United States Patent [19]

Morel

[11] **3,780,399**

[45] **Dec. 25, 1973**

[54] **FIBER OPENING MACHINE**

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[52] **U.S. Cl.** **19/97**

[51] **Int. Cl.** **D01b 1/00,** D01g 19/00

[58] **Field of Search** ..... 19/97, 112, 234, 19/115, 96; 29/110, 121 R, 121 A, 121 H, 29/124, 125, 81 J, 81 L; 69/27

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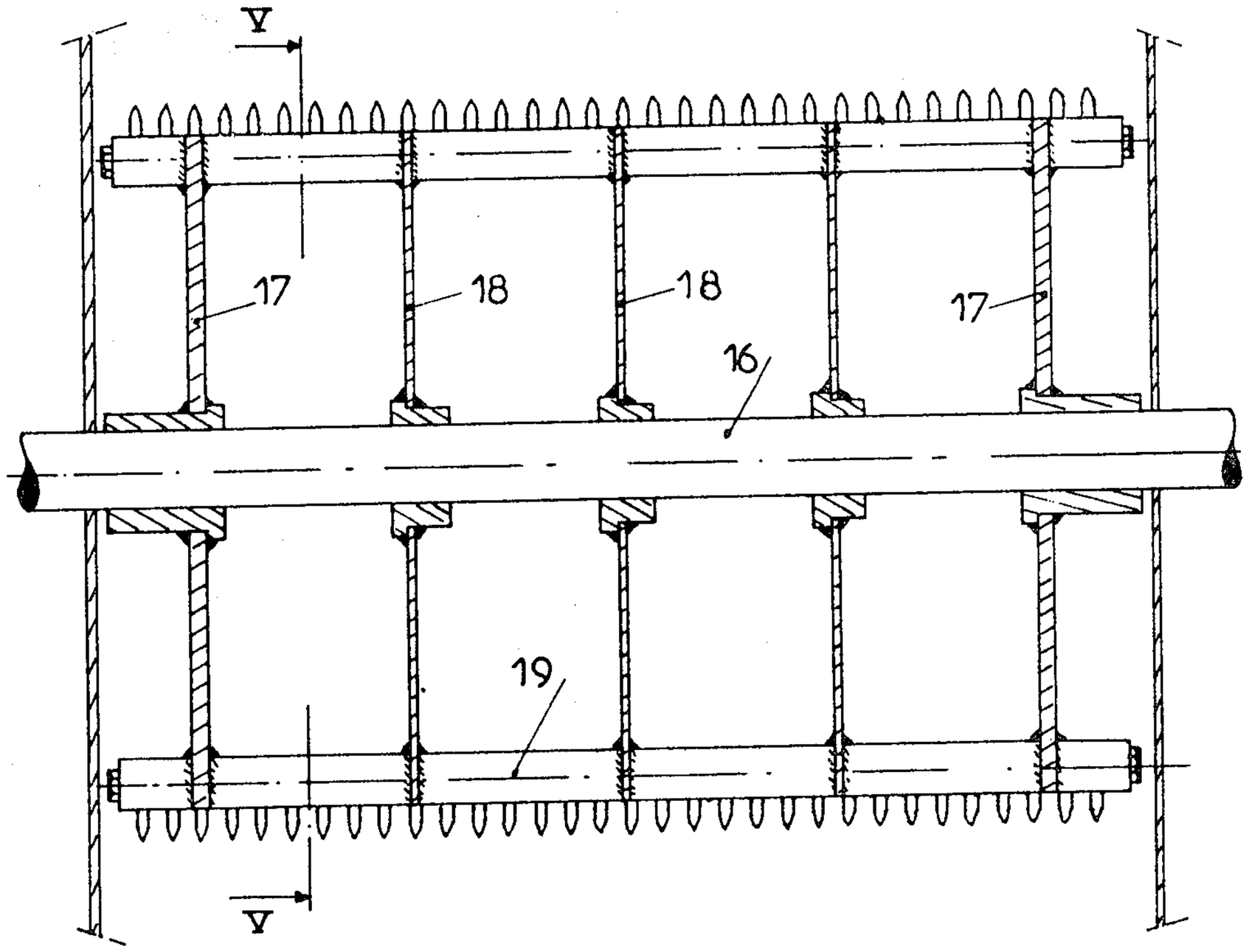
Primary Examiner—Dorsey Newton
Attorney—Richard C. Sughrue et al.

