April 23, 1957 I. BARNETT 2,789,319

FIBER OPENER AND CLEANER

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Fig. 1.

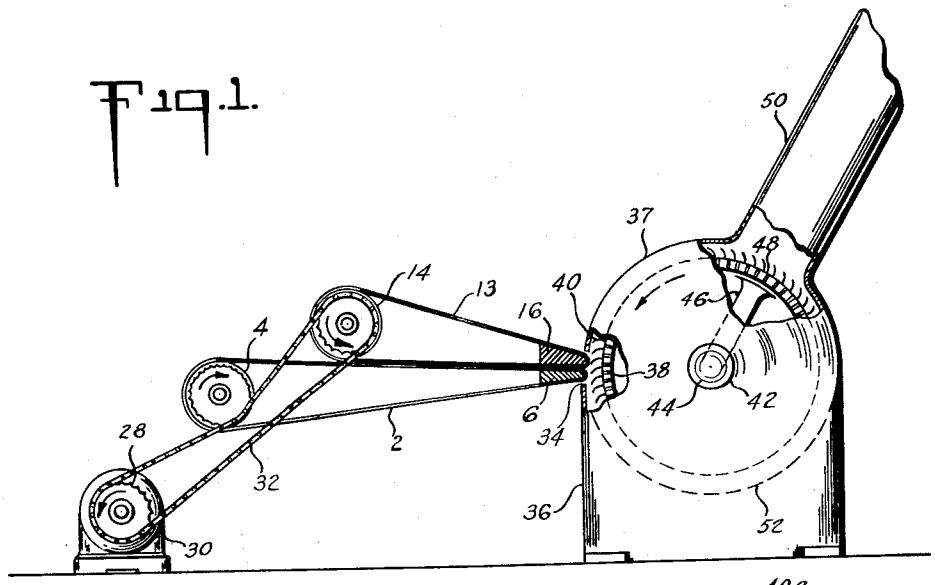


Fig. 3.

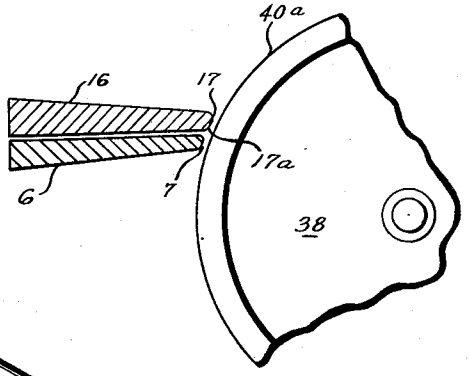
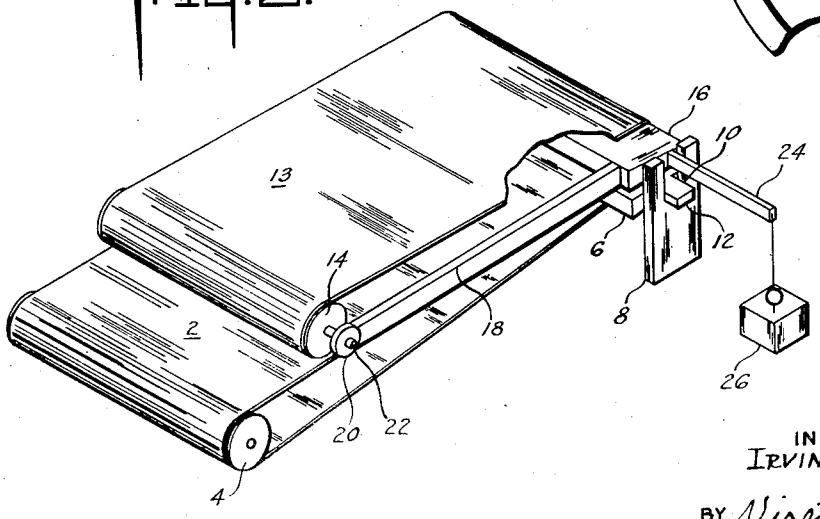


Fig. 2.



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FIBER OPENER AND CLEANER

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1 Claim. (Cl. 19—96)

The present invention relates to an apparatus for opening and cleaning masses of fibers and particularly masses of relatively short, weak, brittle fibers, such as mineral wool.

