

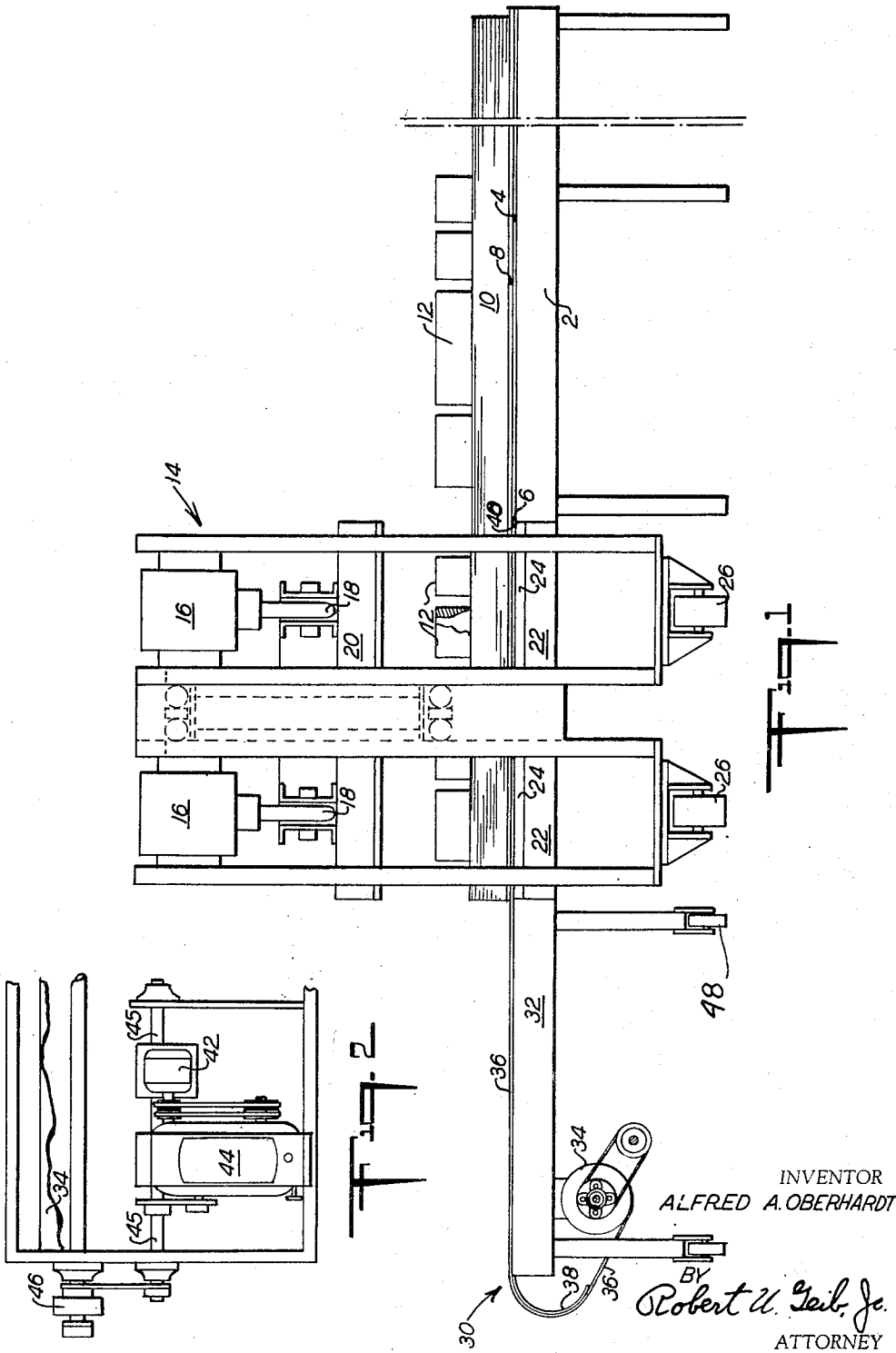
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PORTABLE DIE CUTTING AND WORK FEEDING APPARATUS

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PORTABLE DIE CUTTING AND WORK
FEEDING APPARATUS

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3 Claims. (Cl. 164—20)

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This invention relates to die cutting, and more particularly to a novel apparatus for die cutting superposed layers of cloth.

