheets may hence be printed by a single operation.

In order to keep the trough supplied, I connect thereto a flexible pipe 84, which leads to a reservoir 85, into the top of which protrudes a funnel or nozzle 86, fixed at 87 in a stopper 88 of a bottle 89, containing a supply of ink 33^x. This receptacle 85 may be provided with an air-opening 90 at its top. The ink flows out of the bottle and through the nozzle 86 in the reservoir 85 until it rises in the latter above the tip of said nozzle, as at 33^y, whereupon the flow of ink from the bottle stops. The ink flows freely from the reservoir through the tube 84 and keeps the trough supplied. As the reservoir empties the top of the nozzle 86 becomes uncovered, enabling air to enter the bottle, thus liberating a fresh supply of ink therefrom, so that the supply 33^y in the reservoir tends to keep a uniform height, and hence the supply 33 in the trough is not allowed to diminish.

In the case of thin packages of material the amount of ink taken up by the needles will be less than when the packages or stacks are thick, so that for this and several other reasons it is desirable to regulate the level of the ink 33 in the pool. This may be done by raising or lowering the reservoir 85, which for this purpose is mounted upon a bracket 91, said reservoir having a slotted arm 92, engaging a guide-rib 93, formed upon said bracket, and also having a pendent stem 94, fitted in a vertical socket 95 in said bracket and resting upon the tip of a thumb-screw 96, threaded into the bracket and adjustable up and down, so as to vary the height of the reservoir. If the reservoir is raised, then owing to the tendency of the fluid to find the same level in both receptacles it flows into the trough and fresh fluid flows down from the bottle 89. In case it is decided to reduce the supply of fluid in the trough it may be drawn off through the tube 84 and reservoir 85, the latter being provided with a drain-cock 97, Fig. 17, for this purpose. The reservoir may also be lowered, so as to maintain a low level of the fluid in the trough. The flow from the bottle is automatic at all levels of the pool in the trough. The nozzle 86 is shown as provided with a stop-cock 98, which may be turned off, as at Fig. 1, when the machine is out of use, so that the bottle and nozzle may together be lifted from the receptacle 85. The latter is also shown with a cock 99 leading to the pipe 84, and at the trough end of the latter is shown still another stop-cock 100, all of these being manipulated to control the flow of ink into or out of the trough or reservoir from time to time as required.

After running through a quantity of sheets or stacks with one word-line or collection of types in the type-head said needle-types may be removed and another letter, word, or combination of words substituted. Thus a single machine is adapted for perforating and printing a large range of single characters, words, sentences, or reading matter.

It will be observed in this instance that I employ movable needle-types—that is to say, types which are capable of being transposed or combined in different ways, so as to spell different words or so as to be used in different associations—and where in the claims I employ the term “movable” in connection with types, strippers, or platen-sections I intend said term to have this limited meaning. I believe that I am the first to conceive of using movable needle-types either in a perforating-machine or in a perforating and coloring machine, and also the first to employ movable strippers and movable platen-sections and blank or spacing sections. The needles in each type may be parallel and project from the end of a right-angled shank, the latter being provided in one of its sides with a jog or nick or other means to adapt it to be keyed, hung, or otherwise positioned upon an operating head or frame, said nick being preferably near the end of the shank opposite to the needle end, and hence near to the base of the shank, so that the spline or other device to which the type is engaged by means of said nick may not unduly diminish the range of puncturing movement of the type. It will further be noted in this instance that I provide movable strippers, one for cooperation with each needle-type, said strippers being preferably mounted, by means of right-angled sleeves 5, upon the type shanks or blocks, so that both the types and shells may be selected and assembled or composed and justified simultaneously, thus economizing labor, although the strippers may be otherwise formed and mounted within the scope of my invention. I prefer to perforate the stripping-plates so that they exactly match or fit the needles, although they may be otherwise constructed, if desired. By having a close fit of the needles in the stripper-holes, however, I am enabled to positively direct the needles as they enter the work, so that they are caused to move straight into the package, thus avoiding liability of injury to the needles and enabling them to perforate a thicker or denser package or pile of sheets than would otherwise be feasible. It is also noted that in this instance the stripper and the needle-type are relatively movable, so that when the stripper is pressed against the work the needles may move through the work, said stripper having a close sliding engagement or fit upon the type-shank by means of the sleeve 5, the contrivance being

of a telescopic nature and the sleeve being locked upon the shank by means of the pin 7 and slot 6, thus enabling the types and strippers to be handled freely without liability of dismemberment. By providing the strippers also with a nick it may be engaged to the spline or key 17 at the same time that the type-shank is engaged to the spline or key 21, thus facilitating the assemblage or composition of the types and also enabling the spline 17 to control the strippers as a body while the spline 21 moves the types as a body. Viewed in one way, however, it will be understood that the nick 12, formed in the telescopic sleeve or section 5, may be regarded really as a nick upon the type itself, since said sleeves enable the types to be assembled and justified in the lower head 14, the upper head 19 being by preference adapted only to operate the types, which it does regardless of their arrangement upon the head 14 and regardless of the number of types employed. The nicks 11 and 12 are preferably at the same side of the stripping needle-type, so as to facilitate engaging the nicks simultaneously with said splines. It will also be understood that I employ a font of movable needle-types, said font including, if desired, all the letters of the alphabet, the ten digits, and the usual characters, and having a larger number of frequently-used letters than of the infrequent letters, the types preferably corresponding in width to the width of the needle groups necessary for each letter, the type "I" being, for instance, much thinner than the type "W." I also employ quadrats or spacing-blocks of various widths, as seen at Fig. 11, so as to justify the needle-types or cause them to fill the recess 13 in the type-head 14, each of said quadrats being provided with a nick or its equivalent 12^a, so as to enable it to be hung upon the spline 17, and the lower end of the quadrats being preferably flush with the bottom surfaces of the strippers, so that said quadrats cooperate with the strippers to clamp the work upon the table or platen. Except in the matter of width said quadrats may have uniform dimensions, and the jogs 12^a may be formed near their upper ends.

It is desirable sometimes to be able to assemble several characters at once, and I may therefore employ, either singly or in connection with other needle-types, one or more logotypes, as at 4^a, Fig. 7, fitted with needles grouped to form a word or a plurality of characters and provided with a stripper 5^a, having corresponding perforations at 10^a and also having nicks 11^b and 12^b, Fig. 7. It is not essential in all cases that a movable stripper having perforations grouped to form a plurality of characters be attached to the logotype or used in connection therewith. It will also be seen at Fig. 5 that I may use a movable platen-section 37^a, having a sys-

tem of perforations 38^a grouped in the form of a plurality of letters or characters and rabbeted at 36^a.