Conventional textile openers, pickers and cards in general have certain mechanical characteristics which render them unsuitable for handling mineral fibers. For example, these machines usually include a pair of rolls for feeding fibers to the teeth of picker wheels or cards which rolls are of such a size that short fibers, such as mineral wool, will no longer be subject to the gripping action of the rolls at the time the fibers move into the path of the teeth. Moreover, conventional machines usually include fixed or spring loaded feed rolls which exert different pressures on the fibers depending upon the volume of fibers therebetween which results in periodic crushing of brittle, weak fibers.

A primary object of the present invention is to provide a fiber opening and cleaning apparatus which includes novel feeding means particularly adapted for handling short fibers.

A further object of the present invention is to provide a fiber opening and cleaning apparatus including fiber feeding means arranged to exert a uniform pressure on the fibers.

A further object of the present invention is to provide a fiber opening and cleaning apparatus in which the fibers are subjected to minimum mechanical action.

My invention will be more fully understood and further objects and advantages will become apparent when reference is made to the following detailed description of a preferred embodiment of the invention and to the accompanying drawings in which:

Fig. 1 is a side view, partially in section and with parts broken away, of the apparatus of the instant invention;

Fig. 2 is an isometric view of portions of the fiber feeding means of the apparatus of Fig. 1; and,

Fig. 3 is a partial sectional view, on an enlarged scale, of elements of the apparatus of Fig. 1.

Referring to the drawings, there is shown a conveyor belt 2, movable by means of a roller 4, and extending over a relatively fixed bar 6. As will be seen in Fig. 2, the bar 6 is supported by means of a bracket 8 having a slot 10 in the upper portion thereof, through which slot extends a projection 12 of the bar 6. Since both sides of the conveyors are supported in the same manner, the arrangement has been illustrated for one side only. Arranged above the conveyor 2 is a second conveyor 13, movable by means of roller 14 over a bar 16. Bar 16 is spaced at a fixed distance from roller 14 at each side by means of an arm 18 connected to a suitable bearing 20, journalled on shaft 22 of roller 14. At each end of the bar 16 an extension 24 is provided, extending through slot 10 of bracket 8, and supporting a weight 26. The rollers 4 and 14 are mounted in any suitable fixed bearings. For the purpose of driving the conveyors 2 and 13, a sprocket 28 is connected to the shaft of a motor 30 and engages a chain 32 which is meshed with sprockets on the shafts

of rollers 4 and 14. It will be noted from the arrangement of chain 32 that the adjacent runs of conveyors 2 and 13 move in the same direction.

The roller 14 is so positioned in relation to the roller 4 that the adjacent runs of conveyors 2 and 13 converge at a slight angle. The bars 6 and 16 are shown somewhat triangular in configuration, the nip between the bars being formed by corresponding sides of the triangles and thus including substantial surface areas which extend substantially from one longitudinal edge of each bar to the other longitudinal edge. As seen in Fig. 1, the portions of conveyors 2 and 13 between bars 6 and 16 will be in contact with each other or with material therebetween throughout the width of the bars. Conveyors 2 and 13 are made of some soft, flexible material, such as leather or reinforced rubber or plastic.

Conveyors 2 and 13 form a fiber feeding means which extends into an opening 34 in housing 36 of a picker means, generally designated by the numeral 37. Mounted for rotation within the housing 36 is a drum 38, to the outer surface of which is secured a plurality of teeth 40. The toothed surface of drum 38 extends entirely across the width of conveyor belts 2 and 13. At each of its ends the drum 38 is journalled by means of a bearing 42 on a hollow shaft 44, the interior of shaft 44 being in communication with a flared jet means 46 which extends to a position adjacent the inner surface of the drum. The drum 38 is provided with a multiplicity of perforations 48 through which air supplied to shaft 44 is blown by means of jet 46 into a discharge trunk 50 extending upwardly from housing 36. Arranged substantially concentrically with and below drum 38 is a screen 52 having openings therein sufficiently large to pass unfiberized material or shot. By any convenient mechanical means, the details of which would be apparent to those skilled in the art, the shaft 44 is made adjustable in a hlorizontal plane in order to vary the distance between teeth 40 and conveyors 2 and 13.

