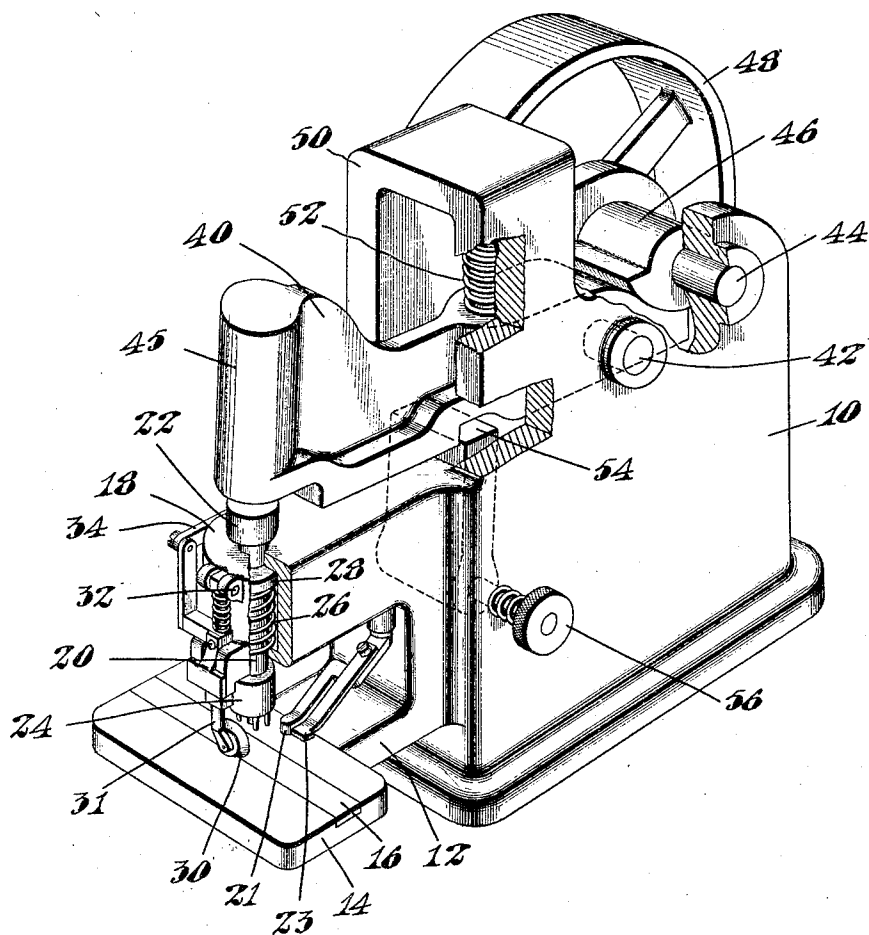


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E. E. WINKLEY
PERFORATING MACHINE
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PERFORATING MACHINE

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This invention relates to machines for perforating sheet material such, for example, as the upper leather and linings used in the manufacture of boots and shoes.

5 In machines of this type as heretofore constructed, the tubular perforating or cutting tool is driven through the work and, in order to secure clean cutting, its edge is forced under heavy pressure against or into the material of the work support. Particularly in 10 cutting fibrous materials such as leather and textile sheet material, of which the fabric linings of shoe uppers are made, is it difficult to secure clean cutting without subjecting 15 the edge of the tool to a pressure which unfavorably affects the life of the tool and subjects the machine to strain and to excessive friction in its moving parts. In the attempt to alleviate these conditions, a strip of backing material of paper or soft metal interposed between the work support and the work is employed in one type of perforating machine. The cutting edge of the tool penetrates the work and enters the backing, and 25 after each operation the backing strip is advanced to present a fresh surface. This expedient is satisfactory in securing clean cutting but necessitates additional mechanism for handling the backing.

30 I have discovered that clean cutting in perforating machines may be secured without excessive pressure or the use of a backing by actuating the tool to strike a sharp cutting blow upon the work so that full advantage is taken of the inertia of the work 35 and the cutting operation effected before the fibres of the work have time to be displaced or compressed by the advancing edge of the tool. In one of its aspects, therefore, the present invention consists in a perforating or cutting machine having a cooperating work support and edged tool arranged for relative movement terminated 40 definitely by a stop at the point of surface contact, in combination with means for imparting a percussional or hammer blow to one of them. A stop of some sort is an essential element of the combination, necessary in order to protect the edge of the tool from 45 being driven into the material of the work

support. The stop is arranged to arrest the travel of the moving member independently of the contact of the work support and tool and just as the cutting edge of the tool and support make surface contact. In such a 55 construction, it is desirable that the moving member be of relatively small inertia in order that it may be rapidly accelerated under the impact of the hammer member and also that its movement may be arrested without 60 undue strain to the machine.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof, selected for purposes of 65 illustration and shown in the accompanying drawing, in which the single figure is a view in perspective of a perforating machine showing certain parts broken away.

