July 26, 1955 A. J. HARTLEY 2,713,905

PERFORATING DEVICE

Filed Feb. 8, 1952

FIG. 1.

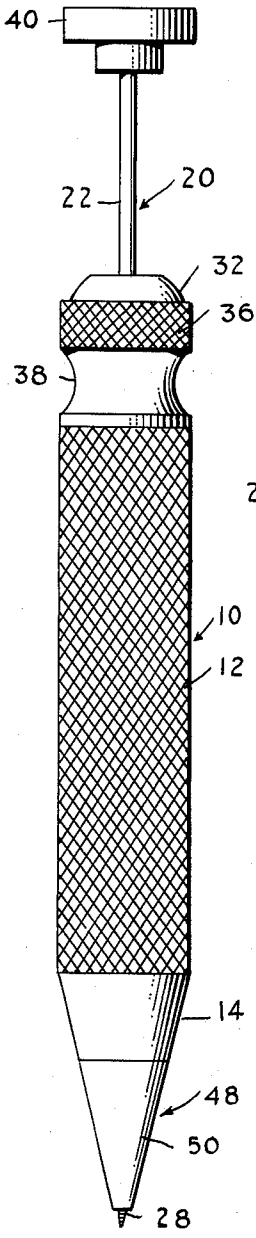


FIG. 2.

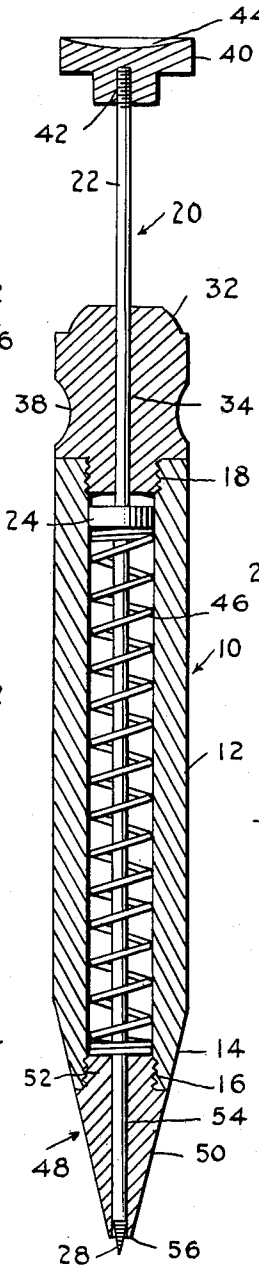


FIG. 3.

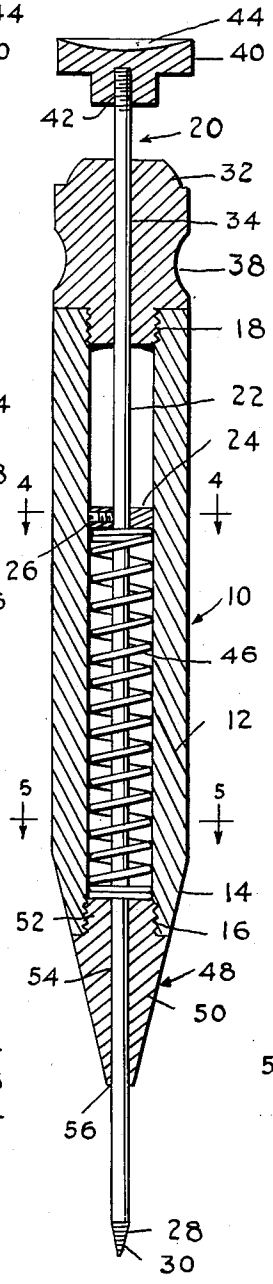


FIG. 4.

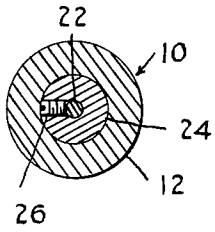


FIG. 5.

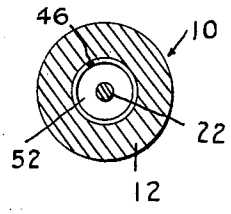
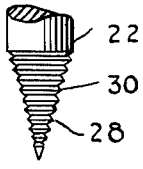


FIG. 6.



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PERFORATING DEVICE

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1 Claim. (Cl. 164—119)

This invention relates to devices for forming perforations in paper or other thin sheets of material. More particularly, the invention is a perforating device of the type stated adapted to be held in the hand, and designed particularly for making correction perforations in master rolls used on mechanical typewriter units, such as those of the vacuum-operated type.

Vacuum-operated typewriter equipment of the character referred to is provided with master rolls of specially treated paper. These are formed with a plurality of small perforations for the several letters of the alphabet. The perforation of the master rolls, in this connection, is accomplished through the use of large perforating machines. After the rolls have been perforated by said machines, they are placed upon an automatic typing machine unit, and are then run over the vacuum bar of the unit. The vacuum bar is provided with a plurality of small apertures, and these cause the typewriter attached to the unit to type those letters of the alphabet corresponding to the perforations formed in the master roll, said perforations of the master roll permitting a vacuum condition to occur within the track or vacuum bar.