I also believe myself to be the first to make a perforating-machine having a head adapted to hold a series of movable needle-types, thus enabling a font of such types to be used to form any desired combination in the machine, so that said machine is enabled to perform a large range of work. I consider within the scope of my invention all means for assembling needle-types in different orders so as to form different combinations in a head or frame whether those types are secured or positioned by means of justifying devices or otherwise, although I prefer to justify my needle-types, because it enables me to square them nicely with relation to the work-table, or, in other words, to set them on their feet. It will also be seen that the head or head portion 14 may be considered as the frame in which the types are assembled, since it is provided with a recess in which they are justified and also with means for locking the types, the function of the upper head or head portion 19 in this instance being merely to operate the types as they are guided in the lower head 14. Preferably the clamp 15 is long enough to close the recess 13, so as to bear upon all the types and spacing devices therein. I prefer to support the type-head by its ends above the work-table 24, so as to leave a large space in which to manipulate the material and enable any desired portion thereof to be brought beneath the needles.

The forcing-head 19 while thrusting the needles through the work is guided by means of the vertical draw-bars 23. The object of making a plane under surface upon said head is to enable it always to operate the needle-types whatever their arrangement in the composing head or form 14. I effect variable relative movements of the forcing-head 19 and the stripper-support 14 and also a relative movement between the work-table and each of the stripper and forcing-head elements 14 and 19, as at Fig. 14, preferably moving both the stripper-support and the forcing-head down and up or toward and away from said table and also moving the forcing-head independently of both the table and the stripper-holder. Of course many variations may be resorted to in the construction and operation of this portion of the machine without departing from the scope of my invention; but I prefer that the stripping means, however constructed, shall move with the forcing-head so as to clamp the work and then remain stationary during the remainder of the advance movement of said forcing-head. The machine may be therefore regarded as having a compound head the portions 19 and 14 whereof are relatively movable, the portion 19 controlling the nee-

ble-bearing bodies of the types and bearing upon the portions thereof which project from the stripper-sleeves and the portion 14 causing the stripper portions of the stripping needle-types, as well as the flush lower ends of the quadrats, to clamp the work. The heads of the rods 74 limit the separation of the members 14 and 19 and nominally enable the latter to support the former. The compression-springs 71, which work between the heads 14 and 19 at these ends, tend to separate said heads, so that as the latter rises the former continues to hold the work until the needles are withdrawn from the work. The head 14 is guided by the rods 23, fixed to the head 19, said rods passing through guiding perforations 29 in the ends of the stripper-head, as seen at the right of Fig. 1.

I believe I am the first to employ a forcing-head fitted for operating a variety of needle-types in combination with a head fitted for receiving a variety of strippers for coöperation with said types, said heads being relatively movable, and so far as this feature of my invention is concerned it is not always essential that the strippers be attached to the types or that either the strippers or the types be always of the "movable" or variable-combination variety.

It will also be seen in this instance that the groups of perforations 38 and 38^a on the movable platen-sections, Figs. 9 and 5, occupy nearly the entire width of the sections, so as not to make undue space between the letters of a word; that the rabbeted portions 36 and 36^a constitute attaching means at the top and bottom edges of said sections; that the sections are of uniform height or length, but that they vary in width according to the width of the groups of perforations therein necessitated by the shape of the letter or character; that the recesses or rabbeted portions of the sections are formed in their upper surfaces, so as to enable the sections to lie in the grooves 35 and enable the upper faces of the sections to be substantially flush with the top of the work-table 24; that all of the movable sections, whether perforated or blank, taken together, form a platen—that is, a device for supporting the work directly at the portions thereof which are subjected to the thrust of the needle-types—and that by having the width of the platen-sections agree with the width of the stripping-needle types both sets of devices may be readily assembled and brought into register, although it is not essential in all cases that the platen be made up of sections, since it is obvious that a single-piece detachable platen, having one or more words or characters perforated therein, may be employed, as at Fig. 5, and be made of sufficient length to bridge over the entire opening in the work-table, whether there be employed in coöperation therewith a

logotype, as at Fig. 7, or a combination of movable types. It will also be observed in this instance that the color-retaining channel 3 extends longitudinally of the needle and is located near the point thereof, so as to take up a charge of color as the lower portion of the needle dips into the trough 33; that by forming the color-groove laterally of the needle it may readily take up and discharge the fluid. I believe that I am the first to provide below a penetrable work-support or platen a vessel containing a pool of coloring fluid, although, so far as some features of my improvements are concerned, it is not essential that the ink or fluid pool have this precise location, and obviously in some classes of work it may be omitted without departing from the scope of certain features of improvement disclosed herein. Preferably a support for the work intervenes between the stripper and the coloring means, means being provided for effecting relative movements of said supporting-plate and the needles, relative movements of said supporting-plate and said stripper, and relative movements of said stripper and said needles.

While I prefer to insert the needles into a pool of coloring fluid after having been thrust through the work, still it is not essential in all forms of my invention that the plunging occur at this precise point in the operation or, so far as certain features of the invention are concerned, that coloring fluid be supplied by the process above explained. When using the term "ink" or "coloring fluid", I mean to include any suitable liquid, paste, paint, or other coloring-matter in any form or of any consistency. The ink may either be free in a trough or vat or be contained in a sponge or mass of felt or other material placed in said trough or in any other suitable receptacle.

It will be seen in the present form of the invention that the needles are detachable from the marking-machine independently of the ink vessel, whereby I greatly facilitate the operation of substituting one set of types for another. It will also be seen that the strippers are likewise detachable independently of the ink vessel. It will also be perceived that the level of the ink-pool in the trough below the needles may be altered at any time by varying the height of the reservoir 85 and that after the latter is adjusted the height of the ink in said pool is maintained automatically, so that the proper quantity may be always supplied to the needles, and that in this instance the relative adjustment of the two ink vessels 33 and 85 determines mechanically the height of the pool in the former, although it may be otherwise mechanically determined within the scope of my invention. It will also be noted that the springs 83 oppose the downward movement of the draw-bars 23, which conjointly carry

the needle-head 19 and are operated by the transverse shaft 48 through the cams and the bearers 51, said springs hence tending to return said parts to normal position; that by having below the work-table the proper devices for operating the needle-head freedom of action is secured for the workman, thus facilitating the operation of the machine, and that manually-controlled means are provided for maintaining connection between the power-driven friction-wheel 49 and the forcing-head 19.