[57] **ABSTRACT**

The textile fiber-opening machine is provided with a feed roller having a plurality of pivoted pressure members individually spring biased toward the periphery thereof to assist in the feeding of the material of varying thickness therebetween. A breaking cylinder is also provided having a plurality of axially directed peripheral grooves. An assembly of toothed members are fastened together end-to-end. Such an assembly is inserted and retained in each of the grooves with the teeth projecting outwardly from the grooves to engage the material being fed by the feed roller.

4 Claims, 7 Drawing Figures



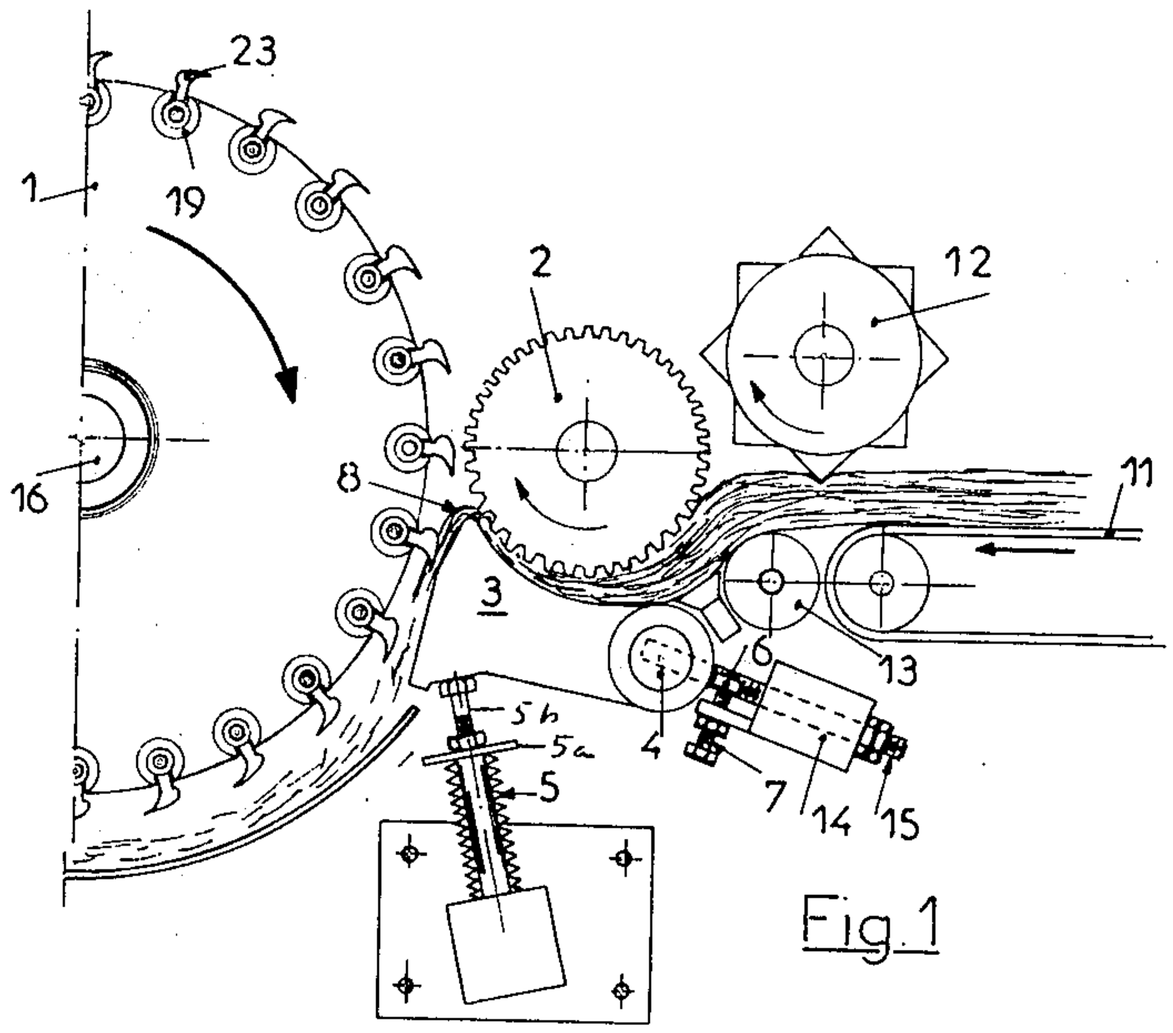


Fig. 1

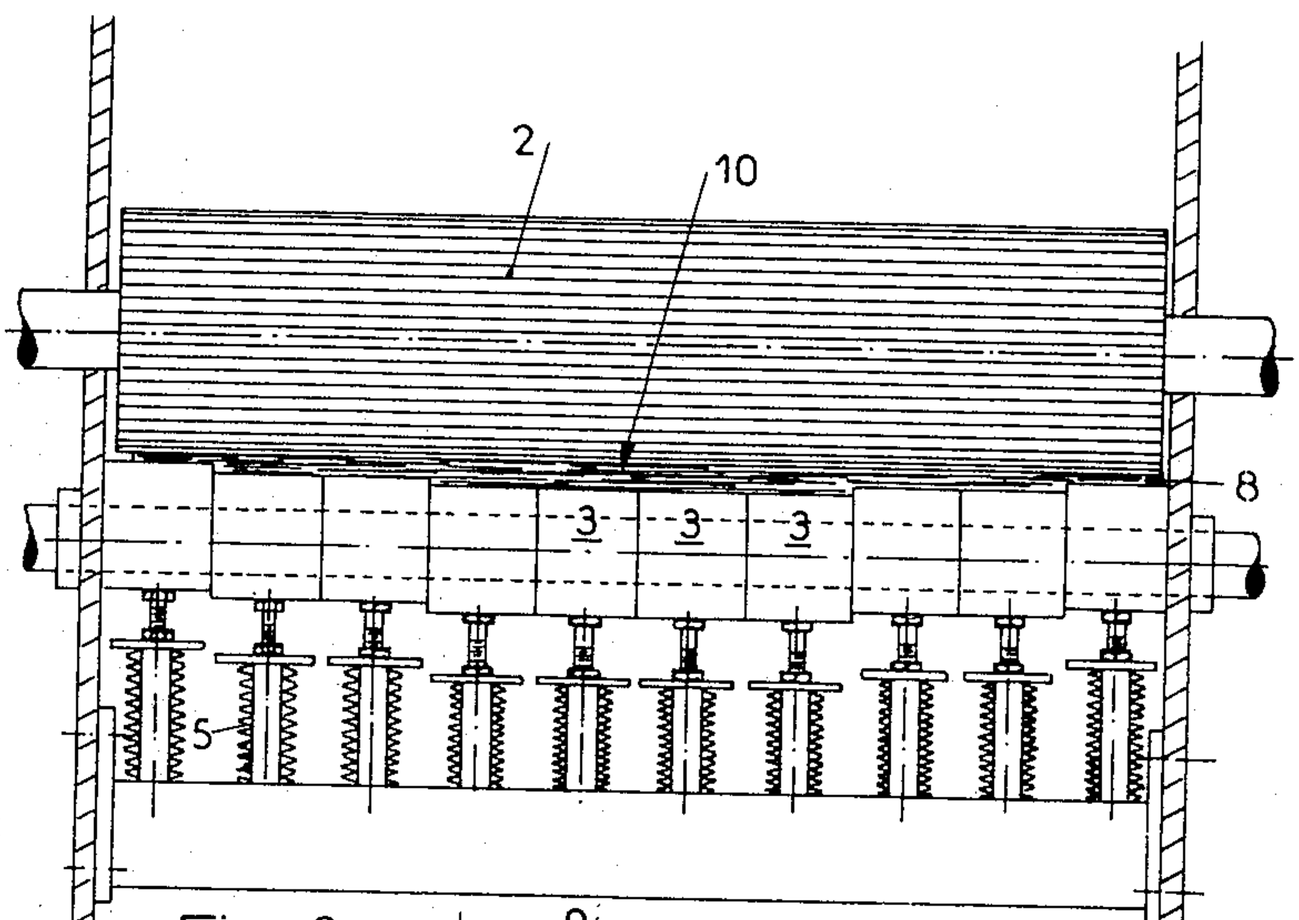


Fig. 2

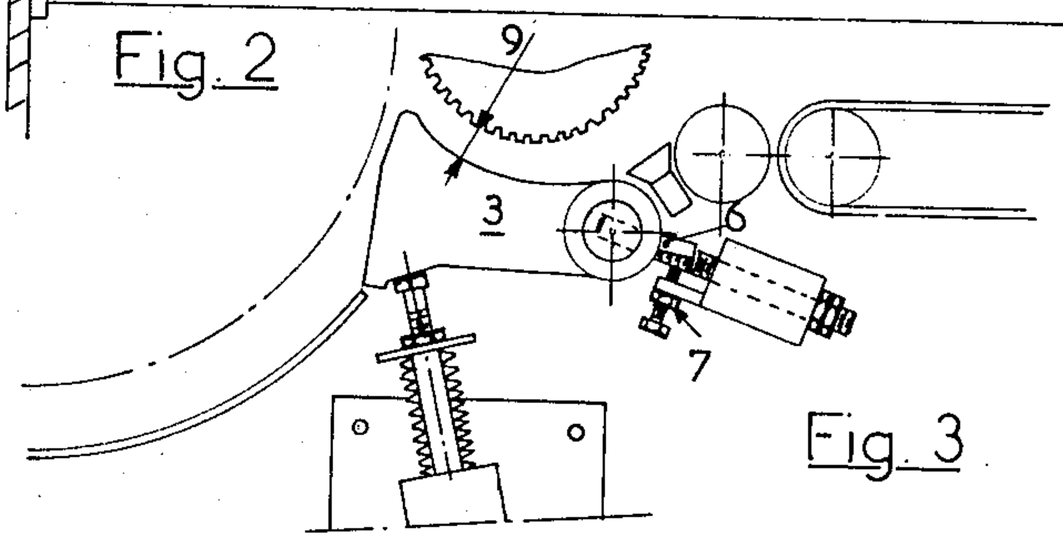


Fig. 3

