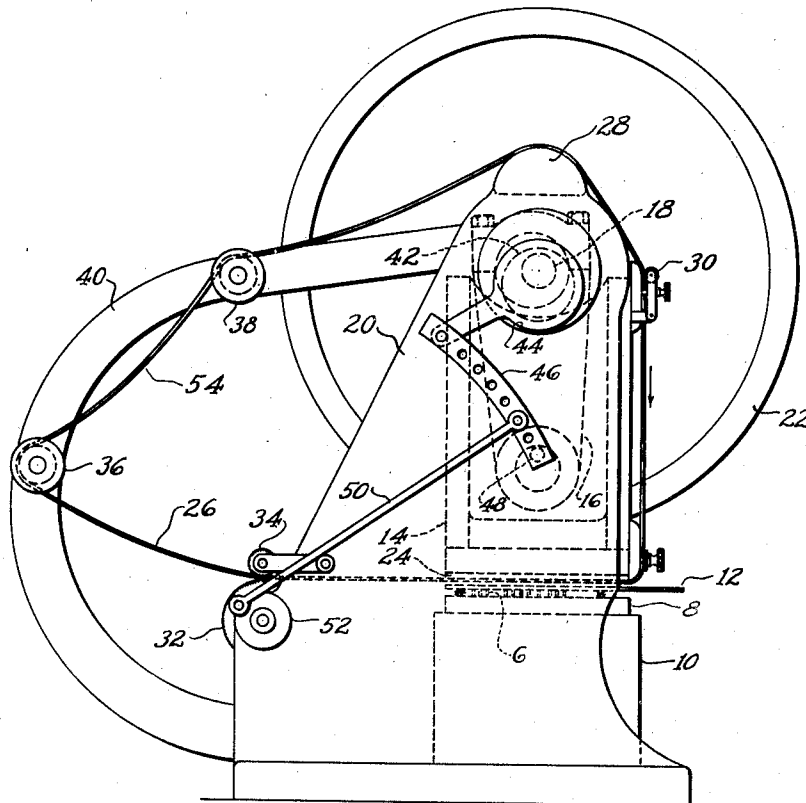


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PERFORATING MACHINE
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Witness

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PERFORATING MACHINE

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The present invention relates to perforating machines, and more particularly to improvements in machines for perforating materials such as leather and the like, for example, leather shoe uppers.

In punching the small holes which form the ornamental designs in shoe uppers and for performing similar operations in like materials, there is generally employed a machine provided with a die having sharpened tubes for perforating the work and a platen against which the die operates, one of said elements being arranged for movement toward and away from the other to cause the work to be perforated. To insure a clean cut as the die passes through the work, it is essential that the leather or other material be firmly supported, yet the support or backing must be free of any tendency to dull the cutting edges of the die when they pierce the work and partially penetrate the backing.

Accordingly, it has heretofore been the practice to employ, as a protective layer between the work and its support, a strip of paper adapted to serve as a backing material which may be partially penetrated by the die after the latter passes through the work. To insure a smooth backing surface for each piece of work, the paper is arranged in strip form, being fed over the platen or work support in step-by-step fashion from a supply roll after each punching operation.

The use of paper as a backing material is open to certain objections, however. While the paper may be repassed through the machine once or possibly twice without affecting the quality of the work done, this requires a shifting of the supply and take-up spools and a rethreading of the paper strip for each pass, with consequent shut-down of the machine. At best, the life of the paper is relatively short, requiring that a new roll must be placed in the machine at not infrequent intervals.

Another objection to the use of paper results from what is known as "picking," i. e. where the die, on passing through the work, partially cuts into the paper beneath with the result that the cut fibres or portions of the paper frequently separate from the rest of the paper after withdrawal of the die from the work, and remain in the holes in the work instead of passing out through the hollow tubes of the die along with the pill of leather cut by the die. As a result, extra time is required to clean out the holes after punching.

Accordingly, it is an object of the present in-

vention to provide, for use in leather perforating machines and the like, a backing material of improved characteristics and manner of operation, which will eliminate the "picking" problem and likewise enable a clean cut to be obtained while affording complete protection to the die.

Another object of the invention is to provide a leather perforating machine having backing material of such composition, arrangement, and manner of use as will permit the machine to be operated without attention to the backing material for substantially longer periods of time than has heretofore been possible with the conventional paper backing strips.