While one valuable feature of my invention resides in the capacity of the machine to perforate and mark or print a large quantity of sheets or a thick mass of material at one stroke, still it will be understood that it may be used for perforating and marking a single sheet or article. The sharp corners of the three-sided spear-points readily puncture the fabric and open a passage for the cylindrical needle-shanks.

Many variations in construction, operation, and method beside those herebefore alluded to may be resorted to within the scope of my invention, and portions of my improvements may be used without others.

Having described my invention, I claim—

1. A movable needle-type consisting of a right-angled shank, and a series of parallel sharp-pointed needles projecting from the end of the shank and grouped in the form of a letter or character; each of said needles having a three-sided spear-point and a longitudinal ink-groove.

2. A font of movable needle-types each consisting of a shank, and a series of needles projecting from the end thereof; said needles being grouped in the form of a letter or character, the width of which approximates the width of said shank, so that a series of such needle-types may be assembled compactly to form a word; each of said needles having a three-sided spear-point and also having an ink-retaining groove.

3. In combination, a movable stripping needle-type consisting of a shank, a group of needles projecting therefrom and a stripper having a sliding engagement with said shank.

4. In combination, a movable stripping needle-type consisting of a shank and a group of needles projecting therefrom a stripper-plate perforated to receive said needles, and a sleeve mounted upon said shank and having at one end said stripper-plate.

5. In combination, a movable stripping needle-type consisting of a shank and a group of needles projecting therefrom a stripper-plate perforated to receive said needles, and a sleeve mounted upon said shank and having at one end said stripper-plate, said shank being right-angled in cross-section and said sleeve fitting closely thereon.

6. In combination, a movable stripping needle-type consisting of a shank having a group of needles projecting from its end, and a device telescoping upon said shank and locked thereto and having at one end a stripper-plate adapted for the passage of said needles.

7. In combination, a movable stripping needle-type consisting of a body and a series of needles projecting therefrom, and a stripper having a nick.

8. In combination, a movable stripping needle-type comprising a shank having a nick and a series of needles projecting therefrom, and a stripper having a nick.

9. In combination, a movable stripping needle-type consisting of a right-angled shank, a series of needles projecting therefrom, and a device telescoping said shank and having at one end a stripper-plate through which said needles may move; a nick in one side of said shank, and a nick in the same side of said telescoping device.

10. In combination, a movable needle-type consisting of a right-angled shank and a series of needles projecting therefrom; a device telescoping said shank and having at one end a stripper-plate through which said needles may move; a nick in one side of said shank, and a nick in the same side of said telescoping device; and means for locking said telescopic device to said shank.

11. In combination, a movable needle-type consisting of a right-angled shank and a series of needles projecting therefrom; a device telescoping said shank and having a stripping-plate for said needles; said telescoping device having a longitudinal slot and said shank having a locking-pin projecting into said slot; and one at least of said shank and telescopic elements having a nick.

12. In combination, shank 4 having near one end a nick 11, needles inserted in the end of said shank, sleeve 5 telescoping upon said shank and having a nick 12, stripping-plate 9 in one end of said sleeve and having perforations 10 adapted to said needles, slot 6 in said sleeve, and locking-pin 7 seated in hole 8 in said shank and projecting into said slot.

13. A movable stripper for use in combination with a needle group, said stripper having perforations grouped to form a letter or character, and also having a nick or the like, whereby it may be set or composed upon a key or support side by side with other strippers.

14. A needle-stripper consisting of a sleeve or tube having a stripping block or plate in one end and a nick in one side.

15. A needle-stripper consisting of a right-angled sleeve or tube having a perforated stripping-plate in one end and near its other end a nick.

16. A needle-stripper consisting of a sleeve or tube, and a plate or block in one

end thereof having perforations grouped in the form of a letter or character, and having means whereby it may be assembled side by side with other strippers upon a common carrier.

17. In combination, a movable stripping needle-logotype consisting of a shank and a system of needles projecting therefrom and grouped in the form of a plurality of letters or characters, a stripper-plate perforated to receive said needles, and a sleeve loose upon said shank and having said stripper-plate at one end.

18. In combination, a movable stripping needle-logotype consisting of a shank and a system of needles projecting therefrom and grouped in the form of a plurality of letters or characters, a stripper-plate perforated to receive said needles, a sleeve loose upon said shank and having said stripper-plate at one end, a nick in said shank, and a nick in said sleeve.

19. A movable platen-section 37 adapted for use in a perforating-machine, a rabbet upon its opposite edges at 36, said section having a system of perforations therein grouped in the form of a plurality of letters or characters.

20. A perforating and marking machine having a head which is keyed for receiving a series of movable needles each having a three-sided spear-point and an ink-retaining means, said machine also including means for supplying ink to the needles automatically.

21. In a perforating-machine, the combination with a work-table of a head having a seat for a series of movable needle-types each needle being provided with a spear-point and ink-retainer, means for effecting a relative movement of said head and said work-table, and means for supplying ink automatically to said needle-types.

22. In a perforating-machine, the combination with a forcing-head having a key or spline and adapted to reciprocate a row of needle-types placed side by side and engaging said spline the needles of each type having a spear-point, of means for moving said forcing-head so as to thrust the needles through the work, and means for supplying ink automatically to said needle-types.

23. In a perforating-machine, the combination of a forcing-head having a key or spline, a series of movable needle-types having jogs whereby they are held upon said key or spline the needles having three-sided spear-points and ink-retainers, means for moving and guiding said forcing-head, and means for supplying ink automatically to said needle-types.

24. The combination of a series of movable needle-types, strippers for said types, a forcing-head, a stripper-support, and a work-support, said stripper-support including

means for guiding said series of movable needle-types while in operative relation to said forcing-head; and also comprising means for effecting a relative movement of said forcing-head and said stripper-support, and also a relative movement between said work-support and each of said stripper-support and forcing-head elements.

25. In a perforating-machine, the combination of a work-table; a head having means for supporting needle-types and strippers the needles of each type having three-sided spear-points and ink-retaining means; a forcing-head having means for operating the types independently of the strippers; means for moving said stripper and type-holder away from said table; and means for moving said forcing-head independently of both said table and said stripper and type-holder.

26. In a perforating-machine, the combination of a forcing-head having a key or spline, a series of movable needle-types having jogs whereby they are held upon said key or spline, means for moving and guiding said forcing-head, stripping means moving with said forcing-head so as to clamp the work and then remaining stationary during the remainder of the advance movement of said forcing-head, and an ink-holder entered by the needle-types during the movement of said forcing-head.