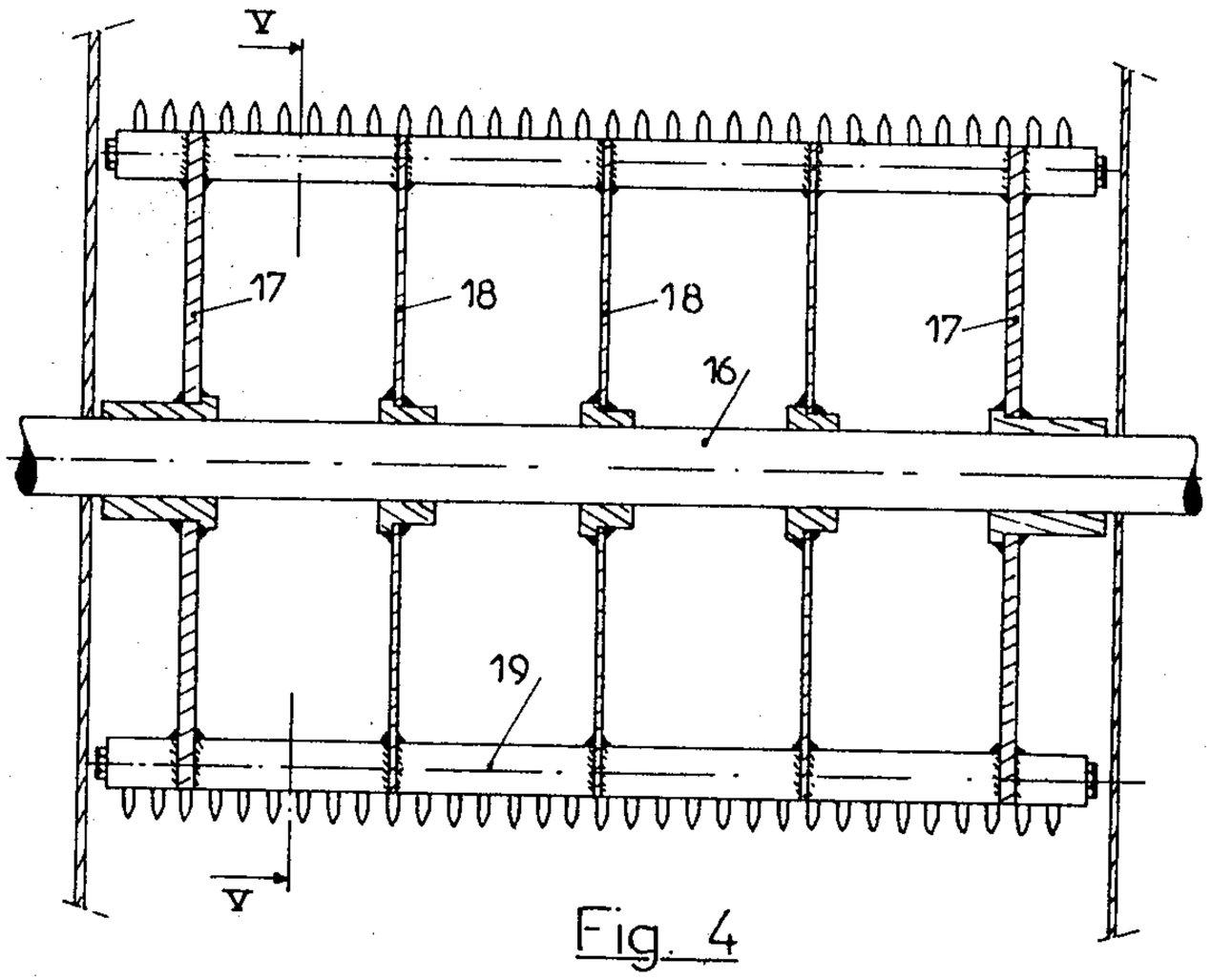


Fig. 4

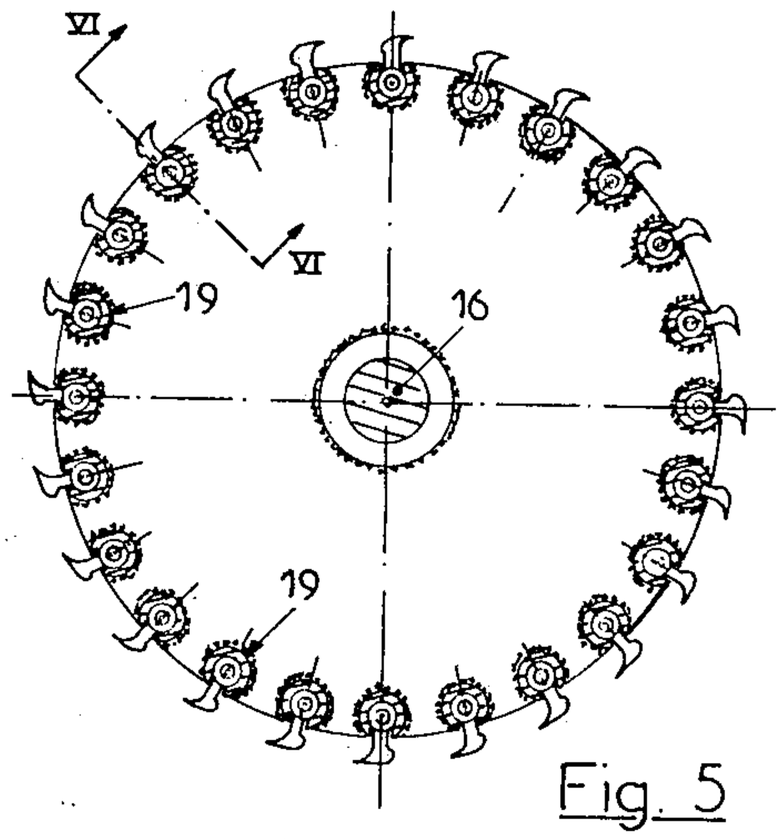


Fig. 5

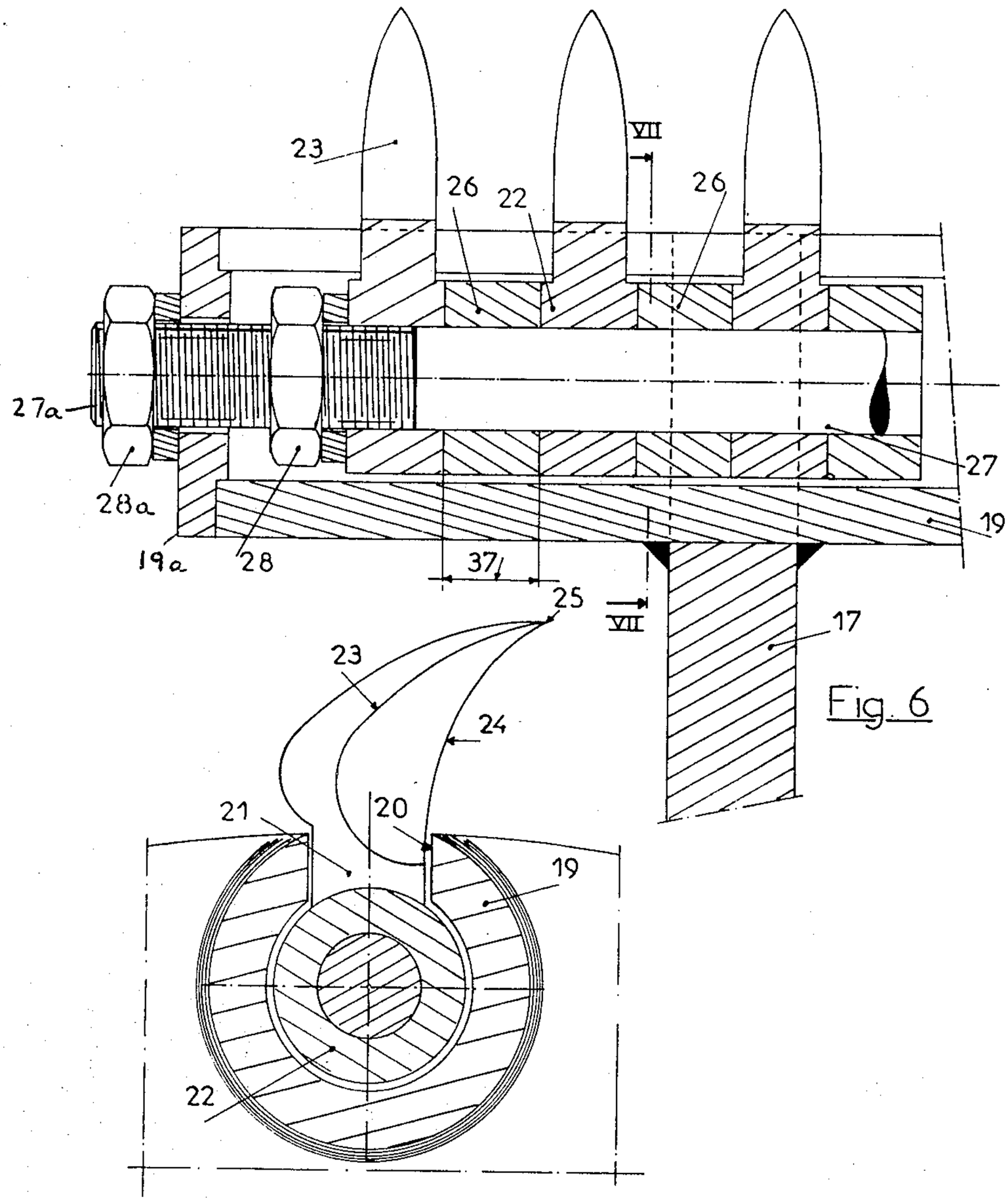


Fig. 6

Fig. 7

FIBER OPENING MACHINE

The present invention relates to breaking or opening machines of the kind which are used in the textile industry, mainly to produce fibres from recovered waste fabric, or to open up new fibres before carding or burring.

In machines of this kind, it is necessary to hold the waste or fibres whilst they are acted upon by the teeth of a swift, and for this purpose different holding systems are utilised. On of the commonest of these consists of a rubber covered roller which draws the material on to a steel trough. Another known system comprises two fluted metal rollers. Both these known devices ensure a