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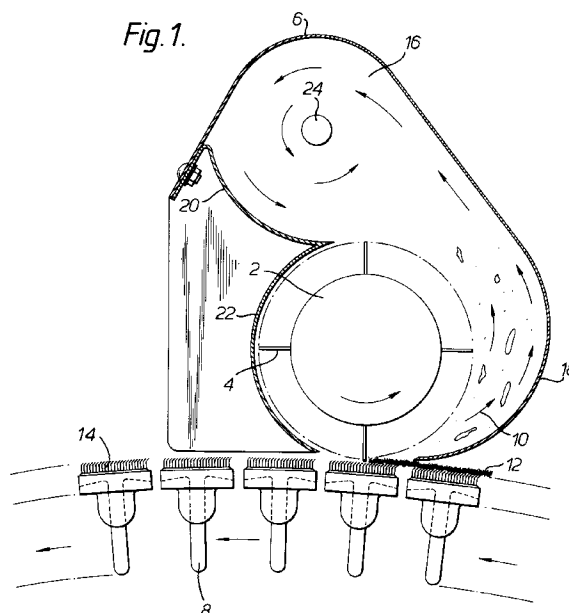
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(54) **Flat stripping arrangement.**

(57) An impeller 2 is located adjacent revolving flats 8 such that the air flow 10 which it produces removes waste, for instance picked up during a carding process, from the flat wire 14 of the revolving flats 8. The waste is then carried by the air 10 into a cylindrical compartment 16 where it is removed by an applied suction, a bleed hole 24 assisting the flow of air along the compartment 16 for the evacuation of the waste 6.



The present invention relates to a flat stripping arrangement and more particularly to a method and apparatus for stripping or cleaning waste laden revolving flat cards.

Previously, it has been known to remove the waste from flats by means of an oscillating comb which is used to comb waste off the flat wire. Subsequent to combing, the waste is allowed to fall into a suction plenum from where it can be pneumatically extracted and carried to a waste collection section. To remove impurities impregnated in the flat wire, the flat stripping comb is followed by a slow revolving "Phillipson" brush whose bristles penetrate the flat wire.

This arrangement is disadvantageous in that devices such as a drive mechanism, gearboxes and bearing housing units are needed to support and control the oscillating motion of the comb and these are complicated and therefore costly.

Additionally, this flat stripping and suction plenum arrangement is normally located in the front block shaft region and restricts access to the main cylinder top feather edge sheet, front sheet and post carding plates.

Further developments in flat stripping have incorporated a fast rotating brush to remove the waste from the flat wire. However, not only do the bristles of the rotating brush get impregnated with fibrous waste, thereby necessitating manual cleaning, also, because the bristles penetrate the flat wire, carding efficiency is affected due to wear of the wire points.

Hence it is an object of the present invention to provide a method or apparatus which will economise on space and use a more simple construction with fewer moving parts.

According to the present invention there is provided a flat stripping apparatus comprising a housing having an opening to be located adjacent the flats of a revolving flat system;

stripping means for stripping waste from the flats; and

suction means for removing stripped waste from said housing; characterised in that

said stripping means comprises an impeller within said housing which does not contact the flats for creating a flow of air across said opening counter to the direction of movement of the revolving flats so as to strip waste from the flats.

According to another aspect of the present invention there is provided a method of stripping flats comprising collecting the removed waste by means of suction and characterised by directing a flow of air across each of the set of revolving flats in turn, the flow of air being counter to the direction of movement of said revolving flats so as to remove waste from the flats.

The invention will be more clearly understood from the following description given by way of exam-

ple only with reference to the accompanying drawings in which:

Figure 1 illustrates a cross section of revolving flats and a non contact impeller according to one embodiment of the present invention;

Figure 2 illustrates a cross section of revolving flats, the non contact impeller and a helical brush according to a second embodiment of the present invention;

Figures 3(a) and (b) illustrate respectively straight and helical blades for use with the non contact impeller of Figures 1 and 2;

Figures 4(a), (b), (c) and (d) illustrate alternative cross sections of impeller blades for use with the impeller illustrated in Figures 1, 2 or 3; and

Figure 5 illustrates a partial cross section of a non contact impeller of the brush type according to the first embodiment of the present invention.