Heretofore, in the garment industry, for example, it has been customary to cut components of garments from superposed layers of cloth with hand-operated knives which are rotated or reciprocated by an electric motor. Such methods necessitate the employment of highly skilled operators and are also objectionable in that they are quite time-consuming.

It is among the objects of the present invention to die cut superposed layers of cloth, particularly for wearing apparel, in a manner which is not only rapid and accurate, but which eliminates the necessity for truly skilled labor.

Another object of the present invention is to provide a die cutting apparatus which is of comparatively simple construction, can be built at relatively low cost, and is capable of operating at high efficiency in quantity production.

Another object is to provide an apparatus of the aforementioned type which is capable of applying very high pressures, so that it will cut easily and cleanly through a larger number of layers of cloth or the like.

The invention, then, comprises the features hereinafter fully described and as particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative of but one of a number of ways in which the principles of the invention may be employed.

In said drawings:

Figure 1 is a side elevation of a die cutting apparatus which has been constructed in accordance with the teachings of the present invention; and

Figure 2 is an enlarged elevational view of a portion of the showing of Figure 1, the same comprising a reeling device by means of which the material to be worked, together with the die elements, are moved into the pressure-applying means.

The apparatus

Referring more particularly to the drawings, the numeral 2 designates an elongate table which may acceptably be of the type such as are commonly used in the cutting rooms of the garment industry. Tables of this type are most frequently of great length and of extremely sturdy construction capable of holding many superposed layers of cloth.

The present invention contemplates the employment of a large number of such tables which

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may, if desired, be in side-by-side relationship, but only one of which is, in the interests of simplicity, shown in the accompanying drawings.

Upon each of the said tables 2 there is disposed a strip of flexible belting 4 of substantially the same length and width; for example, 60 feet long and 5 feet wide.

At one end (i. e., the left-hand end as viewed in Figure 1), the strip of flexible belting 4 is provided with a transverse connector strip 6, such as in the nature of a flattened coil spring.

Upon this strip of flexible belting 4, there is disposed a strip 8 of cardboard which is of substantially the same length and width, the said cardboard being, for example, $\frac{1}{8}$ inch in thickness.

According to the teachings of the present invention, upon this cardboard strip 8 there is placed a large number of superposed layers of cloth 10 of substantially the same length and width; and a large number of die elements 12 are disposed on top of the upper surface of the layers of cloth 10 with their cutting edges in contact therewith.

According to one embodiment, at each 25 square foot area of the superposed layers 10 of cloth, there may be arranged a sufficient number of die elements 12 to form all of the components of a complete garment; for example, a man's shirt or underwear. In such an instance, then, the layers of cloth 10 and their superposed die elements 12 might, with a 60-foot table 2, be prearranged at 25 square foot areas for twelve consecutive die cuttings, the manner of which will be later described.

Referring still to Figure 1 of the drawings, a portable heavy duty pressure-applying apparatus is shown as being disposed at the left-hand of the elongate table 2, the same being generally designated at 14.

This portable heavy duty pressure-applying apparatus 14 may, if desired, be of the type which is disclosed in my co-pending patent application, Serial No. 327,607. That is, it may acceptably be made up of a substantially rectangular framework of heavy structural members, the upper portion of which carries a plurality of vertically disposed fluid-actuated cylinders 16, the pistons 18 of which extend downwardly and are connected to a vertically reciprocable platen 20 of substantial area; for example, 25 square feet.

The supply and exhaust pipes for the fluid cylinders 16 by which the power medium is admitted to either end and escapes from the other,

and the valves for said pipes, are not shown nor further described herein, the same being well understood by those skilled in the art.