good grip on the material, but on the other hand, they have a disadvantage in that they do not allow the passage of an excess thickness of any kind, such as a pad of cuttings, representing fifteen to twenty thicknesses of cloth superposed on each other, cords with knots, seams or very large tufts of fibrous material. As regards the component which is used for the opening up of the waste of fibres, it is generally composed of a drum clothed with plates covered with round or flat pointed teeth according to the nature of the material which is to be treated. The plates themselves are made from steel or wood.

It is a major disadvantage of these drums, that the teeth are relatively fragile, which necessitates their frequent replacement.

The present invention has as one of its objects, a particularly robust feeding and holding device for the waste or fibres, and as another object, the provision of an opening up component which is a toothed cylinder of novel construction.

According to one aspect of this invention, a textile breaking or opening machine of the kind wherein a feed mechanism delivers the material to a breaking cylinder, has its cylinder formed with a plurality of axially directed peripheral grooves, and in each groove there is fitted an assembly of toothed members fastened together end to end, the arrangement being such that the assembly of toothed members is retained within its axial groove until released therefrom. The axial grooves and the assemblies of toothed members are preferably so arranged that each assembly can only be fitted in or removed from its groove by axial movement.

Preferably, the toothed members in an assembly are clamped together by an axially applied compressive force, and it is preferred to provide spacers fitted between adjacent toothed members. In a preferred arrangement, the toothed members and the spacers, if any, are threaded on to a common rod, and screw and nut clamping means are provided to apply the compressive force.

According to another preferred feature each groove is formed by a tube having a longitudinal slot in its cylindrical wall, and each toothed member may comprise a short tube with a tooth projecting radially outwards therefrom. It is also preferred that each tooth has a curved profile with a concave cutting edge, and a pointed tip after the fashion of a sickle.

