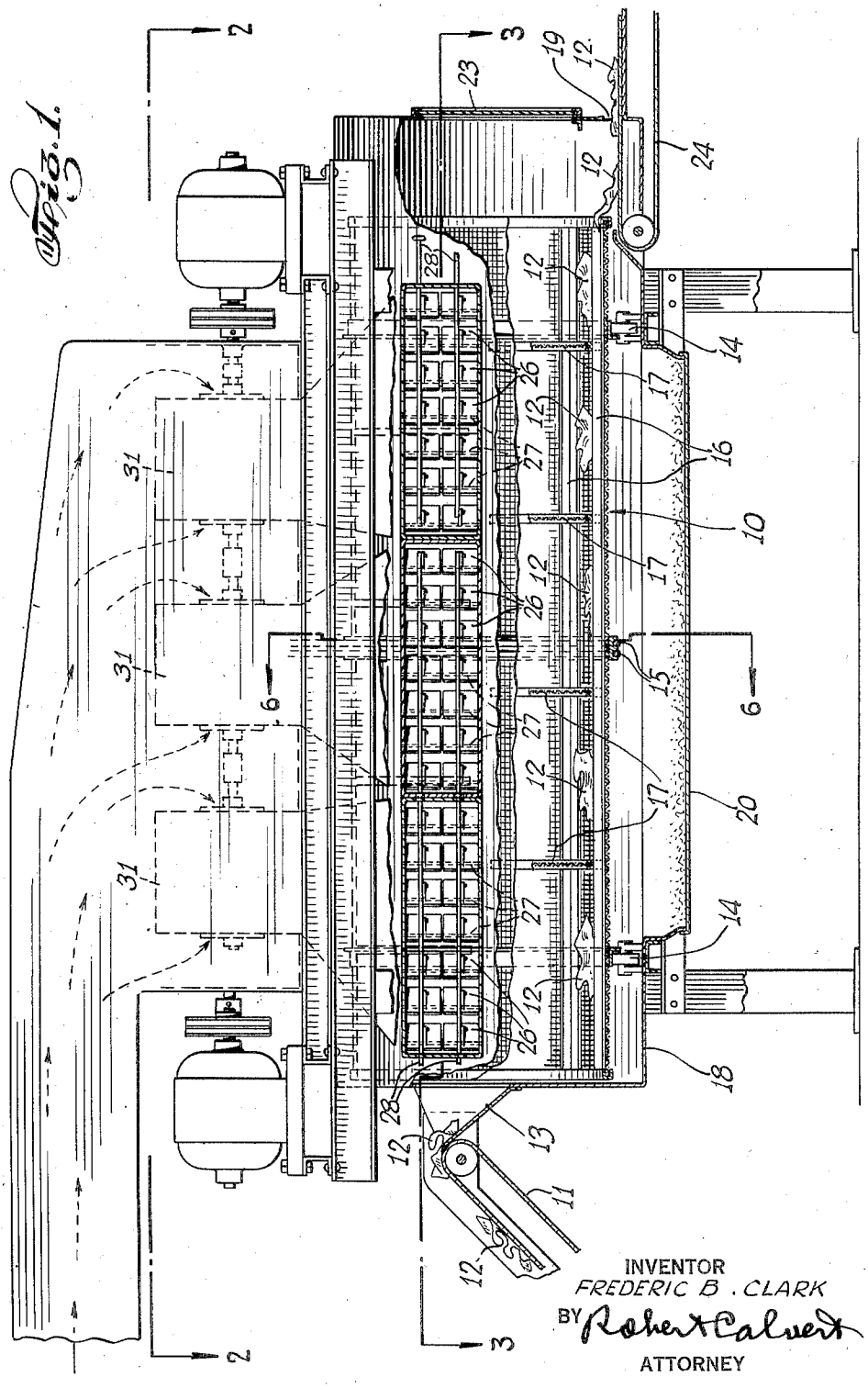
Nov. 19, 1940. F. B. CLARK 2,222,139

MACHINE FOR REMOVING HAIR FROM LAUNDRY ARTICLES

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Fig. 1.