While bars 6 and 16 have been shown as substantially triangular in cross section, it will be understood that this configuration is not critical. The only essential feature of the construction is that each bar include a longitudinal edge 7, 17 which may be placed adjacent the corresponding edge of the other bar and adjacent the path of teeth 40. As will be clear from Fig. 3, if the edges of the bars are adjacent both to each other and to the path of the teeth, represented by line 40*a*, the conveyor belts extending over the edges will be in contact with material therebetween at points very close to the teeth and thus, even with short fibers, the conveyors will hold the material while it is subjected to the action of the teeth. The only limitation on the proximity to the teeth of the nip between the conveyors is the necessity of providing rounded corners, as at 17*a*, on the bars to prevent excessive wear of the belts. To provide for a considerable fiber holding action by the conveyors it is preferable to make the adjacent faces of bars 6 and 16 substantially planar and to connect these faces to the edges 7, 17 by rounded portions of as small a curvature as will permit smooth movement of the belts around the corner. As illustrated, the planar surface of each bar is substantially contiguous to the edge portion.

The bars 6 and 16 extend parallel to the axis of drum 38 and the planar surfaces lie in planes intersecting the path of the teeth. Fig. 3 is an illustration of an arrangement wherein the bars 6 and 16 are positioned in planes spaced from the drum axis, whereas Fig. 1 shows these surfaces aligned with the axis. It is to be noted that the longitudinal edges of the bars in Fig. 3 may have different contours than in Fig. 1 in order to permit their being placed closer to the path of the teeth.

In operation, fibrous masses are fed by any conventional means onto conveyor 2 which carries the material into

contact with conveyor **13**. By reason of the convergence of the adjacent runs of the conveyors, the material is firmly held therebetween while being fed toward the teeth **40** of drum **38**. By reason of the fact that bar **16** is urged downwardly by weights **26**, the pressure of the conveyors on the material being fed is constant regardless of fluctuations in the thickness of the material. The apparatus is adjusted so that the distance between the discharge end of the conveyor means and the teeth **40** of drum **38** is less than the average length of the shortest fibers being processed. Thus, the conveyor means is arranged to feed fibrous material into the path of teeth **40** and to effectively hold the fibers while they are being subjected to the action of the teeth. The amount of pressure applied by the conveyors to the material can easily be regulated through proper selection of weights **26**, and when the device is used for processing mineral wool fibers it is preferable that the holding action of the conveyors be such that slippage of fibers may occur as a result of the pulling force of teeth **40**. In effect, the teeth **40** tease the fibers from the nip between the conveyors and thus thoroughly open the fibers without harsh mechanical action tending to crush or break them. The fibers are carried by teeth **40** over screen **52** through which shot or other unfiberized material drops, the fibers then being carried into the path of jet means **46** at which point they are blown from teeth **40** into trunk **50** for collection.

In view of the fact that jet **46** is spaced somewhat from the inner surface of drum **38**, some air flows through the perforations of the drum substantially throughout its periphery. The effect of the air flow just described is to prevent clogging of fibrous material at the bases of teeth **40**. It will be noted that jet **46** is arranged to remove fibers from teeth **40** before the fibers have been carried through a complete revolution. It is advantageous to remove the fibers from the teeth as soon after passage over screen **52** as practicable in order to reduce to a minimum

the mechanical action on the fibers. With conventional machines centrifugal force, with or without suction, is relied upon to remove fibers from the teeth. These systems many times do not remove fibers in less than one revolution and consequently fibers are carried past the feed means and cause mutual abrasion with fibers being fed to the teeth.

Having thus described my invention in rather full detail, it will be understood that these details need not be strictly adhered to and that various changes and modifications may suggest themselves to one skilled in the art, all falling within the scope of the invention as defined by the sub-joined claim.

What I claim is:

An apparatus for opening and cleaning fibrous masses comprising a perforated drum mounted for rotation about a hollow shaft, a multiplicity of teeth projecting from the periphery of said drum, jet means positioned within said drum and communicating with and fixed to said shaft, a housing around said drum, a trunk leading from said housing adjacent said jet, a screen in said housing beneath said drum, an opening in said housing, and means for feeding fibrous masses through said opening into the path of said teeth, said fiber feeding means including a pair of bars having adjacent longitudinal edges extending generally parallel to the axis of said drum and positioned adjacent the path of said teeth, a conveyor belt extending over each of said longitudinal edges, and means for driving said belts in a direction toward said teeth.

References Cited in the file of this patent

UNITED STATES PATENTS

11,865	Kitson	Oct. 31, 1854
188,295	Hollingsworth	Mar. 13, 1877
2,025,395	Langen	Dec. 24, 1935
2,332,973	Louie	Oct. 26, 1943