According to another aspect of the invention, a textile breaking or opening machine has a feed mechanism which includes a feed roller co-operating with a series of independently mounted troughs arranged in close juxtaposition across the width of the feed roller. Preferably the troughs are pivoted on a common shaft extending transversely of the machine. It is also preferred that each trough is resiliently loaded towards the feed roller, and the resilient load may be provided by a coil spring, or by Bellville washers. Stop means are preferably provided to limit the movement of each trough towards the feed roller.

According to yet another preferred feature of the invention, the cylinder comprises a series of axially spaced discs supported on a central shaft. In that case, the tubes may be received in holes formed in the peripheries of the discs.

Thus, a machine constructed in accordance with the preferred features of the invention has a feed system which ensures that there is a good grip on the material, whatever may be its nature, when it is being presented to the breaking or opening cylinder. It is also to be observed, that the cylinder itself possesses interchangeable sets of teeth provided by the individual assemblies, the number and distribution of the teeth being capable of selection in relation to the nature of the material which is to be worked.

Other advantages of the invention, will appear from the following description of a textile breaking or opening machine, which is given by way of example only, with reference to the accompanying drawings, in which:

FIG. **1** is a longitudinal section through part of the machine, showing the opening cylinder, and the material feed system,

FIG. **2** is an end view of the apparatus shown in FIG. **1**, illustrating material of excess thickness being admitted to the machine,

FIG. **3** is a detail view showing the mounting of a trough,

FIG. **4** is a transverse cross section through the breaking cylinder,

FIG. **5** is a section on the line V-V in FIG. **4**,

FIG. **6** is a section to a larger scale on the line VI—VI in FIG. **5**, and

FIG. **7** is a section on the line VII—VII in FIG. **6**.

There is illustrated in the drawings a breaking or opening machine, which essentially consists of a breaking cylinder **1**, to which the material or textile waste is presented, whilst it is gripped between a fluted steel feed roller **2**, and a series of independently mounted steel feed troughs **3**, arranged side by side in close juxtaposition across the width of the machine, as clearly illustrated in FIG. **2**. Instead of being fluted, the feed roller **2** could be provided with teeth.

The troughs **3** are independently pivoted on a common shaft **4** which is carried by screws **15** passing through holes in a mounting block **14** which is fastened to a stationary part of the machine. Locking nuts are provided on the screws **15**, for the purpose of securing the screws in any adjusted position, so that it is possible to vary the position of the shaft **4** relatively to the cylinder **1**, and to lock the shaft in such an adjusted position.

Each of the troughs **3** is resiliently loaded towards the feed roller **2**, by loading means **5**, which consists either of a coil spring, or a series of Bellville washers. The resilient means acts on the trough **3**, through a collar **5***a* and a sliding rod **5***b*, which is of adjustable length. Thus by adjusting the length of the rod **5***b*, it is possible to vary the resilient load on each of the troughs **3**.

Each of the troughs also has a stop finger **6** (see FIG. **3**) which is adapted to engage with a regulating screw

stop 7, secured in a bracket projecting from the mounting block 14. The screw stop 7, is pre-set to ensure a minimum distance 9 between the troughs 3 and the fluted roller 2, so that in no circumstance can the troughs actually engage with the fluted roller 2, due to the pressure of the resilient means 5, when there is no material passing through the machine.

It will be seen by reference to FIG. 2, how the passage of a local excess thickness 10 in the sheet of waste 8, causes the displacement only of those troughs 3 which correspond to the width of the excess thickness, whilst the other troughs continue to operate normally throughout the width of the machine. Consequently, the independent mounting and loading of the troughs 3, enables local irregularities in the thickness of the material being fed through the machine to be accommodated.

For the purpose of carrying material into the machine, there is an endless feed belt 11, a pressing roller 12, which lies over the exit end of the belt 11, and a plain surfaced roller 13 below the path of material as it leaves the belt 11. The pressing roller 12, and the plain surfaced roller 13 co-operate to feed the material as shown in FIG. 1 towards the zone of co-operation between the fluted feed roller 2 and the troughs 3.

Turning now to the construction of the cylinder 1, this essentially comprises a skeleton drum, formed by a steel shaft 16, two end plates or discs 17, and a series of axially spaced intermediate plates or discs 18. All the discs 17 and 18 are fixed on to the central shaft 16, and they are of the same outside diameters. This construction is clearly shown in FIGS. 4 and 5 of the drawings. On the discs 17 and 18 are mounted a number of longitudinal tubes 19, these tubes being welded into recesses formed in the peripheries of the discs 17 and 18, so that the outer portions of the tubes 19 lie in the circumferential plane of the cylinder. Each tube 19 is formed with a longitudinally extending slot 20, which extends throughout the width of the cylinder. These tubes 19 provide mountings for removable toothed assemblies, one of which will now be more particularly described.