27. A perforating-machine, having a compound head, the parts of said head being relatively movable, one part of said head being fitted for supporting and clamping the stripper portions of a series of movable stripping needle-types assembled therein, and the other part of said head being fitted to bear upon the needle-carrying portions of said needle-types so as to thrust the needles through the work while said stripper portions clamp the work.

28. A perforating-machine having a head, a series of movable stripping needle-types therein and a head which operates independently portions of said types; said heads being relatively movable.

29. A perforating-machine having a head provided with a key and clamp, a series of movable stripping needle-types having sleeves which are engaged by said key, said machine also having a head provided with a key cooperating with the shanks of such needle-types, said heads being relatively movable.

30. A perforating-machine having a head fitted to receive a series of needle-types and spacing blocks or quadrats, so that said types may be properly spaced in said head, and also having a head fitted to bear upon all of said types regardless of their order or position in the first head, and cause their needles to penetrate the work.

31. The combination with a series of mov-

able stripping needle-types of a work-clamping head and a forcing-head, the stripping portions of said types being justified in said clamping-head, which causes said stripper

portions to clamp the work; and said forcing-head controlling the needle-bearing bodies of the types.

32. The combination with a series of telescopic movable stripping needle-types, each consisting of a needle-holding shank and a stripper-holding sleeve, of a work-clamping head having a key or spline adapted to nicks formed in said slides, and a forcing-head adapted to bear upon the ends of said shanks opposite to said needles and also having a key or spline adapted to nicks in said shanks.

33. In a perforating-machine, the combination of a work-clamping head, a series of movable stripping needle-types justified and locked therein, and each consisting of a needle-bearing shank and a stripper-ended sleeve; and a forcing-head mounted so as to bear upon the portions of said shanks which project from said sleeves, so as to thrust the needles through the work while the latter is being clamped by the ends of said stripper-sleeves.

34. In a perforating-machine, the combination of a work-table; a work-clamping head supported over said table and consisting principally of a recessed bar; a key or spline extending along said bar; a series of movable telescopic stripping needle-types each consisting principally of a needle-bearing shank and a stripping-sleeve, and each of said sleeves having a nick fitting upon said key or spline; spacing blocks or quadrats also nicked so as to fit upon said key or spline and flush with the ends of said stripper-sleeves at the working ends of the latter; said spacing blocks or quadrats justifying said needle-types in said recess, a bar for locking or clamping said types and spacing-blocks against said bar; a forcing-head supported above said work-clamping head so that the under surface of the latter bears upon the upper ends of said type-shanks; a key or spline upon said forcing-head adapted to nicks in said shanks; and means for causing said work-clamping head to clamp said strippers upon the work and said forcing-head to thrust the needles through the work after the latter is clamped.

35. In a perforating-machine, the combination of a head, a series of movable needle-types each provided with a stripper portion which is fitted to said head, and each also having a body and a series of needles carried by said body, a forcing-head for operating said needle-carrying bodies, and a spring tending to separate said heads.

36. The combination of a series of movable needle-types each provided with a stripper, a head in which said strippers with their types are fitted, an independently-movable

forcing-head for operating upon said types, and compression-springs working between said heads at their ends and tending to separate said heads.

37. The combination of a series of movable needle-types each provided with a stripper, a head in which said strippers with their types are fitted, an independently-movable forcing-head for operating upon said types, and means fixed to one of said heads for guiding the other thereof.

38. The combination of a series of movable needle-types each provided with a stripper, a head in which said strippers with their types are fitted, an independently-movable forcing-head for operating upon said types, and rods fixed upon the ends of said forcing-head and passing through guiding-perforations in the ends of said stripper-head.

39. The combination of a series of movable needle-types each provided with a stripper, a head in which said strippers with their types are fitted, an independently-movable forcing-head for operating upon said types, rods fixed to the ends of said forcing-head and passing through guiding-perforations in the ends of said stripper-head; means acting upon said rods for operating said forcing-head; and springs tending to separate said heads.

40. In a perforating-machine, the combination with a work-table of a head placed over said table and fitted for receiving the stripper portions of a series of movable stripping needle-types, a forcing-head placed over said stripper-head, rods fixed in said forcing-head and extending down through said stripper-head and said table, means below said table for moving said rods longitudinally, and a spring operating between said stripper-head and said forcing-head.

41. The combination of a series of needle-types each provided with a stripper, a head in which said strippers with their types are fitted, and a head for forcing said types; said heads being relatively movable.

42. In a perforating-machine, the combination with a forcing-head and a series of movable needle-types acting therewith of an independent head having a series of distinct and independent strippers each adapted to one of said types, a work-table, and means for causing said stripper-head to clamp the work.

43. The combination of a series of movable needle-types each provided with a stripper, a stripper-head in which said strippers are fitted, a forcing-head adapted to control said types, a work-table, a spring for causing said stripper-head to clamp the work, and means for enabling said forcing-head to thrust the needles into the work.

44. The combination of a series of needle-types each provided with a stripper, a head in which said strippers are fitted, a forcing-

head adapted to control said types, means tending to separate said heads, means for limiting the separation of said heads, a work-table, and means for effecting relative movements of said forcing-head, said stripper-head and said work-table.

45. In a perforating-machine, the combination of a work-table, a forcing-head, a series of needle-types connected thereto, a stripper-head a series of independent strippers clamped thereon and adapted to said needle-types, means for moving said forcing-head, and means for pressing said stripper-head upon the work.

46. In combination, a work-table provided with a seat upon which may be adjusted a perforated plate, and also having an opening bridged by said plate; a head to which is fitted a detachable stripper; a head upon which is supported the body of a needle-type; said seat and said head being so constructed that the needles may be brought into register with the perforations in both stripper and plate; yielding means for clamping the work between the stripper and the plate; and means for effecting a relative movement of the work and the needle-head so as to force the needles through the work.

47. In a perforating-machine, the combination with a work-table, of a head having a seat for a series of movable needle-types, the needles thereof each being provided with ink-retainers, means for effecting a relative movement of said head and said work-table, and means upon said work-table for securing a series of movable platen-sections, and means for supplying ink to the needle-types.

48. In a perforating-machine, the combination of a head, means for supporting a series of movable needle-types in operative relation to said head, a work-support, means for moving said head so as to force the needles through the work, an opening in said work-table beneath said type-supporting means, and grooves upon opposite sides of said opening for receiving the top and bottom edges of a series of movable perforated platen-sections.