With these objects in view, there is provided in accordance with the invention a backing material composed of rubber compounded with a substantial quantity of a fibrous filler, a mineral fiber such as unwoven asbestos fiber having been found particularly well adapted for the purposes of the invention. The material may be sheeted out in strips of substantially the same widths and thicknesses as the paper which it supplants, but in view of its superior qualities as compared with paper, a relatively short length of the new material is fully equivalent in durability of several long lengths or rolls of the usual paper backing strips. As a result, it has been found that the material may be successfully used in the form of a short belt, the ends of a strip being joined to make an endless belt for repeated passages through the machine without attention on the part of the operator during the life of the belt.

The backing material of the invention is illustrated in the figure of the drawing in its endless belt form as employed on a perforating machine of conventional construction and arrangement. It is to be understood that the drawing and the accompanying description are by way of illustration only, and in no way are to be taken as a limitation of the features of the invention to embodiment in a particular machine.

The machine shown in the figure of the drawing is of a type commonly employed in punching the small holes forming the ornamental design in fancy shoe uppers, the die comprising a plurality of sharpened steel tubes 6 mounted in a block 8 on a support or anvil 10. A spring-mounted plate 12 supports the leather prior to punching and clears the leather from the die thereafter.

The punching operation is performed by the usual vertically reciprocating platen 14 actuated by a link 16 from a crankshaft 18 journaled in

the top of the machine frame 29. The pulley 22 is continuously rotated from a source of power, not shown, and is connected to the crankshaft to actuate the platen through the usual one-revolution clutch which is under the control of the operator.

The lower face of the platen 14 is covered with a plate 24 of brass or other soft metal to prevent serious damage to the tubes of the die in case, through improper adjustment of the machine, the hereafter described backing material is entirely penetrated by the die during a punching operation.

Instead of the usual paper backing strip with which machines of this type are generally supplied, there is provided, in accordance with the invention, a backing strip of substantially improved qualities. This material, as in the case of the paper strip, is interposed between the work and the platen, the machine being so adjusted that the die entirely penetrates the work to insure a clean cut, yet only partially penetrates the backing strip, the edges of the die stopping short of the brass plate 24 on the platen.

The backing material of the invention is a rubber composition, compounded or "loaded" with a filler to impart firmness and resistance to cutting and indenting so as to withstand repeated punching operations. It has been found that a material having the desired qualities is provided by a compound including a substantial proportion of an unwoven fiber bonded or impregnated with a relatively small amount of rubber. For example, asbestos fiber bonded with 10% to 30% of rubber by weight has given satisfactory results. The usual vulcanizing, accelerating, and anti-oxidizing agents are included in the compounding in accordance with the conventional practice.

The superior qualities of the backing material of the invention, as compared with the paper backing, are believed due at least in part to the cohesiveness of the material, which results in substantial freedom from separation or "picking" of fragments of fibers from the body of the material even under repeated impacts and cuts from the die. The material, when sheeted out to a thinness of approximately .035 inch, of the order of that of the paper formerly employed, affords a firm support to the work to insure a clean cut, yet possess a substantially higher degree of resiliency than the relatively incompressible paper, with the result that the material directly in the path of the cutting edges of the die may yield a considerable amount before actual cutting of the material occurs. Accordingly, if the machine is so adjusted that the die passes through the work no further than necessary for proper perforating, the backing material will withstand a large number of operations per unit of area. Even where cutting of the belt surface occurs, it has been noted that upon continued use of the belt there is a tendency for the cuts to be "ironed out" under subsequent impacts of the die, a property not possessed by the paper backing strip.

While ultimately the surface of the backing material of the invention naturally tends to become uneven under the repeated impressions of the die, nevertheless the normal life consistent with high quality work is many times greater, for the same amount of strip, than the paper which it supplants. By way of illustration it has been found that in the case of a machine using nine inch wide backing, a ten foot length of the

new backing material may be deemed at least the equivalent in life of two full rolls or approximately fifty pounds of paper backing, representing about one hundred and fifty feet per roll.

As a result of such increased durability, and since the other improved qualities of the material are obtained in a thinly sheeted material in no way lacking in flexibility as compared with the paper, it has proven entirely feasible and advantageous to arrange the material in the form of a short endless belt which may be automatically advanced in step-by-step fashion by the machine after each perforating operation throughout repeated passages through the machine. As shown in the figure, the belt, indicated at 25, is arranged to pass over the top of the machine at 28 and downwardly beneath a tensioning roll 30 carried by the platen member 14 and similar to that employed on machines utilizing a paper backing strip. The belt, after passing rearwardly across the under face of the brass plate 24 carried by the platen, runs between a corrugated feed roll 32 and an idler pressure roll 34. Additional idler rolls 36 and 38 supported on a bracket 40 at the rear of the machine serve to support the remaining portions of the belt at points which permit the entire belt to be advanced readily through the machine.