During the operation of cutting the master rolls on the perforating machines, mistakes will inevitably be made by the operator, which mistakes cannot be corrected by the machine, but must be corrected by hand. Thus, in the correction of the mistakes made, some of the perforations must be closed, and in other locations upon the master roll, new perforations must be made.

Heretofore, to my knowledge, the only method in use for forming new perforations in the master roll after the roll has been initially perforated by machine involves the use of a simple hand-operated punch. This is pressed against and twisted within the roll at the desired location.

This method of correcting mistakes or otherwise altering a master roll is a slow process and results in soreness of the palm of the hand when a considerable number of perforations are to be cut. Additionally, this method of correcting the master roll by hand produces inaccuracies, in that the perforations are not always located at the exact point required to produce good operation of the automatic typing machines. Said inaccuracies result, it should be noted, because the present method requires that the location to be perforated be first marked with a pencil or similar object.

In view of the above, it is the broad object of the present invention to provide a perforating device adapted to be held in the hand, which device will be adapted to be readily located at the exact point desired and which will, when so located, operate by a self-contained power to form the desired perforations.

Another important object is to provide a device of the character stated which can be operated with far greater speed than the hand punch conventionally used, and which, though increasing to a substantial extent the number of perforations formed in a specified amount of time, will be operable with maximum ease and facility, without discomfort so far as the user is concerned.

A still further important object is to provide a device as described which, after cutting out a portion of the paper for the purpose of forming a perforation in said paper, will be effective to remove the cut portion, thus to prevent its being drawn into the track or vacuum bar.

Yet another important object is to provide a device as stated wherein there will be embodied a detachable cutting head, so as to permit a new cutting head to be readily substituted for an old one, after the old cutting head has become dull due to continued use over a long period of time.

Yet another important object is to provide a perforating device of the character referred to which can be manufactured at relatively low cost, and will be adapted for disassembly with minimum difficulty, for replacement or repair of the component parts thereof.

Summarized briefly, the invention includes a tubular cylinder, one end of which is provided with a detachable crank head having a circular cutting blade formed thereon. Extending through the cylinder is an elongated center guide, somewhat greater in length than the cylinder, so as to project at its opposite ends beyond the ends of the cylinder. One end of the center guide is provided with a marking point having a longitudinal series of circumferential ribs, any of which can engage under a piece of paper marked by said point for removing a cut portion after said paper has been struck by the blade of the cutting head. Interposed between the center guide and the cylinder is a spring which tends to normally urge the cylinder in the direction of the marking point, so that if one elevates the cylinder with the marking point held in position at a desired location, and then releases the cylinder, the cutting blade will be driven into the paper to form a perforation. Means is embodied, in this connection, for adjusting the tension of the spring, and also for substituting a new cutting head whenever desired.

Other objects and advantages will become apparent from a consideration of the following description in conjunction with the accompanying drawings, wherein:

Figure 1 is a side elevational view of a perforating device formed in accordance with the present invention;

Figure 2 is a longitudinal sectional view;

Figure 3 is a view similar to Figure 2, in which the cylinder has been retracted preliminary to release thereof for the purpose of forming a perforation in a master roll;

Figure 4 is a transverse sectional view taken substantially on line 4—4 of Figure 3;

Figure 5 is a transverse sectional view taken on line 5—5 of Figure 3; and

Figure 6 is a greatly enlarged side elevational view of the lower end of the center guide, showing the construction of the marking point.

Referring to the drawings in detail, the invention includes a tubular cylinder designated generally by the reference numeral **10**. The cylinder is formed with a barrel **12**, a cap attachable to the upper end of the barrel, and a cutting head detachably secured to the lower end of the barrel.

The barrel **12** is externally knurled or otherwise roughened, as shown in Figure 1, the knurling of the barrel being carried out substantially from end to end thereof.

At its lower end, the barrel is exteriorly tapered, as at **14**, said tapered lower end of the barrel being formed with internal threads **16**. In this concentration, the barrel **12** is formed with a longitudinal bore extending fully from end to end of the barrel, and of a constant diameter throughout the length of the barrel, said bore being formed with the internal threads **16** at its lower end and with internal threads **18** at its upper end.

Arranged coaxially with the cylinder **10**, and extending therethrough, is a center guide designated generally

by the reference numeral 20, said center guide including an elongated, small-diameter shank 22. Intermediate the opposite ends of the shank there is secured thereto a collar 24 disposed within and formed to a diameter to effect a sliding fit within the bore of the barrel. The collar 24 can be secured to the shank 22 in selected positions of adjustment longitudinaliy of the shank, being provided with a set screw 26 capable of being threaded through the collar against the shank at any location desired.

At its lower end, the shank 22 is formed with a conical locating and anchoring point 28, said locating and anchoring point being of needle-like formation at its lower end and being formed with a series of circumferential grooves defining longitudinally spaced circumferential ribs 30 surrounding said point.