As illustrated in Figure 1, the flat stripping apparatus has an impeller 2 having blades 4 which rotates (preferably in the region of 1100 rpm) within a housing 6 and is arranged adjacent revolving flats 8 on any part of their return path (moving at preferably 4 inches per minute) such as a straight section as illustrated or a section of relatively tight curvature. The impeller 2 and blades 4 create a flow of air 10 which removes waste 12 from the flat wire 14 of the revolving flats 8 and this air then carries the waste to a cylindrical compartment 16 in which suction is applied to create a vortex from which the waste is removed on a continuous basis.

Considering the apparatus in more detail, the revolving flats 8 form part of a continuous loop passing between a carding area and the flat stripping apparatus. The revolving flats 8 have clothing wire 14 of a slightly hooked shape and during the carding process are pulled through a fibrous material such as cotton so as to align the fibres and produce the carding affect. However, they also pick up waste such as loose or short fibres and these must be removed by the flat stripping apparatus in order to ensure an efficient carding process.

The impeller 2 is positioned such that its blades 4 pass very close by, but do not touch the flat wire 14 and the clearance between the periphery of the impeller and the flats may be up to 10 mm.

Further, the impeller rotates at a high speed so as to create a flow of air adjacent and in the opposite direction to the direction of movement of the flat wires 14. Hence, the waste is pulled from the flat wire 14 and carried away.

The system is particularly effective with clothing wire of the type indicated since the hook portion of the wire 14 lies substantially in the same direction as the air flow 10 such that the air currents directly push waste off. Further, it will be understood that the direction of air flow indicated in Figure 1 will create a suctional force which will draw air through the wire up into

the housing, taking the waste with it. The process is still further enhanced by the involute shaping 18 of the housing 6 and an adjustable deflector 20 and enclosure 22 which are located closely around the impeller 2. These contain waste within the housing 6 and prevent air entering except around the wire 14. The involute shaping 18 may be an adjustable distance from the flats, the spacing being large enough for the waste on the flats to pass through and typically being between 2 and 10 mm.

Furthermore, though not illustrated in the Figures, it is preferred to include an additional plate which extends from the lip of the involute shaping upstream and adjacent the unstripped flats.

The waste is directed to the cylindrical compartment 16 where suction is applied from an external fan source such that the waste is removed on a continuous basis. Suction is applied through aperture 23, illustrated in Figure 5, at one end of the cylindrical compartment 16 and, at the other end, a bleed hole 24 is provided in order to assist the flow of air along the compartment for the evacuation of the waste. The suction applied to the cylindrical compartment 16 is a negative pressure level sufficient to overcome the positive pressure created by the rotational movement of the impeller.

A second embodiment is illustrated in Figure 2 in which a helical brush 26 is provided beyond the impeller 2. Unlike previous brushes, it is slowly rotating (preferably 6 rpm) and is positioned down stream of any suction. This brush may be used in order to penetrate the wire 14 and remove embedded impurities and/or micro dust, but need not cope with the bulk of the waste since this will already have been removed by the impeller 2. The dislodged micro dust and impurities, when removed, come under the influence of the air movement 27 of the impeller 2 and are removed together with the waste 6 in the air stream. Hence, the wire 14 is first cleaned by the impeller 2 and then by the spiral brush 26. An additional function of this brush is to clean the bearing surfaces at the ends of the flat of contaminated waste.

The impeller 2 extends the full width of the flat wire 14 and contains a number of blades, not necessarily four as illustrated. Further, they may be straight as illustrated in Figure 3(a) or helical as illustrated in Figure 3(b). In addition, the blades 4 on the impeller 2 may be of different shapes including a paddle blade as illustrated in Figure 4(a), a backward curved blade as illustrated in Figure 4(b), a forward curved blade as illustrated in Figure 4(c) and an aerofoil blade as illustrated in Figure 4(d). The type of impeller and blade shape is chosen to achieve high air movement efficiency without attracting waste to attach around the impeller itself.

Alternatively, as illustrated in Figure 5, the impeller 2 may comprise a cylindrical brush 28 which does not contact the flat wire 14. Preferably, the cylindrical

brush 28 has densely populated bristles which rotate nominally 0.76 mm above the flat wire. The construction and arrangement is basically the same as that with the bladed impeller and can also include the helical brush 26 of Figure 2. However, as illustrated in Figure 5, the enclosure 22 preferably extends within the housing 6, with an adjustable stripping edge 30 set close to the brush 28.

The helical brush 26 comprises a continuously helically wound metal backed nylon bristle strip mounted on a tubular shaft. Rotational movement of this brush is slow and provision can be made to have it easily removable from its working position.