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MACHINE FOR REMOVING HAIR FROM LAUNDRY ARTICLES

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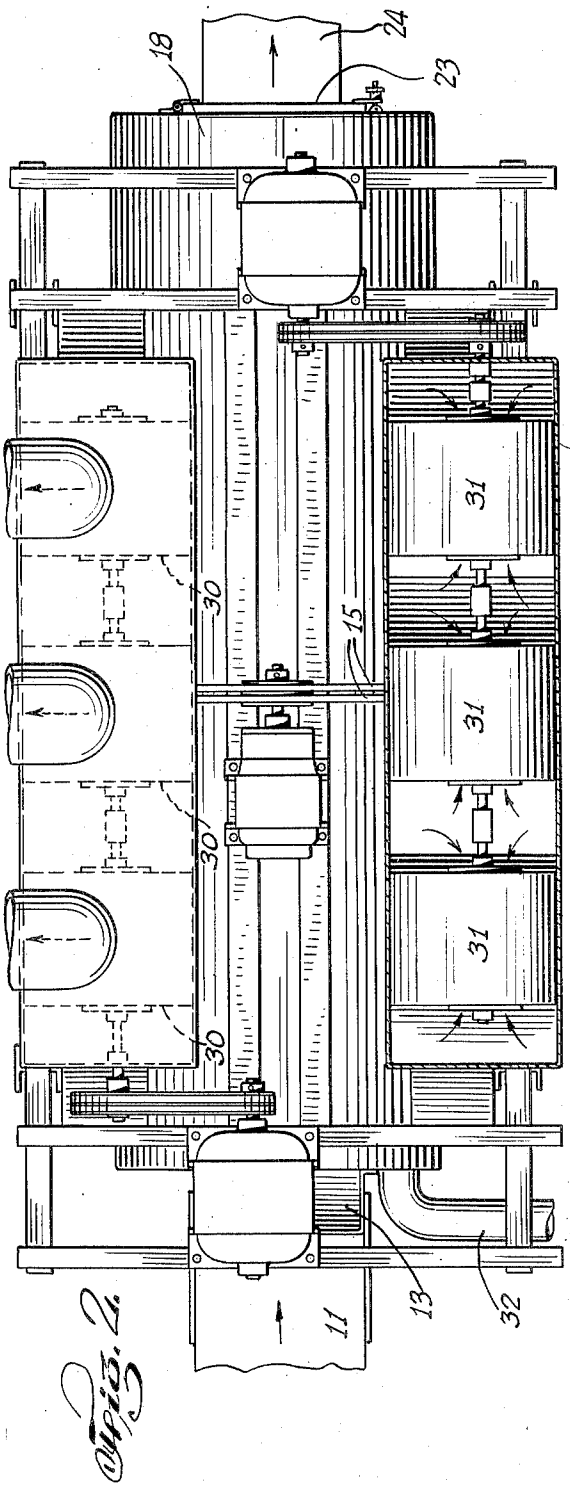


Fig. 2.

