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EDGE STRAIGHTENING TOOL

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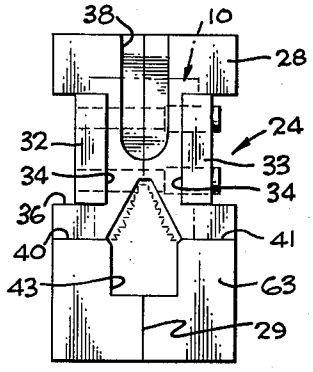
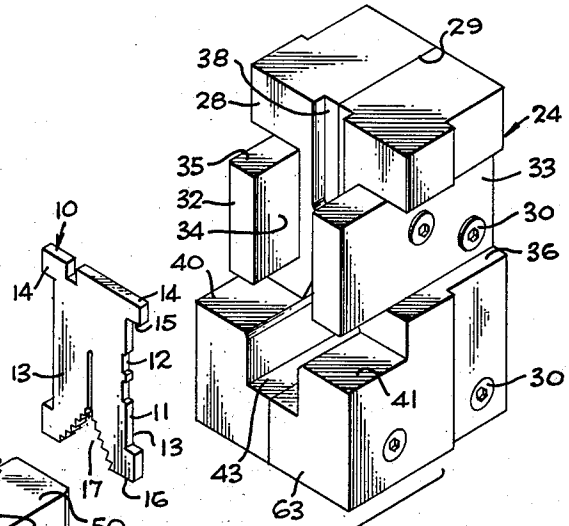


Fig. 2



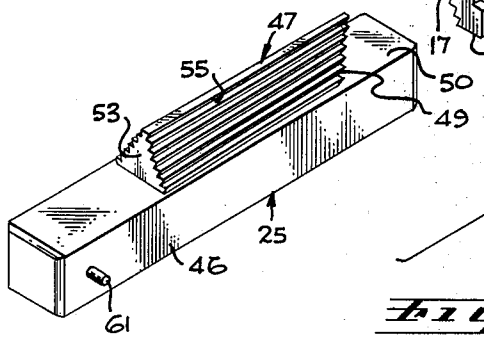


Fig. 1

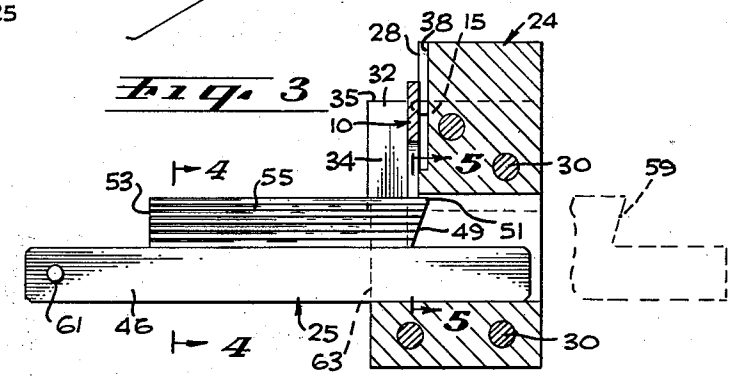


Fig. 3

Fig. 4

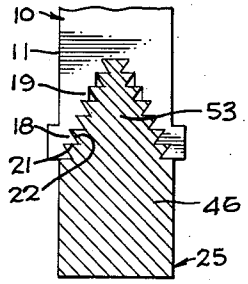
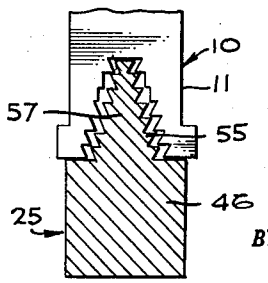


Fig. 5



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EDGE STRAIGHTENING TOOL

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This invention relates to a tool for straightening deformed edges of a plate and is especially well suited for straightening the teeth of matrixes used in a linotype machine.

As is well known by those familiar with linotype machines, such machines employ matrixes in the form of brass plates each of which has an intaglio of a letter to be produced in relief on a slug to be cast by the machine. The machine assembles the matrixes in a line and carries them to a mold where the line-of-type, or slug, is cast. The matrixes are then carried by an elevator to a distributor or sorter bar along which they are moved until directly over their respective channels in a magazine into which they drop from the bar for selection and assembly into another line of type. The distributor bar has longitudinal ribs to which the matrixes cling by their teeth, the ribs having breaks or discontinuances and each of the matrixes having a selected number of its teeth shortened, such that the permutations of discontinuances and short teeth provide for sorting the matrixes into groups of a common letter each. If a matrix has been damaged as by its teeth being nicked or bent, it will not slide smoothly, if at all, along the distributor bar and it may not drop off from the bar at its proper channel in the magazine. I would judge that of the number of matrixes ordinarily discarded because of damage in one form or another, about one-third are faulty because the teeth are bent.

It is an object of this invention to provide a tool by which matrixes having bent teeth may be easily and quickly straightened for use.