My invention is illustrated as embodied in 70 a perforating machine of the bench type, having a frame 10 with parallel side walls, a lower forwardly-extending arm 12 carrying the work support and an upper forwardly-extending arm 18 carrying the perforat- 75 ing tool. The work support comprises a flat plate 14 upon which the work to be perforated may be spread and which is supported clear of the bench so that the sides of an upper, for example, may be passed beneath it 80 in perforating the same. A strip 16 of hardened steel or other suitable material is inserted in the plate 14 flush with the surface thereof.

The perforating tool comprises a plunger 85 20 mounted for vertical movement in bearings formed in the forward end of the arm 18. Preferably, the plunger is tubular for the sake of lightness and provided at its upper end with a solid cap or head 22, which 90 serves to receive the impact of the actuating hammer and also positively to limit the downward movement of the plunger by engaging the upper surface of the arm 18 which is accurately machined for that purpose. 95 The plunger 20 is provided with an intermediate collar or stop 28 which is fixed to the plunger and the latter is surrounded by a compression spring 26 which, acting upon the collar 28, serves normally to maintain the 100

plunger in elevated position with head or stop 22 spaced from the surface of the arm 18. At its lower end, the plunger 20 is provided with a replaceable head 24 in which are set one or more tubular punches of the design which it is desired to use.

A shaft 44 is journaled in the frame 10 and provided at one end outside the frame with a driving pulley 48, to which power may be applied. On the shaft 44 within the frame is a drop cam 46 which acts on the rear end of a hammer member 40 which is pivoted between its ends on a transverse shaft 42 extending between the sides of the frame. The forward arm of the hammer member 40 merges into a solid cylindrical head 45 of considerable mass and inertia. The head 45 is raised by the action of the cam upon the rear end of the hammer and, when released, is impelled downwardly by gravity and by a compression spring 52 interposed between the hammer member and a housing 50 extending upwardly from the frame 10. A pivoted locking piece 54 is provided beneath the hammer 40 for the purpose of locking the hammer in its upper position and rendering it inoperative when desired. An operating stud projects through the frame from the locking piece 54 and is provided with a knurled head 56. As shown in the drawings, the locking piece 54 is in an inoperative position in which its upper end passes freely into a depression in the lower surface of the hammer as the latter is oscillated. When the locking piece 54 is swung forwardly, its upper end is carried out of the depression in the hammer, and it acts as a solid abutment beneath the hammer holding it in the position to which it is moved by the highest portion of the drop cam.

The machine is shown as provided with a roller presser foot 30 of usual type, carried by a rod 31 pivoted upon the transverse pin 32 between ears projecting forwardly from the arm 18. Treadle connections including a lever 34 are provided for lifting the presser foot to facilitate presentation or removal of the work. An edge gauge 21 having a hold-down spring 23 is also provided to assist the operator in controlling the progress of the work through the machine.

In using the machine, the operator presents the work upon the work supporting plate 14 and advances it progressively beneath the perforating tool either by hand or automatically with the assistance of feeding mechanism of any well-known type. Preferably, the machine is equipped with a clutch of the single revolution type, so that upon each depression of the treadle the hammer 40 is given a single oscillation and brought to rest in an elevated initial position corresponding to that shown in the drawing. As will be apparent, the hammer imparts to the tool a sharp blow and, on account of its mass

and inertia, develops a substantial amount of kinetic energy which results in imparting to the tool the velocity of a projectile, so that it is driven into the work with a sharp cutting blow. The stop 22, however, is so designed as positively to arrest the travel of the tool at that point in which the cutting edge of the perforating tool makes surface contact with the strip 16. The result is that not only is the work cleanly perforated but the sharp edge of the punch is not driven into the work support and is not depended upon in any way to arrest the movement of the tool since the movement of the tool is stopped just as the cutting edge of the punch makes surface contact with a hard anvil. Accordingly, the cutting edges of the punch may be more keenly sharpened and, if desired, made of more highly tempered steel than has been found practical heretofore in machines wherein the compressive strength of the cutting edge is subjected to this additional duty of arresting the movement of the parts.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine for perforating shoe materials having, in combination, a frame, a work support carried thereby, a sharp-edged tubular cutting tool guided for vertical reciprocation in the frame, a stop on the tool engaging the frame positively to terminate movement of the tool with its cutting edge in parallel relation to the work support, a spring for moving the tool to space the stop from the frame, and a spring-impelled hammer arranged to be raised and suddenly released to strike a sharp blow upon the tool, movement of the tool by the hammer being limited by engagement of said stop with the frame just as the cutting edge of the tool makes surface contact with a hard anvil.

2. In a machine for perforating shoe materials, in combination, a rigid frame, a work support having a non-yieldable work-engaging surface carried thereby, a perforating tool of relatively small inertia guided for reciprocation in the frame, a rigid stop on the frame engaged by a portion of the tool for limiting movement thereof, the tool being positioned away from the stop during the operation of the machine, a momentum member of relatively great inertia, and spring means for imparting a high velocity to said member to cause it to drive said tool with a sharp cutting blow through the work, movement of the tool by the momentum member being limited by said stop to surface contact between its cutting edge and the non-yieldable work engaging surface of its work support.

In testimony whereof I have signed my name to this specification.

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