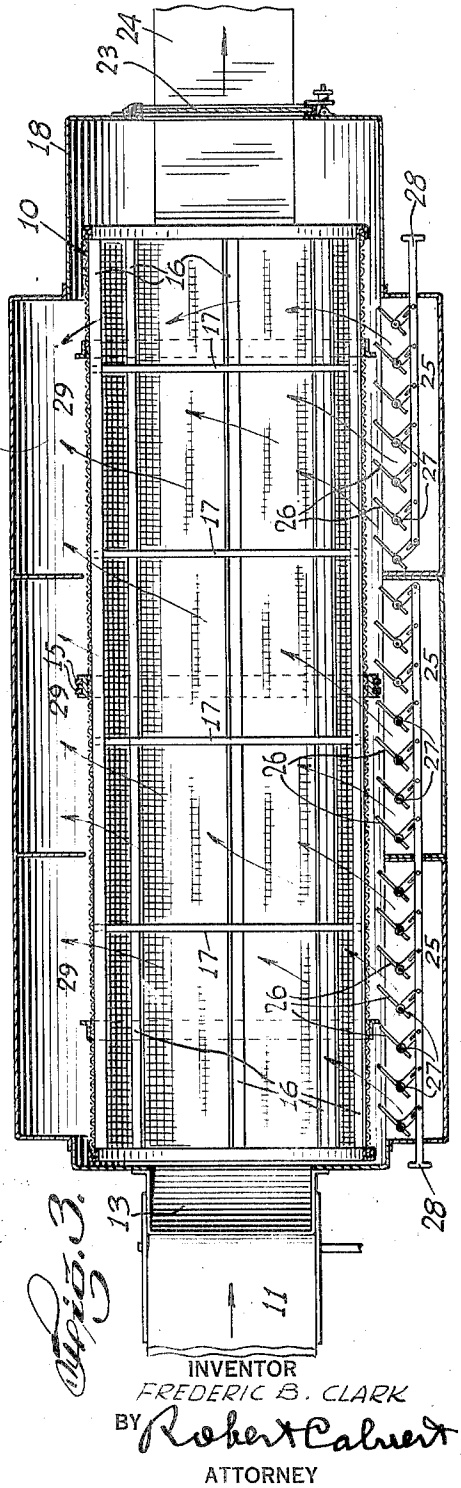


Fig. 3.

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Fig. 5.

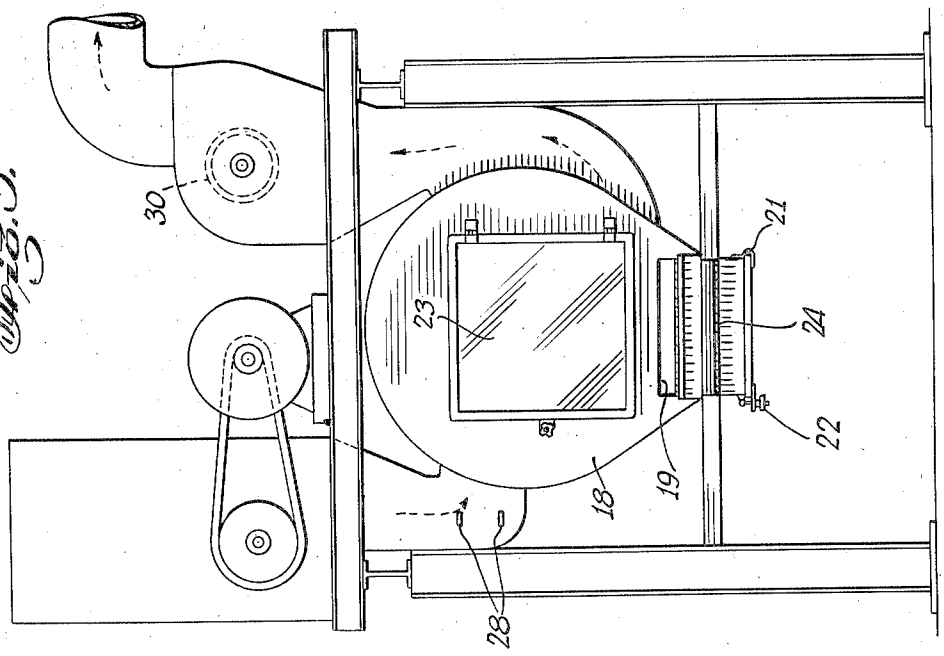
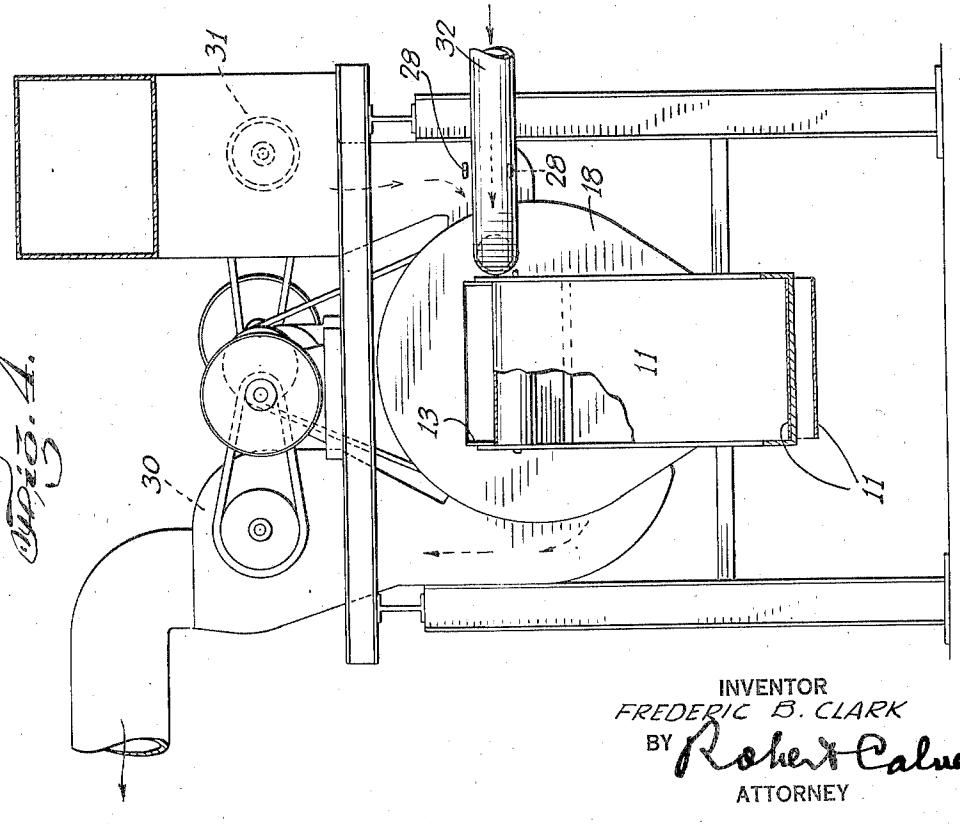