A cap 32 constitutes a part of the cylinder 10, and is formed with a longitudinal bore 34 receiving the shank 22. The cap 32 is knurled exteriorly, as at 36 (Figure 1) and below the knurled portion of the cap, there is formed a wide finger-receiving groove 38.

Formed upon the lower end of the cap 32 (Figure 2) is a reduced, depending extension having external threads engageable with the threads 18 of the barrel 12, thus to permit the cap to be fixedly, but detachably, connected to said barrel.

A thumb rest 40 is provided as a part of the center guide 20, said thumb rest having a depending axial extension formed with a threaded socket 42 receiving the complementarily threaded upper end of the shank 22 for fixedly connecting said rest to the shank. The upper end of the rest 40 is of wide formation, and is formed with a concavity 44 adapted to receive the thumb of a user's hand.

Disposed within the bore of the barrel 12 is a coil spring 46, one end of which abuts against the collar 24, the other end of said spring abutting against the inner end of a detachable cutting head or die 48. The cutting head or die 48 constitutes a part of the cylinder 10, and is formed with a tapered body 50 that defines an extension of the tapered lower end 14 of the barrel 12.

At the upper end of the body 50 there is provided a boss 52 engaged by the lower end of the spring 46, said boss being externally threaded for engagement with the internal threads 16 of the barrel 12.

The detachable cutting head or die 48, as best shown in Figures 2 and 3, is formed with an axial bore 54 receiving the lower end portion of the shank 22. The exteriorly tapered outer surface of the body 50, in this connection, merges into the wall of the bore 54 at the lower end of said body, so as to form upon the cutting head or die an annular cutting blade 56 concentric with and surrounding the marking point 28.

By reason of the construction illustrated and described, the die 48 is mounted for movement longitudinally of the center guide 20 between positions illustrated in Figures 2 and 3, respectively.

In use, the device is held in one hand, the thumb being placed upon the rest 40 and the cap 32 being gripped between the index and second fingers of the hand. As a first step, the user applies the anchoring point to the master roll or sheet to mark the spot at which the correction perforation is to be cut. Thereafter, a length of wood or similar material is placed under the master roll or sheet, and the anchoring point is pushed through the sheet and into the wood support at the marked location. With the center guide held vertically in this position, the user elevates the cylinder 10 to the position illustrated in Figure 3, and while maintaining pressure against the rest 40, releases the cylinder. As a result, the spring 46 is permitted to expand, and will drive the die in the direction of the marking point, so as to cause the cutting blade to engage and cut through the sheet and form a perforation therein at the selected location.

The piercing of the sheet by the anchoring point is effective to engage one or more of the circumferential ribs under the cut portion of the sheet or master roll, so that, after the cutting blade forms the perforation, the mere lifting of the implement from the master roll or sheet will cause the cut out portion to be removed. This prevents the cut portion from being pulled into the equipment by the vacuum when the paper travels over the track bar of the automatic typing unit during the operation thereof.

It will be readily understood that although it has been stated herein that the rest 40 is adapted to receive the thumb of a user, with the groove 38 receiving the index and second fingers of the user's hands, any method of grasping the device can be employed, according to the particular desires of the user. Thus, the user might well desire to place the thumb and second finger in position within the groove 38 of the cylinder 10, pressing the first finger or index finger against the rest 40.

It is also believed worthy of note that the device has, as an important characteristic thereof, a self-contained striking power deriving from the use of an exteriorly disposed, tubular sliding cylinder which, by the balance of its own weight and the tension of the spring, is given the correct amount of striking power to perforate the sheet and form a clean aperture therein. The device, it should be noted, is not primarily a marking or scratching tool, the center guide having as its primary purpose the guiding of the surrounding die to the exact location at which the sheet is to be perforated, and having also the important function of picking up the portion cut from the sheet after the perforation is made.

Another important characteristic of the invention is believed to reside in the provision of a removable and replaceable cutting head or die which can be readily detached from the barrel 12 whenever the cutting blade 36 thereof becomes dull or is broken, for substitution of a new cutting head.

Still further, it is believed to be of importance that the tension of the spring 46 can be varied as desired by positioning of the collar 24 at a desired location upon the shank 22, thereby to adjust in turn the amount of striking power delivered to the die 48.

It is believed clear that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor changes in construction that may be permitted within the scope of the appended claim.

What is claimed is:

A hand implement for perforating sheet material comprising a guide shank, a locating and anchoring point carried by said shank and extending longitudinaly therefrom in axial alignment therewith for piercing the portion of a sheet to be punched out and fixing the position of said implement relative to the sheet, a series of longitudinally spaced circumferential ribs carried by and extending outwardly from said anchoring point for detachably engaging the sheet material, and a continuous cutting blade carried by the shank for movement longitudinally thereon from a retracted position in which it surrounds the shank to a projected position in which it surrounds the anchoring point in spaced relation thereto, and means carried by the guide shank and operatively engaging the cutting blade for driving the cutting blade toward and through a sheet pierced by the anchoring point to punch out a portion thereof and said ribs effective to lift the punched out portion of the sheet upon removal of the implement.

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