The lower portion of the heavy duty pressure-applying apparatus 14 carries a rigid foundation 22 upon which there is disposed a pressure-receiving bed 24 which may be made up of pieces of strong, thick and smooth timbers laid side by side and extending over the same area as the platen 20.

The upper surface of the pressure-receiving bed 24 is adapted for alignment with the top of the elongate table 2.

The bottom of the heavy duty pressure-applying apparatus 14 is provided with suitable caster wheels 26 by means of which it may be easily moved from one cloth receiving table 2 to another, for reasons which will appear hereinafter.

Disposed at the left-hand side of the heavy duty pressure-applying apparatus 14 (as viewed in Figure 1) there is a portable material advancing apparatus which is generally designated at 30.

This portable material advancing apparatus 30 is shown as comprising a substantially rectangular framework of sturdy structural members, and is provided with an upper surface 32 which is adapted for alignment with the upper surfaces of the pressure-receiving bed 24 and, accordingly, the top of the elongate table 2.

Disposed beneath its upper surface 32, the portable material advancing apparatus 30 carries a rotatable cylindrical reel or wrapping roll 34, to which there is attached one end of a strip of flexible belting 36. The other end of the strip of flexible belting 36 passes over a curved guide 38 and onto, and over the upper surface 32 of the portable material advancing apparatus 30 and through the portable heavy duty pressure-applying apparatus 14, passing between the platen 20 and pressure-receiving bed 24 of the latter.

This free end of the strip of flexible belting 36 carries a transverse connector strip 40 which is similar to, and is adapted to intermesh with, the transverse connector strip 6 of the strip of flexible belting 4 on the elongate table 2. These transverse and intermeshed connector strips 6 and 40 of the strips of flexible belting 4 and 36, respectively, are connected together in any suitable manner; for example, by a rod or wire (not shown) which is inserted therethrough.

The portable material advancing apparatus 30 also carries an electric motor 42 which drives the aforementioned cylindrical reel or wrapping roll 34, through a transmission unit 44, counter shaft 45 and clutch mechanism 46, suitable sprockets and chains being employed in the manner well-known in the art.

Suitable speeds are provided for either or both the electric motor 42 and the transmission unit 44, but, as such, form no part of the present invention, and are therefore neither shown herein nor further described hereinafter.

Method of operation

According to the method of operating the apparatus of the present invention, a strip of flexible belting 4 is placed atop the elongate table 2; and, upon the said strip of flexible belting, there is disposed a strip 8 of cardboard. As before mentioned, the elongate table 2, belting 4 and cardboard strip 8 may be, for example, 5 feet in width and 60 feet in length. Upon the cardboard strip 8, there is placed a large number of superposed layers of cloth 10; for example, 60

layers. At prescribed intervals of, say, five feet in length (which, together with the aforementioned five feet in width, would constitute a 25-square-foot area), a large number of die elements 12 are placed upon the cloth with their cutting edges in contact therewith. These die elements 12 may be of various shapes; and, within each of the aforementioned prescribed 25-square-foot areas, comprise all of the components of a single garment; for example, a man's shirt or underwear. As has previously been mentioned, in such instance, the layers of cloth 10 and their superposed die elements 12 within each of the hereinbefore described 25-square-foot areas may be so prearranged on the elongate table 2 that there may be twelve consecutive die cuttings at each 5-foot interval in the 60-foot length of the elongate table 2.

According to the foregoing construction and arrangement, the top surface of the superposed layers of cloth 10 may be chalk-marked at each 5-foot interval to thereby permit relatively unskilled labor to rapidly assemble the die elements 12 within that particular 5-foot x 5-foot (or 25-square-foot) area. Of course, the die elements of successive 25-square-foot areas (or 5-foot lengths of the layers of cloth 10) may vary; but for the highest rates of production, they would be the same. That is, in each successive 25-square-foot area, there would be dies for cutting all of the component parts of a certain garment; for example, a man's size 34 shorts.