Fig. 4.



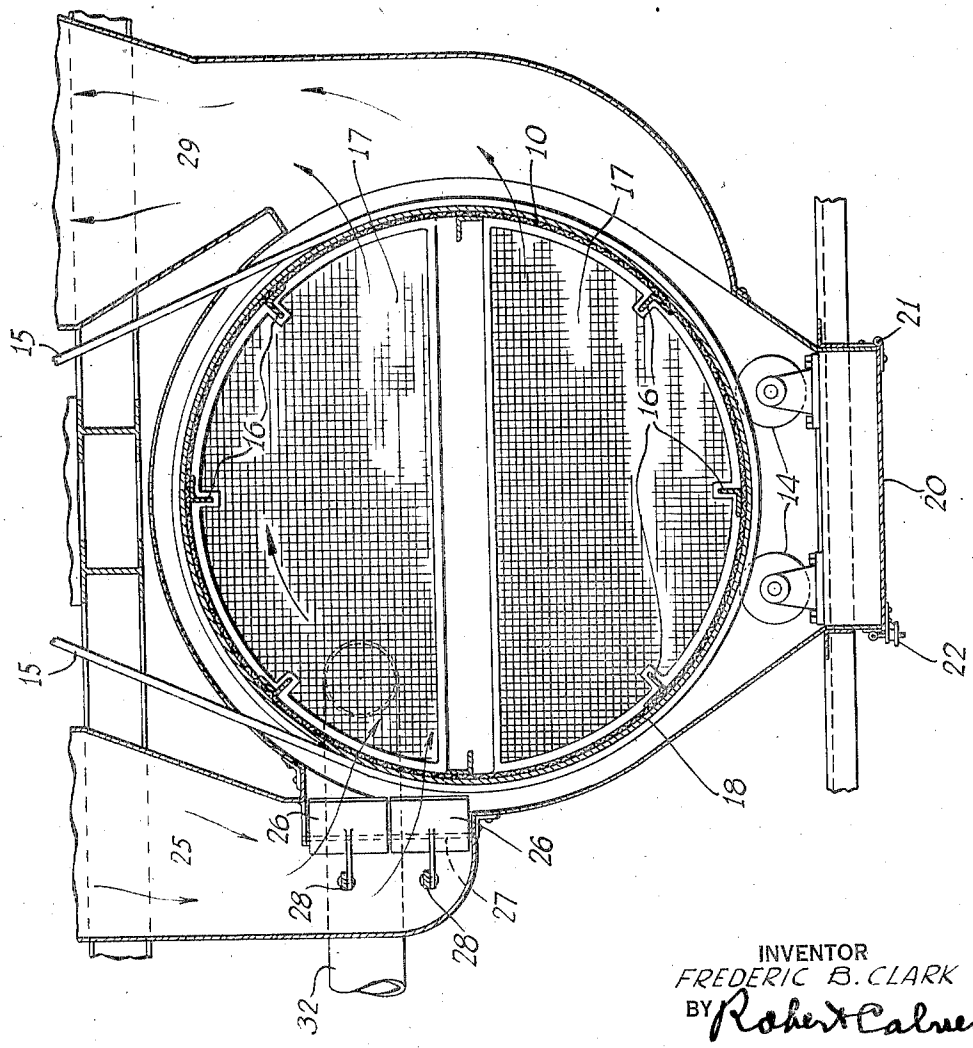
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Fig. 6.