49. A perforating-machine comprising a forcing-head, a stripper-support, and a work-support; means being provided for supporting a series of movable needle-types in operative relation to said forcing-head the needles thereof each being provided with ink-retainers; and said machine also comprising means for effecting a relative movement of said forcing-head and said stripper-support, and also a relative movement between said work-support and each of said stripper and forcing-head elements; said work-table having means for rigidly holding a detachable platen having perforations in register with the needles in said forcing-head.

50. In a perforating-machine, the combi-

nation of a work-support; a stripper-holder; a forcing-head having means for operating a plurality of movable needle-types; means for moving said stripper-holder toward and away from said table; means for moving said forcing-head independently of both said table and said stripper-holder; an opening in said table beneath said stripper-holder; grooves upon opposite sides of said opening for receiving a perforated work-supporting device; and means at the ends of said opening for locking said work-supporting device.

51. The combination with a series of needle-types, each provided with a stripper, of a double head, the portions whereof are relatively movable; the stripper portions of said types being clamped within one portion of said head, and the other portion of said head being fitted to bear upon the needle-carrying bodies of said needle-types, so as to force the needles through the work, while said stripper portions clamp the work; and a perforated support upon which the work is clamped.

52. A perforating-machine having a head in which is supported portions of a series of movable stripping needle-types, and also having a head which operates other portions of the same types, said heads being relatively movable; and a frame in which is supported a series of platen-sections having perforations corresponding to the grouping of the needles upon the needle-types.

53. The combination with a series of shanked needle-types, each provided with a stripper-sleeve, of a head provided with a key to which said stripper-sleeves are fitted, and also with means for clamping the sleeves, a head provided with a key for coöperating with the shanks of said needle-types, and a series of platen-sections secured below said sleeves and each perforated to match the overlying needle-type.

54. In a perforating-machine, the combination of a work-clamping head; a series of movable stripping needle-types justified and locked therein, and each consisting of a needle-carrying shank and a stripper-ended sleeve; a forcing-head mounted so as to bear upon the portions of said shanks which project from said sleeves so as to force the needles through the work while the latter is being clamped by said stripper-sleeves; and a series of movable perforated platen-sections upon which the work is clamped.

55. A movable perforating and inking type consisting of a body and a series of parallel needles projecting therefrom and grouped in the form of a letter or character, each of said needles being provided with a three-sided spear-point and an ink-retaining opening.

56. A movable perforating and inking type consisting of a body having a nick and a series of parallel needles projecting from said body and grouped in the form of a letter or

character, each of said needles being provided with a three-sided spear-point and an ink-retaining channel.

57. A movable perforating and inking type consisting of a right-angled shank having a nick in one of its sides, and a series of parallel needles projecting from the end of the shank and grouped in the form of a letter or character, each of said needles having a three-sided spear-point and at its point a longitudinal ink groove or channel.

58. A movable perforating and inking type consisting of a shank and a series of needles projecting from the end thereof and grouped in the form of a letter or character, and provided with a stripping-plate perforated for the passage of said needles, each of said needles having a three-sided spear-point and an ink-retaining formation.

59. In combination, a perforated stripper attached to a movable needle-type, said needle-type consisting of a body and a series of needles projecting therefrom; said needles and stripper being relatively movable, and each of said needles having a three-sided spear-point and an ink-channel near its point.

60. In combination a group of needles each having a lateral ink-holding groove and a three-sided spear-point; a device for holding a supply of ink; a stripper; a work-holder; and means for effecting relative movements of said needle group, said ink-holder, said stripper, and said work-holder.

61. In combination, a group of needles each having a three-sided spear-point and an ink-channel; an ink-receptacle; means for dipping the points of said needles into said receptacle so as to supply ink to their grooves; a stripper; and a work-holder.

62. In combination, a group of needles each having a three-sided spear-point and an ink-channel; an ink-receptacle; a stripper; a perforated work-holder; means for clamping the work between said stripper and said work-holder; and means for forcing the needles through the work and through said stripper and work-holder and causing the needles to dip into said receptacle.

63. In combination, a group of needles each provided with a three-sided spear-point and an ink-channel; a stripper; a perforated work-holder; means for causing said stripper to clamp the work upon said work-holder; an ink-receptacle below said work-holder; and means for thrusting the needles through said stripper, said work and said work-holder and into said receptacle.

64. In combination, a series of needles grouped in the form of a letter or character and each provided with a three-sided spear-point and a longitudinal ink-holding groove; a stripper provided with perforations and correspondingly grouped; means for holding

ink; and means for causing the ink to be supplied to said needles.

65. As a means for perforating and marking a thick package of sheets, the combination of a series of needles each being provided with a three-sided spear-point grouped in the form of a letter or character, a stripper conforming to said needle group, and means below said stripper for inking the needles.

66. As a means for perforating and marking a pack of sheets, the combination of a series of needles each being provided with a three-sided spear-point grouped in the form of a letter or character, a support for the sheets, said support being penetrable by said needles, and inking means; said support being arranged between said needles and said inking means.

67. As a means for perforating and marking a pack of sheets, the combination of a series of needles each being provided with a three-sided spear-point grouped in the form of a letter or character; a stripper conforming to said needle group; a support for the sheets, said support being penetrable by the needles; and means for inking the needles; said support intervening between said stripper and said inking means.

68. As a means for perforating and marking a pack of sheets, the combination of a series of needles each being provided with a three-sided spear-point grouped in the form of a letter or character; a stripper conforming to said needle group; a support for the sheets, said support being penetrable by the needles; means for inking the needles; said support intervening between said stripper and said inking means; and means for clamping the sheets between said stripper and said support.

69. The combination of a series of needles each having a three-sided spear-point and grouped in the form of a letter or character; a stripper; a support for a package of sheets, said support being penetrable by said needles; and an ink vessel beneath said support.

70. The combination of a series of needles each having a three-sided spear-point and grouped in the form of a letter or character; a stripper perforated to conform to said needles; a plate for supporting a pack of sheets, said plate being likewise perforated; and an ink vessel beneath said plate.

71. The combination of a group of needles; each having a three-sided spear-point and a stripper; a perforated work-supporting plate; an ink-holder; and means for effecting relative movements of said supporting-plate and said needle group, relative movements of said supporting-plate and said stripper, and relative movements of said stripper and said needle group.