Another object is to provide a tool of the above-mentioned character which is simple and rugged in construction, easy to manipulate, reliable in service, and economical to manufacture.

Further objects and advantages of the invention will appear in the course of the following part of this specification wherein the details of construction and mode of operation of a preferred embodiment of a tool of this invention are described with reference to the accompanying drawing, in which:

FIG. 1 is an exploded view of the tool in perspective showing the die and broach parts of the tool in separated relationship and a matrix between the separated parts;

FIG. 2 is a front elevational view of the tool die as it appears in FIG. 1, and showing a matrix in position to be straightened;

FIG. 3 is a central vertical section through the tool; and,

FIGS. 4 and 5 are schematic representations of the broach part and complementary recess of the matrix, the broach part being shown in cross-section taken upon planes indicated by lines 4—4 and 5—5, respectively, on FIG. 3.

Referring to the drawing in greater detail and with the use of reference numerals, a conventional matrix for a linotype machine is shown and designated generally by reference numeral 10. It is a brass plate having in a front edge 11 thereof an engraved impression 12 of a letter in intaglio for forming a corresponding letter in relief on a slug to be cast as a line-of-type from an assemblage or row of matrixes. The matrix has opposite side faces 13, four end extensions 14 defining inside shoulders 15, and end edge 16, and a recess 17 extending inwardly from and being open at the end edge 16. Recess 17 is of generally V-shape and is defined by a plurality of teeth some of which are designated by numeral 18 and others by numeral 19. The illustrated matrix has seven teeth on each side of its V-shape recess 17 and these may be described in detail as each having a tread surface 21 and a riser surface 22 which extend in respective planes normal to the plane of the matrix plate. The riser surface of the five regular teeth 18 on each side of the recess are undercut and the riser surfaces of the two shortened teeth 19 on each side of the recess extend at right angles to their respective tread surfaces.

As is well known by those familiar with linotype machines, the matrixes are designed to slide along a distributor bar of the machine, the bar having a plurality of longitudinal extending ribs into which the teeth of the matrixes fit. The ribs of the distributor bar are interrupted or discontinued at selected places such that, as a consequence of the permutations of rib discontinuances and combinations of regular teeth 18 and shortened teeth 19, the matrixes are sorted into groups of common letters each, by dropping from the distributor bar into respective channels of the magazine of the machine.

The matrixes become damaged in various ways, damage to the teeth occurring from being bent slightly transversely of the plane of the matrix plate or from being bent in a way such that the pointed ends of the teeth extend in directions slightly inwardly or outwardly of the recess 17. When the teeth are bent in any of these fashions the matrixes will not slide smoothly, if at all, on the distributor bar of the linotype machine and they will drop off from the distributor bar prior to reaching their assigned magazine channels and sometimes will pass by their drop-off places. Unless the damaged matrixes are straightened, they must be discarded.

The tools of this invention are designed to straighten bent or distorted teeth of linotype matrixes. The illustrated embodiment of this invention comprises a body or die 24 and a broaching implement 25. The die 24 has a flat surface 28 upon which the matrix 10 is seated for performing a teeth-straightening operation. For simplicity in forming the die, it may be constructed as complementary half portions indicated by the medial line of separation at 29 in FIG. 1. The two half portions of the die are secured together as by a plurality of bolts 30. There are two standards 32 and 33 extending out from the flat surface 28, these presenting parallel inside faces 34 for snugly receiving the matrix between them with the inside shoulders 15 of the matrix fitting snugly against respective end faces 35 of the standards whereby the standards hold the matrix against movement when seated upon the flat surface 28. For convenience in construction, the standards may be formed as plates which are secured by certain of the fasteners 30 in side recesses 36. A groove 38 in the flat surface 28 permits an operator to insert a tool, e.g. a screw driver, under the matrix to lift the matrix out from between the standards 32 and 33 upon completion of a straightening operation. Shoulders 40 and 41 on the die complement the holding function of the standards, these shoulders being engageable by the end edge 16 of the matrix.

The die 24 has an opening 43 extending therethrough for slidably receiving the broaching implement 25. Such opening 43 is cylindrical and of a cross-section corresponding to that of the broaching implement to snugly accommodate sliding of the broaching implement into and out from the die.

Referring now to the details of construction of the illustrated broaching implement 25, it comprises a cylindrical rod 46, here of rectangular cross-section, and an integral broaching portion 47 formed preferably of tool steel. The broaching portion 47 is of generally triangular cross-section conforming to the shape of the recess 17 of the matrix. An end face 49 at the forward or entering end of the broaching portion extends at an acute angle

from an inside surface **50** of the entering end portion of the rod **46**, such that the vertex **51** of the broach enters the apex of the V-recess of the matrix to guide the broach into accurate alignment with the recess. The opposite or trailing end face of the broach is designated by reference numeral **53**. The broach **47** has a plurality of longitudinal ribs **55** extending on its two exposed sides from end to end thereof. These ribs are of a number and size to mate tightly against respective teeth of a matrix having all regular (undercut) teeth **18**, a matrix of that species being known as a pi-mat. It is appropriate to note further than the ribs **55** on the broach **47** are similar to but slightly larger in cross-section than those on the distributor of the linotype machine.