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UNITED STATES PATENT OFFICE

2,222,139

MACHINE FOR REMOVING HAIR FROM LAUNDRY ARTICLES

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Application March 25, 1939, Serial No. 264,256

14 Claims. (Cl. 15—12)

This invention relates to a machine for removing hair from laundry articles. The invention relates particularly to the blowing of hair from barbers' towels or the like in a tumbling machine of special type.

The invention comprises a machine for passing a stream of gas over the laundry articles while in motion within the tumbler. The invention includes the use of the gas stream to suspend the articles at intervals in the said stream as it moves across the tumbler. In a preferred embodiment, the invention comprises a rotating cylinder with air-permeable wall, transverse baffles and means for causing a stream of gas to pass across the space within and then out of the cylinder.

The invention will be illustrated by description in connection with a typical machine shown in the attached drawings, to which reference is made.

Fig. 1 is a side elevational view of my machine, with parts broken away to expose the interior construction of the rotating cylinder.

Fig. 2 is a plan view of the machine with the inlet air header in section.

Fig. 3 is a longitudinal section on the line 3—3 of Fig. 1.

Fig. 4 is an end elevation of the feed end of the machine.

Fig. 5 is a similar view of the discharge end of the machine.

Fig. 6 is a cross-sectional view of the cylinder and adjacent parts of the machine on line 6—6 of Fig. 1.

In the various drawings there are shown a tumbler or hollow cylinder 10 with wall adapted to admit air, say a gauze wall of meshes of about one-half to one inch or so. Means such as the belt conveyor 11 are provided for continuously delivering the laundry articles 12 down the chute 13 to the feed end of the cylinder 10. The articles to which the invention is particularly applicable are barbers' towels and cloths or the like carrying hair that has become associated with the laundry articles during hair-cutting. For best operation the articles should be small, say not much larger than the common barbers' towels.

The apertures in the cylinder wall should be smaller than the articles in their most compact form, to prevent the articles from falling or being blown through the apertures.

The cylinder is disposed with its longest axis approximately horizontal. While the cylinder may be inclined after the manner that is common in rotating kilns and dryers, such inclination is not necessary in my machine, inasmuch as other means to be described are adequate to cause the articles 12 to move through the cylinder forwardly, that is, towards the discharge end.

Suitable means are provided for rotating the cylinder about its longer axis, and upon a plurality of series of rollers 14, as, for instance, the motor driven belts 15 which act upon a driving ring attached to the outside of the cylinder.

On its inside the cylinder is provided with a plurality of spaced lifting elements 16, such as small continuous angle irons extending lengthwise of the cylinder and secured at one side to the cylinder. Six to ten of these angles may be used. There have been used to advantage eight of them at 45° spacing, each flange of the angle irons being about two inches wide.