72. The combination of a group of needles; each having a three-sided spear-point and a

stripper; a perforated work-supporting plate; an ink-holder; and means for causing said stripper to clamp the work upon said supporting-plate and said needles to pass through the work and supporting-plate and into said ink-holder.

73. The combination of a group of needles; each having a three-sided spear-point and a stripper; a work-supporting table; a perforated plate substantially flush with said table; an ink-receptacle below said plate; and means for causing said stripper to clamp the work and said needles to pass through said plate and into said receptacle.

74. In a perforating and marking machine, the combination of means fitted for carrying a detachable needle-type having needles provided with spear-points and ink-retaining means and a detachable stripper; a device fitted for holding in place a detachable platen or work-support; and an ink-receptacle.

75. A perforating and marking machine having a detachable needle-type having needles provided with spear-points and ink-retaining means, a detachable plate for supporting the work, said plate being perforated in conformity with said needle-type, and an ink-receptacle.

76. In a marking-machine, the combination with means for detachably holding a needle-type having needles provided with spear-points and ink-retaining means and a cooperative stripper above the work, of a work-table having means for detachably securing a perforated plate in operative position relatively to the needle-type, so that the needles upon passing through the work may penetrate said plate; said table having an opening bridged by said plate; and an ink vessel supported below said opening.

77. In a marking-machine, the combination with a head and a group of needles supported thereby each having three-sided spear-points and ink-retaining means, of a work-table; a plate fixed thereon and having perforations in conformity with the grouping of the needles in said head; and an ink vessel.

78. In a marking-machine, the combination with a head and a group of needles supported thereby each having three-sided spear-points and ink-retaining means, of a work-table; a plate fixed thereon and having perforations in conformity with the grouping of the needles in said head; means above said plate for clamping the work thereon; and an ink vessel below said plate.

79. In a marking-machine, the combination with a head and a group of needles supported thereby each having three-sided spear-points and ink-retaining means, of a work-table; a plate fixed thereon and having perforations in conformity with the grouping of the needles in said head; means above said plate for clamping the work thereon, said clamping means having perforations regis-

tering with the perforations in said plates; and an ink-holder entered by the needles after passing through said plate.

80. In a marking-machine, the combination with a work-table, of a head having a seat for a series of movable needle-types the needles whereof are each provided with three-sided spear-points and ink-retaining means; means for effecting a relative movement of said head and said work-table; means upon said work-table for receiving a series of movable platen-sections; and means for supplying ink to the needle-types.

81. In a marking-machine, the combination of a head; means for supporting a series of movable needle-types in operative relation to said head; a work-support; means for moving said head so as to force the needles through the work; an opening in said work-table beneath said type-supporting means; and an ink-receptacle having opposite grooves for receiving the top and bottom edges of a series of movable perforated platen-sections.

82. In a marking-machine, the combination of a work-support; a stripper-holder; a forcing-head having means for operating a plurality of movable needle-types; means for moving said stripper-holder toward and away from said table; means for moving said forcing-head independently of both said table and said stripper-holder; an opening in said table beneath said stripper-holder; an ink-receptacle below said opening; grooves upon opposite sides of said opening for receiving a penetrable work-supporting device; and means at the ends of said opening for locking said work-supporting device.

83. In a marking-machine, the combination with a work-table of a head having a seat for a series of movable needle-types the needles whereof are each provided with ink-retaining means and three-sided spear-points; means for effecting a relative movement of said head and said work-table; stripping means adapted to said needle-types; a penetrable work-support or platen placed beneath said stripping means; an ink vessel; and means for causing said needles to penetrate the work and enter said vessel.

84. In a marking-machine, the combination of a forcing-head having a key or spline; a series of movable needle-types the needles whereof are each provided with three-sided spear-points and which types have jogs whereby they are held upon said key or spline; means for moving and guiding said forcing-head; stripping means first moving with said forcing-head, so as to clamp the work, and then remaining stationary during the remainder of the advance movement of said forcing-head; a perforated plate upon which the work is clamped; and an ink vessel covered by said perforated plate.

85. In a marking-machine, the combina-

- tion of a head; means for supporting a series of movable needle-types the needles whereof are each provided with three-sided spear-points and ink-retaining means, and which types are in operative relation to said head; a perforated work-support; a supply of ink below said support; means for moving said head so as to force the needles through the work; and coöperative stripping means.
86. A marking-machine having a double head, the portions of said head being relatively movable, one portion being fitted for supporting and clamping the stripper portions of a series of needle-types the needles whereof are each provided with three-sided spear-points and ink-retaining means, and the other portion being fitted to bear upon the needle-carrying portions of said needle-types, so as to force the needles through the work, while said stripper portions clamp the work; a perforated support upon which the work is clamped; and means beneath said support for supplying the needles with ink.
87. A marking-machine having a head in which is supported portions of a series of movable stripping needle-types each needle whereof is provided with a three-sided spear-point, and also having a head which operates other portions of said types, said heads being relatively movable; and an ink vessel over which is supported a series of plates having perforations corresponding to the grouping of the needles upon the needle-types.
88. In a marking-machine, the combination of a clamping-head; a series of movable stripping needle-types justified and locked therein, and each consisting of a needle-containing shank and a stripper-ended sleeve; a forcing-head mounted so as to bear upon the portions of said shanks which project from said sleeves, so as to force the needles through the work while the latter is being clamped by said stripper-sleeves; a series of movable perforated platen-sections upon which the work is clamped; and an ink vessel covered by said sections.
89. In a marking-machine, the combination of means for supporting a package of sheets; a vessel for containing ink; a series of needles each having a three-sided spear-point and means for drawing ink from said vessel; said supporting means being penetrable by said needles; and means for thrusting the needles through the work and through said supporting means.
90. In a perforating and marking machine, the combination of an open vessel for containing a pool of ink or coloring liquid; a group of needles normally withdrawn from said vessel; and means for dipping the points of said needles into said vessel; said needles being provided with spear-points and ink-retaining means.
91. In a perforating and marking machine, the combination of similarly-perforated plates; means for clamping sheets between said plates; a group of needles provided with spear-points and ink-retaining means; a vessel for holding a pool of ink; and means for moving said needles through said plates and through the work and also causing said needles to dip their points into said vessel.
92. In a marking-machine, the combination of a group of needles having spear-points and ink-retainers; an ink vessel; means independent of said ink vessel for detachably retaining said needle group, so that it may be removed from or replaced in the machine independently of said ink vessel; and means for effecting a relative movement of said needles and said ink vessel so as to supply ink to the needles.
93. In a marking-machine, the combination of a detachable group of needles having spear-points and ink-retainers; an ink vessel; a detachable stripper; said needle group and stripper being detachable independently of said ink vessel; and means for producing relative movements of said needle group and said ink vessel.
94. In a marking-machine, the combination of a detachable group of needles having spear-points and ink-retainers; an ink vessel; a detachable stripper; said needle group and stripper being detachable independently of said ink vessel; a perforated work-holder; means for clamping the work between said stripper and said work-holder; and means for thrusting said needles through the work and also causing them to dip into said ink vessel.
95. A marking-machine having a type-head adapted to receive a series of movable needle-types each needle thereof having a three-sided spear-point and ink-retainer and supported by its ends in operative relation to a work-table; said table having means for supporting movable perforated plates, and also being provided with an ink vessel below said plates.
96. In a marking-machine, the combination with a head fitted for receiving movable needle-types each needle thereof having a spear-point and ink-retainer, of a work-table having both an ink-receptacle and also means above said receptacle fitted for receiving movable perforated work-supporting sections.
97. In a marking-machine, the combination with a work-table, of a head mounted thereover and fitted for receiving movable needle-types each needle thereof having a spear-point and ink-retainer, means for supporting a detachable perforated platen flush with said table; an ink-receptacle below said platen; and means for depressing said type-head.
98. In a perforating-machine, the combination with means for detachably holding a needle-type the needles whereof are each pro-