Referring to FIGURES 4 and 5 of the drawing it will be noted that the broach **47** is slightly narrower at its entering end **49** (FIGURE 5) than at the trailing end **53** (FIGURE 4). More particularly, the broach tapers slightly at its exposed sides such that the riser surfaces of the ribs fit relatively loose with respect to their corresponding riser surfaces **22** of the matrix teeth at the entering end of the broach (FIG. 5) and they wedge tightly against the riser surfaces **22** of the matrix teeth in the trailing end portion of the broach (FIG. 4). Also the altitude **57** of the triangular broach is slightly shorter at the entering end of the broach than at its trailing end, whereby the tread surfaces of the ribs **55** fit relatively loose with respect to their corresponding tread surfaces **21** of the matrix teeth at the entering end of the broach and they wedge tightly against the teeth tread surfaces at the trailing end of the broach. Thus the entering end of the broach slides easily into the recess of the matrix and tightly at its trailing end. The inwardly extended position of the broaching implement is indicated by the broken line representation **59** in FIG. 3.

Projections **61** on opposite sides of the broaching implement **25** at its trailing end constitute stop elements for engagement with a top surface **63** of the die **24** to prevent the broaching implement from dropping or being passed through the die in which case it might become damaged. The projections **61** are spaced from the trailing end face **53** of the broaching portion **47** by a distance greater than that between the stop-engagement surface **63** and the surface **28** upon which a matrix is seated, whereby when the broaching implement is passed or driven into the die to a position of its projections **61** engaging the stop surface **63**, the broaching portion **47** will have cleared the matrix and the matrix may then be easily lifted out from the die.

Assuming that the point of a matrix tooth **18** is bent transversely of the plane of the matrix plate, the planes of its riser and tread surfaces will be slightly twisted. By passing the broach through the matrix recess in one straightening operation and then reversing the matrix in the die and passing the broach through its recess again, the ribs on the broach in wedging and rubbing against the riser and tread surfaces of matrix will flatten these surfaces and straighten the tooth. Such flattening of tooth surfaces will also be effected in the case of the point of a tooth being bent inwardly or outwardly of the recess. Furthermore, any burrs on the matrix teeth will be burnished off as the broach is passed through the matrix recess. The riser surfaces of the shortened teeth **19** of the matrix **10** will not be contacted by the ribs of the broach, but these riser surfaces are not as susceptible to being damaged as are the surfaces of the teeth **18** inasmuch as the riser surfaces of teeth **19** extend at right angles from their respective tread surfaces and they are adequately recessed to prevent engagement with the ribs of the distributor bar.

While the invention has herein been shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having thus described the invention what is claimed as new in support of Letters Patent is:

1. A broaching tool for straightening the edge surface of a flat plate in which said edge surface is originally straight and normal to the plane of the plate, the tool comprising a die and a broaching implement, the die having a flat surface for seating the plate in the die, means for engaging the plate to hold it on said flat surface against turning in the plane of said flat surface, a cylindrical opening in the die extending normal to said flat surface, the broaching implement having a cylindrical guide rod portion snugly slidable in said die opening, a broach on the implement spaced from said plate-holding means by a distance such that the broach will rub against said edge surface as the implement is passed into the die opening, the broach tapering outwardly from its entering end to its trailing end so as to wedge tightly against said edge surface as the broach passes against the said edge surface.

2. A tool for straightening matrixes of the class in which the matrix is a metal plate having a plurality of teeth defining the sides of an open recess in the matrix by which the matrix clings to and is slidably along a distributor bar of a linotype machine, the tool comprising a die and a broaching implement, the die having a flat surface upon which the matrix may be seated, means for engaging the matrix to hold the matrix against movement on said flat surface, and having a cylindrical opening extending normal to said flat surface for slidably receiving said implement, the broaching implement having a cylindrical rod portion slidable axially in the die opening, a broach portion having an entering end and a trailing end and being of a shape in cross-section to correspond and mate with the recess of the linotype matrix, the broach portion having a plurality of longitudinally extending ribs on its outside surfaces conforming in number to that of the matrix teeth, and the broach portion increasing in cross-section from its entering end to its trailing end such that the entering end of the broach will loosely enter the recess of the matrix and the trailing end will fit tight in the recess of the matrix to press the teeth of the matrix back into the general plane of the matrix.

3. A tool according to claim 2 in which the plane of the entering end surface of the broaching portion is inclined to extend at its vertex forwardly of its base.

4. A tool according to claim 2 in which said die has a stop surface spaced above said flat surface, said rod portion having a stop proximate its trailing end for engagement with said stop surface of the die to prevent passage of the broaching implement entirely through said die opening, and said stop on the broaching implement being spaced from the trailing end of said broach portion by a distance greater than the space between said stop surface and said flat surface, whereby the broach portion will pass entirely through said matrix before said stop engages said stop surface.

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