Each toothed assembly (see FIGS. 6 and 7) comprises a rod 27 on to which are threaded alternately toothed members formed by bosses 22 with teeth 23, and tubular spacers 26. The outside diameter of the bosses 22 of the toothed members, and the outside diameters of the spacers 26 are such, that the bosses and spacers can fit easily into the bore of a corresponding tube 19 of the cylinder. Each tooth 23 is joined to its corresponding boss 22 by means of a stem 21, which is able to pass through the slot 20 formed in the tube 19. Furthermore, each tooth 23 is profiled in the shape of a sickle (see FIG. 7), that is to say it has a concave cutting edge 24 and a point 25.

The bosses 22 and tubular spacers 26 form a stack on the rod 27, and the spacing between the teeth 23 can be predetermined by selecting an appropriate width 37 of the spacers 22. The ends of the rod 27 are screw threaded, to receive locking nuts 28, and this rod not only serves to apply a compressive force to the toothed members and spacers for the purpose of locking them together, but it also provides extensions 27*a* which pass through end caps 19*a* on the tube 19, for the purpose of locating the assembly of teeth 23 axially relatively to the cylinder 1. Locking nuts 28*a* are fitted on to the rod extensions 27*a*, for the purpose of securing the rod in the correct lateral displacement.

By virtue of the special assembly of the teeth 23 in a stack on the rod 27, the number of teeth can be regulated according to working requirements, since it is possible to fit assemblies of teeth into only selected ones of the tubes 19, or alternatively as shown in FIG. 5, such sets of teeth may be fitted into every one of the tubes 19. Furthermore, it is possible to select the number of teeth to be mounted in each tube, by fitting spacers of variable thickness.

The invention has the added advantage of allowing the preparation of spare sets of teeth for the breaking cylinder 1, in advance of requirements. In fact, it is sufficient for the user to prepare in advance, assemblies of rods 27 and teeth 23 according to the projected use of the machine, and the type of textile material to be worked.

The action of disintegrating the fabric, or opening the fibrous material is carried out by the cylinder 1 rotating in a clockwise direction as seen in FIG. 1, and tearing the material whilst it is held between the feed roller 2, and the feed troughs 3.

It is to be understood, that the invention is not restricted to details of construction described with reference to the drawings. For example, the particular resilient means 5 illustrated in FIG. 1, could be replaced by any other method of applying a loading force to the individual troughs 3, urging them towards the feed roller 2. For this purpose, mechanical, hydraulic or pneumatic return means could be used.

Further with regard to the positioning of the teeth 23 on the rod 27 inside each slotted tube 19, it will be appreciated that these tubes 19 could be replaced by any other mechanical positioning system, for example by rigid bars formed with T slots. It will be observed however that once an assembly of teeth has been placed in position in the cylinder 1, it can only be removed therefrom by sliding out axially from one end.

I claim:

1. A textile fiber opening machine comprising an opening cylinder, said cylinder being comprised of a plurality of axially spaced apart discs and a plurality of parallel axially disposed tubes secured to said discs adjacent the periphery thereof, each of said tubes having a longitudinal slot therein so that said tubes define a plurality of axially directed peripheral grooves, a plurality of toothed assemblies each having a plurality of toothed members, connecting means for securing said members together, each of said assemblies being disposed in one of said axially directed grooves with teeth of said toothed members projecting outwardly from the periphery of said cylinder, and retaining means on said cylinder and each of said assemblies for retaining said assembly in said grooves.

2. A textile fiber opening machine as set forth in claim 1 wherein each toothed member is comprised of a short tube having a tooth projecting radially outwardly therefrom.

3. A textile fiber opening machine as set forth in claim 2 wherein each tooth has a curved profile with a concave cutting edge and a pointed tip.

4. Textile fiber opening machine as set forth in claim 2 wherein the tube of each toothed member in an assembly is disposed on a common rod and further comprising screw and nut clamping means for applying an axially directed compressive force to clamp said toothed members together.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,780,399 Dated December 25, 1973

Inventor(s) Andre Morel

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In The Heading:

The Priority Date was omitted. Should be.

--April 21, 1971 France.....71 15 087

Signed and sealed this 2nd day of July 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER,JR.
Attesting Officer

C.MARSHALL DANN
Commissioner of Patents

USCOMM-DC 60376-P69
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