Claims

1. A flat stripping apparatus comprising a housing (6) having an opening to be located adjacent the flats (8) of a revolving flat system; stripping means (2,4) for stripping waste from the flats (8); and suction means for removing stripped waste from said housing (6); characterised in that said stripping means comprises an impeller (2,4) within said housing (6) which does not contact the flats (8) for creating a flow of air across said opening counter to the direction of movement of the revolving flats (8) so as to strip waste (12) from the flats.
2. A flat stripping apparatus according to claim 1 characterised in that said impeller comprises a cylindrical brush (28).
3. A flat stripping apparatus according to claim 1 or 2 characterised in that said impeller (2) is located adjacent said opening and, in use, rotates about an axis transverse to movement of the flats (8) and passes immediately adjacent the flats (8).
4. A flat stripping apparatus according to claim 3 characterised in that said housing (6) has an involute shape (18) beyond said opening in an upstream direction relative to the movement of the flats (8) therefrom and a compartment (16) from which waste (12) is removed, such that said flow of air continues around said involute shape (18) to carry waste to said compartment (16).
5. A flat stripping apparatus according to claim 4 characterised in that said compartment (16) is cylindrical, having at one end, an aperture through which a suctional force is applied and, at the other end, a bleed hole (24) to assist flow of air along the compartment.
6. A flat stripping apparatus according to any pre-

ceding claim further characterised by a helical brush (26) rotatable about an axis transverse to the revolving flats (8) so as to brush further waste from the flats (8), said brush (26) being within said housing (6), adjacent said opening and downstream of said impeller (2) with regard to the movement of the flats (8). 5

7. A method of stripping flats comprising collecting the removed waste by means of suction and characterised by directing a flow of air across each of the set of revolving flats (8) in turn, the flow of air being counter to the direction of movement of said revolving flats (8) so as to remove waste (12) from the flats (8). 10 15

8. A method according to claim 7 further characterised by subsequently brushing the flats (8) so as to direct any additional removed waste into said flow of air. 20

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Fig. 1.