After there is assembled upon the elongate table 2 the strip of flexible belting 4, the cardboard strip 8, superposed layers of cloth 10 and die elements 12 (within each of the aforementioned prescribed 25-square-foot areas), there is moved against the left-hand end of the elongate table (as viewed in Figure 1) the portable heavy duty pressure-applying apparatus 14, the latter with its transverse reciprocable platen 20 in elevated position. Next, the portable material-advancing apparatus 30 is moved against that end of the heavy duty pressure-applying apparatus 14 which is remote from the elongate table 2. The clutch mechanism 46 of the portable material-advancing apparatus 30 is disengaged; and the operator of the apparatus grasps the outer end of the strip of flexible belting 36 which is wrapped around the cylindrical reel or wrapping roll 34 and moves it between the platen 20 and the pressure-receiving bed 24 of the portable heavy duty pressure applying apparatus 14. Then, the operator intermeshes the transverse connector strips 6 and 40 of the strips of flexible belting 4 and 36, respectively, and unites them with a rod or wire (not shown) in the manner which is well-known in the art of flexible conveyor belts.

During the aforementioned activities, the electric motor 42 may, if desired, be energized along with its associated transmission unit 44 and counter shaft 45. In such case, the operator simply engages the clutching mechanism 46 to thereby permit the wrapping roll 45 to commence winding up the strip of flexible belting 36 to thereby advance the flexible belt 4 and superposed cardboard strip 8, and layers of cloth 10 and the die elements 12 will be advanced between the platen 20 and the pressure-receiving bed 24 of the portable heavy duty pressure-applying apparatus 14.

After the first 5 feet of the flexible belt 4 (with its superposed burden of cardboard strip 8, layers of cloth 10 and cutting dies 12) is advanced onto

the pressure-receiving bed 24 and under the platen 20, the actuation of the wrapping roll 34 is discontinued. This, of course, may be done simply by having the operator disengage the clutching mechanism 46; although it will be understood by those skilled in the art that the present invention contemplates the provision of suitable timing instrumentalities in either, or both, the electric motor 42 and transmission unit 44 which would thus make the 5-foot advances of the strips of flexible belting 4 entirely automatic.

In any event, after the first 5-foot length of the strips of flexible belting 4 has moved between the platen 20 and the pressure-receiving bed 24, the vertically disposed fluid cylinders 16 are actuated to force the platen 20 downwardly against the upper portions of the die elements 12 with tremendous force (for example, 36 tons distributed over a 25-square-foot area). It will also be understood by those skilled in the art that the operation of the fluid cylinders 16 may be such as to control movement of the platen 20 within minute limits, for example, three-thousandths of an inch.

The downward movement of the platen 20 will force the die elements 12 through all of the superposed layers of cloth 10, and possibly to a slight extent into the upper surface of the cardboard strip 8 which, as aforementioned, may acceptably be of possibly $\frac{1}{8}$ inch in thickness.

After the cutting stroke referred to immediately hereinbefore, the fluid cylinders 16 are actuated to elevate the platen 20; and the wrapping roll 34 is energized to wind another 5-foot increment (in length) of the strip of flexible belting 36 which will, of course, have the effect of advancing another 5-foot length of strip of flexible belting 4 and, accordingly, another 5-foot increment of cloth 10 and prearranged die elements 12 under the platen 20.

As a result of this movement, the first 5-foot increment (measured in length) of the cloth 10 and prearranged die elements 12 are moved out onto the upper surface 32 of the portable material-advancing apparatus 30. At this point, the die elements 12 and layers of die-cut cloth 10 are removed from the top surface 32 of the portable material-advancing apparatus 30, during which the next cutting stroke is effected by the operation of the fluid cylinders 16 and platen 20.

So far as the cardboard strip 8 is concerned, it may be severed at each of its 5-foot advance movements, or it simply may be permitted to remain intact until all of the cloth 10 has been cut, after which it (i. e., the said cardboard strip 8) may be reused, either as before, or upon being reversed if the previous cutting operation affected its surface.