vided with spear-points and ink-retainers and a coöperative stripper above the work, of a work-table having means for detachably securing a perforated plate in operative position relatively to the needle-type; so that the needles passing through the work may penetrate said plate; and an ink vessel beneath said opening.

99. In a perforating-machine, the combination with a head and a group of needles supported thereby each having three-sided spear-points and ink-retainers, of a work-table; a plate fixed thereon and having perforations corresponding to the grouping of the needles in said head; and an ink-holding device covered by said plate.

100. In a perforating-machine, the combination with a head and a group of needles supported thereby, of a work-table; a plate fixed thereon, and having perforations corresponding to the grouping of the needles in said head; means above said plate for clamping the work thereon; an ink-trough below said plate; and means for supplying ink to said trough.

101. In a perforating-machine, the combination with a head and a group of needles supported thereby, of a work-table; a plate fixed thereon and having perforations corresponding to the grouping of the needles in said head; means above said plate for clamping the work thereon, said clamping means having perforations registering with the perforations in said plate; a trough below said plate; a pipe leading to said trough; and an ink-receptacle opening into said pipe.

102. In a perforating-machine, the combination of a work-table; a trough supported beneath said table; longitudinal grooves in the upper edges of said trough; a perforated plate adjustable in said grooves and substantially flush with said table; a group of needles above said plate; and means for depressing said needles through said plate and into said trough.

103. In a perforating-machine, the combination of a work-support; a stripper-holder; a forcing-head having means for operating a plurality of movable needle-types; means for moving said stripper-holder toward and away from said table; means for moving said forcing-head independently of both said table and said stripper-holder; an opening in said table beneath said stripper-holder; grooves upon opposite sides of said opening for receiving a work-supporting device; means at the ends of said opening for locking said work-supporting device; and an ink-trough below said plates.

104. A perforating-machine having a double head, the portions of said head being relatively movable, one portion being fitted for supporting and locking the stripper portions of a series of needle-types, and the other portion being fitted to bear upon the needle-

bearing bodies of said needle-types, so as to force the needles through the work while said stripper portions clamp the work; a perforated support upon which the work is clamped; an ink-receptacle below said perforated support; and means for feeding ink into said receptacle.

105. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for causing said needles to be supplied with ink from said receptacle; a reservoir from which ink is supplied to said receptacle; and means for maintaining the level of the ink in said receptacle.

106. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for dipping said needles into said receptacle; a reservoir communicating with said receptacle; an aperture in the top of said reservoir adapted to receive a funnel or nozzle; and an air-inlet, as 90.

107. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for inking said needles from said receptacle; a reservoir communicating with said receptacle; a nozzle or funnel dipping into said reservoir; and a supply-bottle inverted upon said nozzle or funnel.

108. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for inking said needles from said receptacle; and means for varying the relative heights of said receptacle and said reservoir.

109. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for inking said needles from said receptacle; and means for adjusting said reservoir to different levels.

110. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for inking said needles from said receptacle; a reservoir; a flexible pipe connecting said receptacle to said reservoir; and means for adjusting said reservoir so as to vary the level of the ink in said receptacle.

111. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for determining mechanically the height of ink in said receptacle; and means for inking said needles from said receptacle.

112. In a marking-machine, the combination of a group of needles each having an ink-channel; an ink-receptacle; means for dipping said needles into said receptacle; and means for determining mechanically the height of ink in said receptacle.

113. In a marking-machine, the combination with a group of needles and means for operating them, of an ink-receptacle; a flexible pipe connected thereto; a reservoir com-

communicating with said pipe; a device whereon said reservoir is supported; and a screw for adjusting said reservoir to different heights upon said supporting device.

114. In a marking-machine, the combination with a group of needles and means for operating them, of an ink-receptacle; a flexible pipe 84 connected thereto; a reservoir 85 communicating with said pipe; a bracket 71 upon which said reservoir is mounted; a guide 93 upon said bracket; a device 92 upon said reservoir fitted to said guide; a stem 94 upon said reservoir; and a screw 96 threaded into said bracket and supporting said stem.

115. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; means for inking said needles from said receptacle; a reservoir communicating with said receptacle; means for adjusting said reservoir to different levels; and means for draining ink from said reservoir.

116. In a marking-machine, the combination of a device for holding a group of needles; an ink-receptacle; a reservoir communicating with said receptacle; means for adjusting said reservoir to different levels; and means for cutting off communication between said receptacle and said reservoir; and means for draining ink from said reservoir.

117. In a marking-machine, the combination with a group of needles and means for operating them, of an ink-receptacle; an adjustable reservoir communicating with said receptacle; a nozzle dipping into said reservoir; and a bottle inverted upon said nozzle.

118. In a marking-machine, the combination with a group of needles and means for operating them, of an ink-receptacle; an adjustable reservoir communicating with said receptacle; a funnel dipping into said reservoir; a bottle inverted upon said nozzle; and a stop-cock 98 in said nozzle.

119. In a marking-machine, the combination with a group of needles and a device for holding ink, of means for automatically supplying ink to said ink-holding device; and means for effecting relative movement of said needle group and said ink-holding device.