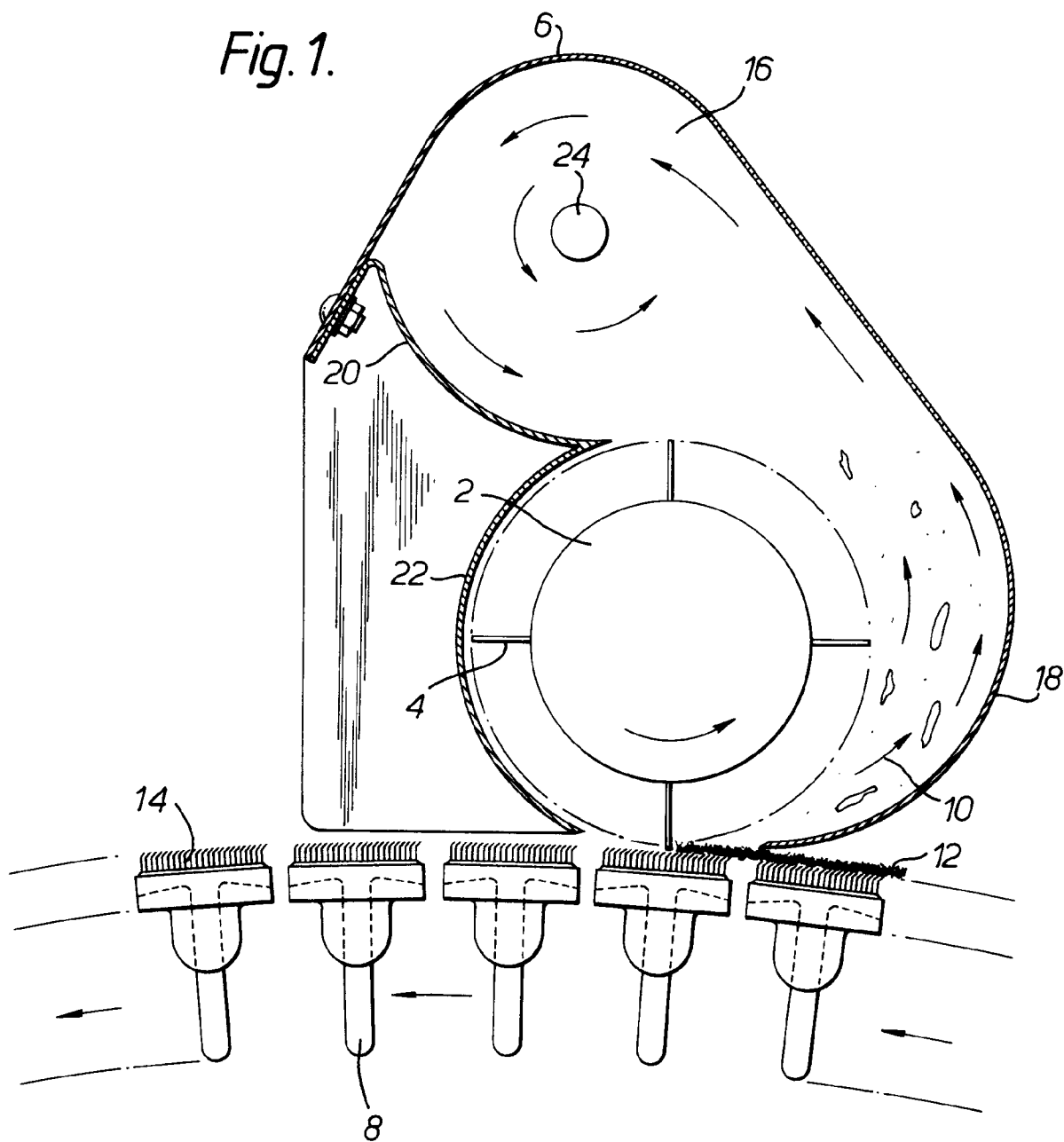


Fig.2.