After there has been die-cut all of the cloth 10 by die elements 12 which were preassembled on one elongate table 2, the heavy duty pressure-applying apparatus 14 and portable material-advancing apparatus 30 may be moved to another location and used in conjunction with another table 2 which has previously been supplied with a strip of flexible belting 4, cardboard strip 8, layers of cloth 10 and die elements 12.

In this connection, it will be understood that, at the time of the completion of the die cutting of all of the material on one elongate table 2, most of the strip of flexible belting 4 which was used in that particular operation will have been wrapped around the wrapping roll 34 with perhaps the trailing end of the said strip of flexible belting 4 lying upon the upper surface of the

material-advancing apparatus 30. Accordingly, the clutch 46 may be disengaged and the strip of flexible belting 4 simply pulled back between the platen 20 and pressure-receiving bed 24 and completely onto the bare table 2, and disconnected from the flexible strip or belt 36; after which both the heavy duty pressure-applying apparatus 14 and material-advancing apparatus 30 may be moved to a new location (i. e., to the feed-out end of another elongate table 2 on which there reposes another strip of flexible belting 4 with its burden of cardboard strip 8, superposed layers of cloth 10 and die elements 12).

While the die cutting of the material on the successive elongate table 2 takes place, the first-described strip of flexible belting 4 may be prepared with cardboard strip 8, superposed layers of cloth 10 and die elements 12.

The foregoing construction and arrangement permits a single heavy duty pressure-applying apparatus 14 and a single portable material-advancing apparatus to serve a number of elongate tables 2.

In order to enable its freer portability, the portable material-advancing apparatus may be supplied with caster wheels 48 which are somewhat similar to the caster wheels 26 (of the heavy duty pressure-applying apparatus 14) but of appropriately lighter construction.

Modification

The teachings of the present invention also contemplate, under certain conditions, the utilization of all of the aforementioned apparatus with but a single set of die elements 12 which are retained by, and secured to, the underside of the platen 20. This may acceptably be done by having the upper surfaces of the die elements 12 composed of magnetizable material and with the undersurface of the platen 20 constituting an electromagnet of suitable size and strength. As such, the aforementioned magnetizable die elements 12 and electromagnetic undersurface of the platen 20 form no part of the present invention, and, accordingly, are neither shown nor further described herein.

The present application is a continuation-in-part of my aforementioned patent application Serial No. 327,607.

While I have shown and described certain specific embodiments of the present invention, it will be readily understood by those skilled in the art that I do not wish to be limited exactly thereto, since various modifications may be made without departing from the scope of the invention as defined in the appended claims.

I claim:

1. A die cutting apparatus for superposed layers of cloth and the like comprising a substantially horizontal elongate table, a strip of flexible belting slidably disposed upon and substantially covering said elongate table and adapted to receive the aforementioned superposed layers of cloth, a separate readily movable cutting machine provided with a smooth surfaced cutting bed which is aligned with and adjoining said elongate table and in substantially the same horizontal plane, a separate readily movable run-out table having a flat top in alignment with and adjoining the cutting bed of said cutting machine and in substantially the same horizontal plane, a wrapping roll carried by said run-out table, a strip of flexible belting attached to said wrapping roll and extending over the top of said run-out table and said

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cutting bed, means for readily connecting and disconnecting the outer end of said last-named strip of flexible belting to the adjacent end of the strip of flexible belting which is disposed on said elongate table, said wrapping roll being adapted to receive in convoluted form all of said last-named strip of flexible belting and a substantial portion of said first-named strip of flexible belting, and means for rotating said wrapping roll to thereby pull successive portions of said first-named strip of flexible belting and the superposed layers of cloth thereon across the cutting bed of said cutting machine and the top of said run-out table successively, whereby the cutting machine and run-out table may be moved for cooperation with other elongate tables.

2. The apparatus as claimed in claim 1 wherein the connecting and disconnecting means com-

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prises metallic intermeshed connector strips with a removable rod extending therethrough.

3. The apparatus as claimed in claim 1 wherein there is a clutching mechanism between said wrapping roll and the means for rotating it.

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