The belt is advanced after each perforating operation in order to distribute the wear as evenly as possible over the entire surface of the belt, the feeding being accomplished automatically by connections substantially similar to those employed in drawing the conventional paper backing strip across the platen from the supply roll. In the machine illustrated, these connections comprise an eccentric 42 on the crankshaft 18 and an eccentric strap 44 for rocking the sector 46 with constant amplitude about its pivot 48 at the lower end thereof. A link 50 adjustable with respect to radial distance from pivot 48 connects the rocking sector with the actuating element of a one-way ratchet or clutch 52, such as the conventional Horton clutch customarily employed, through which the feed roll 32 is rotated in step-by-step manner.

In order that the belt may be quickly and conveniently placed on the machine for use, the material may be supplied in the form of a discontinuous strip which may be readily placed in position and threaded through the guides and rolls and thereafter joined to form a continuous belt. The joint may be made as indicated at 54 by skiving the ends to form a lap joint of uniform thickness, the skived surfaces being joined by a suitable quick-drying cement. The machine is then ready for operation without attention to the backing for a period of time which, with the ordinary paper backing would require a number of shut-downs for rethreading of paper, interchange of supply and take-up rolls, and replacement of fresh rolls of paper.

While it is believed that a backing belt compounded of rubber and unwoven asbestos fibers is particularly well adapted for the purposes of the invention, it is to be understood that the invention is not so limited but shall be deemed to include compounds of rubber with other fibrous substances within the scope of the appended claims.

Having thus described the invention, what is claimed is:

1. In a machine for perforating leather and the like, comprising a die, a platen, and means for moving one of said elements toward and from

the other to cause the die to penetrate the work, a backing for the work adapted to space the work from the platen and to be partially penetrated by the die when the work is pierced, said backing consisting of a strip composed of rubber compounded with a substantial proportion of unwoven fiber, and means for advancing the strip over the platen after a perforating operation.

2. In a machine for perforating leather and the like, comprising a die, a platen, and means for moving one of said elements toward and from the other to cause the die to penetrate the work, a backing for the work adapted to space the work from the platen and to be partially penetrated by the die when the work is pierced, said backing consisting of a strip composed of unwoven fiber impregnated with rubber, said strip being joined at its ends to form an endless belt, and means for advancing the belt over the platen after each perforating operation.

3. In a machine for perforating leather and the like, comprising a die, a platen, and means for moving one of said elements toward and from the other to cause the die to penetrate the work, a backing for the work adapted to space the work from the platen and to be partially penetrated by the die when the work is pierced, said backing consisting of a thin strip composed of unwoven asbestos fiber impregnated with rubber, said strip being arranged in an endless belt for repeated passages through the machine, and means for advancing a portion of the belt over the platen after each perforating operation.

4. In a machine for perforating leather and the like, comprising a die, a platen, and means

for moving one of said elements toward and from the other to cause the die to penetrate the work, a backing for the work adapted to space the work from the platen and to be partially penetrated by the die when the work is pierced, said backing consisting of a strip composed of unwoven asbestos fiber impregnated with rubber, the amount of rubber being under 30% by weight of the whole, and means for advancing the strip over the platen after a perforating operation.

5. A backing belt for use in leather perforating machines between the work and the platen thereof and adapted to be partially penetrated by the die during perforating, said backing belt consisting of a thinly sheeted strip compounded of rubber loaded with a substantial proportion of unwoven fiber.

6. A backing belt for use in leather perforating machines between the work and the platen thereof and adapted to be partially penetrated by the die during perforating, said backing belt consisting of a thinly sheeted strip compounded of rubber loaded with a substantial proportion of asbestos fiber, said strip having its ends adapted to be joined after placing the belt on the machine to form an endless belt of backing for continuous passage through the machine.

7. A backing belt for use in leather perforating machines between the work and the platen thereof and adapted to be partially penetrated by the die during perforating, said backing belt consisting of a strip compounded of rubber loaded with a substantial proportion of unwoven fiber, said strip being of the order of .035 inch in thickness.

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