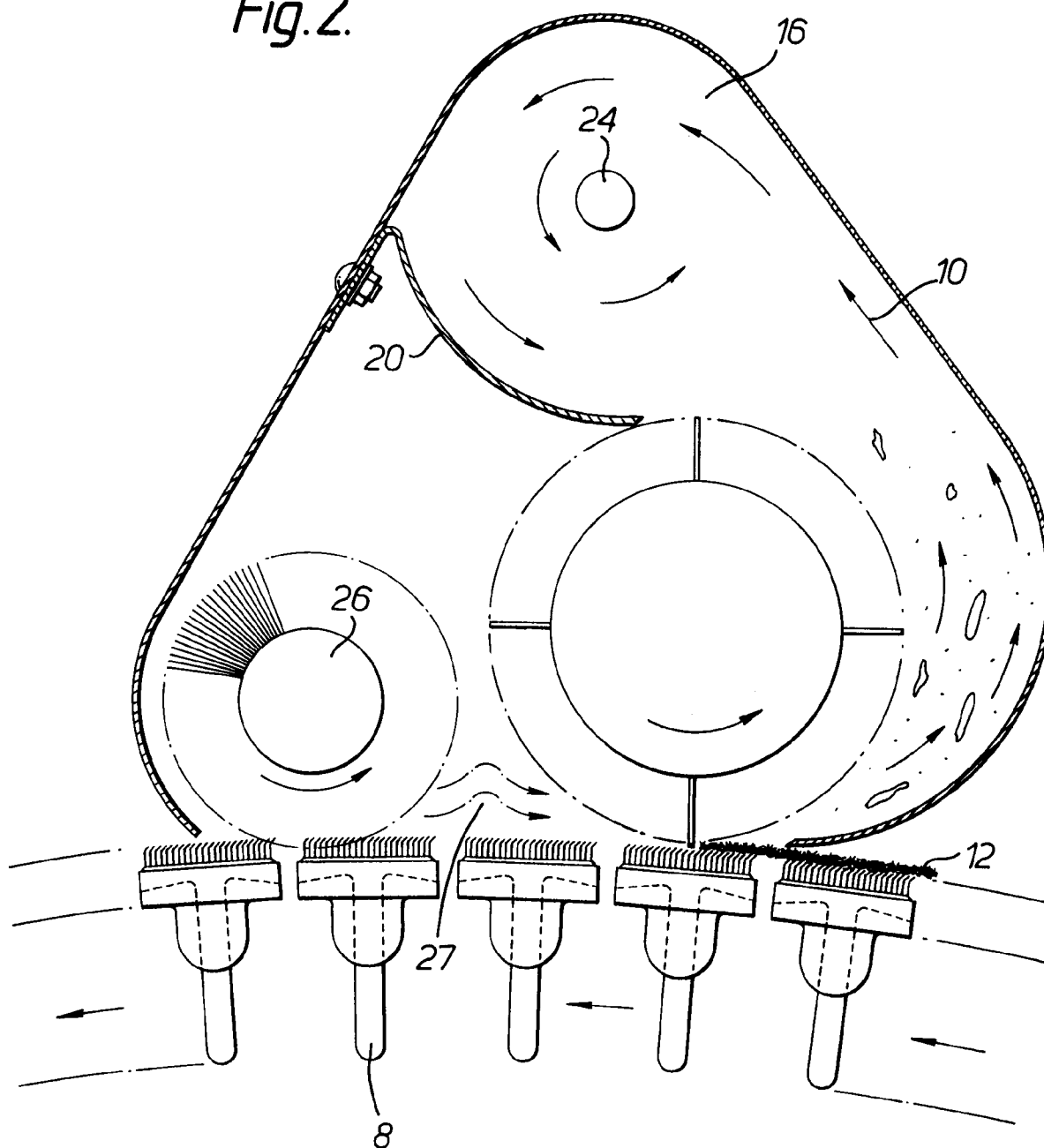


Fig. 3a

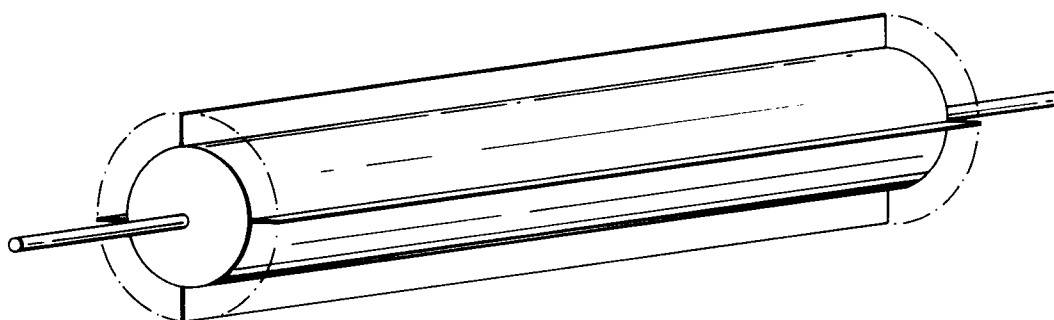


Fig. 3b

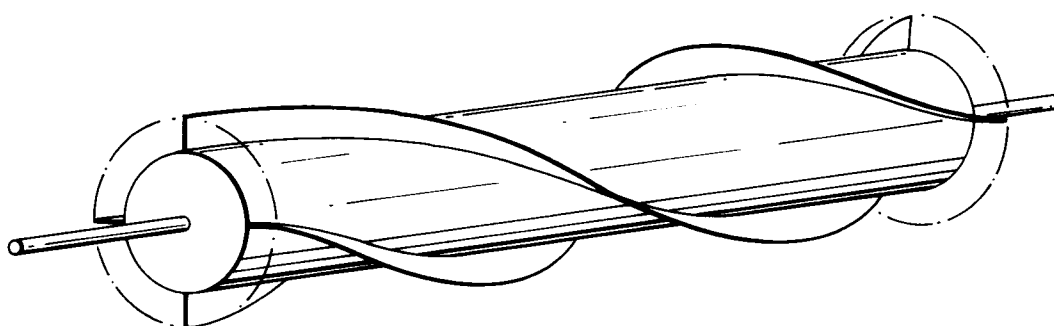


Fig.4(a)

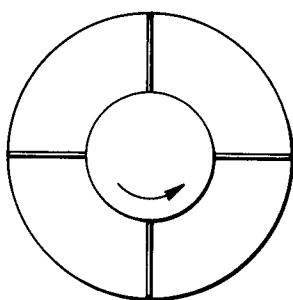


Fig.4(b)

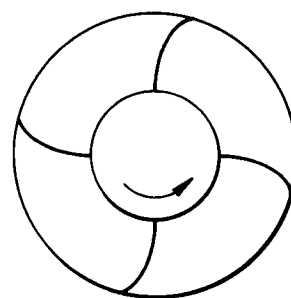


Fig.4(c)

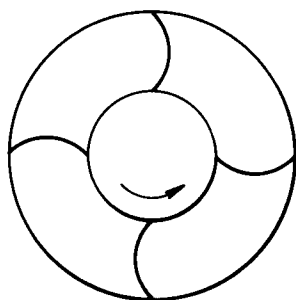


Fig.4(d)

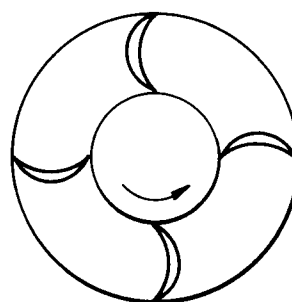


Fig. 5.