120. In a marking-machine, the combination with a group of needles and a vessel for holding ink, of means for automatically supplying ink to said vessel, and means for causing said needles to take ink from said vessel.

121. In a marking-machine, the combination with means for perforating fabric of an ink-receptacle; means for supplying ink from said receptacle to the perforations produced in said fabric; and means for automatically maintaining the level of ink in said receptacle.

122. In a marking-machine, the combination of a group of needles; a perforated work-holder; a stripper; means for clamping the work between said stripper and said holder;

an ink vessel below said work-holder; means for carrying said needles down through said stripper, said work, and said work-holder into said vessel; and means for automatically maintaining the level of ink in said vessel.

123. In a marking-machine, the combination of a group of needles; a stripper; a work-table; means for enabling said stripper to clamp packs of paper of different thicknesses; an ink-receptacle; means for enabling said needles to dip into said receptacle; means for determining mechanically the height of ink in said receptacle; and means for automatically maintaining the level at any determined height.

124. In a perforating-machine, the combination of a detachable needle group; a detachable stripper; a frame having a work-table; a pair of draw-bars mounted to slide vertically in said frame and extending below said work-table; means conjointly carried by said draw-bars for securing said detachable needle group and said detachable stripper; a transverse operating-shaft mounted in said framework; and connections between said shaft and said draw-bars.

125. In a perforating-machine, the combination of a frame having a work-table; a pair of draw-bars mounted in said frame and extending below said work-table; a forcing-head conjointly carried by said draw-bars; a stripper-head yieldingly connected to said forcing-head and guided upon said draw-bars; means for forcing said draw-bars down; and a spring opposing the downward movement of said draw-bars.

126. In a perforating-machine, the combination with a group of needles each having three-sided spear-points and ink-retaining means, of power-driven manually-controlled means for forcing said needles gradually through the work.

127. In a perforating-machine, the combination with a group of needles and a forcing-head, of a power-driven friction-wheel, and a manually-controlled means for maintaining connection between said friction-wheel and said forcing-head.

128. In a perforating-machine, the combination with a group of needles and a forcing-head, of a power-driven friction-wheel, and a manually-controlled lever for maintaining said clutch in operative engagement with said friction-wheel.

129. In a perforating-machine, the combination with a group of needles and a forcing-head, of a power-driven friction-wheel, a shoe contiguous to said wheel, a lever whereon said shoe is mounted, and a manually-controlled lever connected to said shoe-lever.

130. In a perforating-machine, the combination with a group of needles and a forcing-head, of a power-driven friction-ring, shoes adapted to fit the inner and outer peripheries of said ring, a lever whereon said shoes are

mounted, a manually-controlled lever, and a link connecting said levers.

131. In a perforating-machine, the combination with a group of needles and a forcing-head, of a power-driven friction-wheel, a radius-arm whose axis is concentric with said wheel, a lever mounted upon the outer end of said radius-arm, a shoe mounted on said lever, and a manually-controlled lever also mounted on said radius-arm and connected to said shoe-lever.

132. In a perforating-machine, the combination with a group of needles and a forcing-head, of a power-driven friction-wheel, a radius-arm whose axis is concentric with said wheel; means for frictionally connecting said radius-arm to said wheel, a cam operated by said radius-arm, and means for enabling said cam to operate said forcing-head.

133. In a perforating-machine, the combination with a group of needles and a forcing-head, of a radius-arm whose axis is concentric with said wheel, means for frictionally connecting said radius-arm to said wheel, a cam operated by said radius-arm, means for enabling said cam to operate said forcing-head, and springs opposing operating of said radius-arm and said forcing-head.

134. In a perforating-machine, the combination with a group of needles and a forcing-head, of a stripper yieldingly connected to said forcing-head; a cam operatively associated with said forcing-head; a power-driven friction-wheel; and manually-controlled means for connecting said friction-wheel with said cam; the latter having a quick-working face for clamping said stripper upon the work, and a slow-working face for forcing said needles through the work.

135. In a marking-machine, the combination of a work-support; a group of needles; a forcing-head; a stripper yieldingly connected to said forcing-head; an ink-receptacle below said work-support; a cam for operating said forcing-head; a power-driven friction-wheel; and means for connecting said friction-wheel with said cam, the latter having a quick-working face for clamping said stripper upon the work, a slow-working face for forcing said needles through the work, and a quick-working face for dipping said needles into the ink.

136. In a marking-machine, the combination of a work-support; a group of needles; a forcing-head; a stripper yieldingly connected to said forcing-head; an ink-receptacle below said work-support; a cam operatively associated with said forcing-head and having

a quick-working face for clamping said stripper upon the work, a slow-working face for forcing said needles through the work, and a quick-working face for dipping said needles into the ink.

137. In a marking-machine, the combination of a work-support; a group of needles; a forcing-head; a stripper yieldingly connected to said forcing-head; draw-bars conjointly acting upon said forcing-head; bearers upon said draw-bars, a transverse shaft; cams mounted upon said shaft and acting upon said bearers; and means for operating said shaft.

138. In a marking-machine, the combination of a work-support; a group of needles; a forcing-head; a stripper yieldingly connected to said forcing-head; draw-bars conjointly acting upon said forcing-head; bearers upon said draw-bars; a transverse shaft; cams mounted upon said shaft and acting upon said bearers; means for operating said shaft; and springs for returning said bearers and forcing-head to normal position.

139. In a marking-machine, the combination of a work-support; a group of needles; a forcing-head; a stripper yieldingly connected to said forcing-head; draw-bars conjointly acting upon said forcing-head; bearers upon said draw-bars; a transverse shaft; cams mounted upon said shaft and acting upon said bearers; a radius-arm upon said shaft; a power-driven friction-wheel; and manually-controlled means for maintaining frictional connection between said radius-arm and said friction-wheel.

140. In a marking-machine, the combination of a work-support; a group of needles; a forcing-head; a stripper yieldingly connected to said forcing-head; draw-bars conjointly acting upon said forcing-head; bearers upon said draw-bars, a transverse shaft; cams mounted upon said shaft and acting upon said bearers; a radius-arm upon said shaft; a friction-wheel; power-driven movement-reducing gears for operating said wheel; a radius-arm upon said shaft; a lever upon said radius-arm; shoes upon said lever; a manually-controlled lever also mounted upon said radius-arm; a link connecting said levers; a returning-spring for said rock-shaft; returning-springs for said draw-bars; and a returning-spring for said radius-arm.

W. H. HUDSON.

Witnesses:

B. C. STICKNEY,
FRED. J. DOLE.