Also inside the cylinder or tumbler are transverse baffles 17 which are preferably arranged in staggered relationship to each other. These baffles may be freely permeable or impermeable to air. Baffles that have been used to advantage are constructed chiefly of woven wire material or gauze of the same type as used in the cylinder wall 10, the gauze in the baffles as well as in the cylinder wall being framed within and properly supported by suitable metal members. Baffles that have been used to advantage are arcuate in shape and extend more than a fourth and less than half way across the space within the cylinder. For a cylinder that is 3 feet in diameter and 10 feet long, I have used to advantage a total of eight of the transverse baffles, each baffle being about 2 inches short of a complete half circle. The baffles may be considered as segments of a member of circular exterior, the straight side (chord) of the segment extending across the cylinder near the middle thereof and the arc of the segment being adjacent to the cylinder wall, as shown in Fig. 6. The depth of the baffles has an important influence on the rate of forward motion of the articles through the cylinder. While various arrangements of the transverse baffles may be used, I have found satisfactory an arrangement of the baffles in two series, so that the inner edges of all of the baffles lie approximately in one of two parallel planes defining therebetween a space about 4 inches wide.

Disposed around the cylinder is the housing 18 constructed of air-tight material such as metal sheeting and giving a housing that is practically air-tight except for certain openings provided therein including that for the charging chute 13 that has been referred to, opening 19

at the discharge end of the cylinder, certain openings for air that will be referred to subsequently, and others that are incidental.

The housing includes also a lower pan-like closing member 20 removably supported, with suitable hinge and closing mechanism, 21 and 22 respectively, so that the said member may be dropped when it is desired to remove accumulated dirt and other material that has settled through the apertured cylinder upon the said member.

At the discharge end of the machine the housing includes an inspection door 23 suitably including a pane of glass, to permit observation of the operation within the cylinder. At this end the machine includes also a conveyor 24 for continuously removing the articles 12 after passage and discharge from the rotating cylinder.

A feature of the invention is the admission and utilization of a stream of gas of which air is the least expensive and therefore the preferred variety.

In general the machine includes means for introducing a rapid stream of air at a position adjacent to the feed end of the cylinder and the upwardly moving side thereof, causing the air to pass rapidly across the cylinder and preferably forwardly therewithin, and then removing the air, suitably at a position nearer to the discharge end of the cylinder than is the position of introduction of the air. The air is best removed from the cylinder through the downwardly moving side thereof, so that the air is caused to blow over and impinge upon the articles in the cylinder, blow them away from the cylinder on the upwardly moving side thereof and assist in depositing them on the downwardly moving side. During this treatment articles of the type of towels or other small textile sheet objects (herein referred to as "laundry articles") may become temporarily lodged on the edges of one or more of the baffles 17, so that the air whips the articles for a short period and thus facilitates the dislodgement of air-suspendable material on the towel or sheet.

For the admission of the air there is used a header which supplies a stream of air to the compartments 25 spaced side by side along the housing, near a position about half way up on the upwardly moving side of the cylinder. One common header may be used in place of these separate compartments 25, although a better distribution of air towards the ends of the machine is obtained when the air is mechanically divided into streams supplied to each end as well as to the middle of the machine.

Means are provided for establishing approximately the direction of the air at the time of its introduction into the cylinder, as for example the vanes 26 in series extending practically the full length of the cylinder. These vanes are composed suitably of sheets of metal that are just sufficiently thick to be non-bending under the conditions of use. The sheets or vanes are closely spaced, as indicated, and extend approximately parallel to each other.

To permit of proper control and adjustment of the angularity of the vanes with respect to the longer axis of the cylinder and attendant direction of the air stream being introduced, the vanes may be shifted each around a pivot member 27, as by the adjustment rods 28. For more accurate control of the direction of admission of the air, the vanes may be arranged in an upper and lower series, as shown particularly in Fig. 6. Furthermore, the vanes in either or both of such series may be arranged in groups which are independently adjustable as to direction by means of the shift rods 28.

To facilitate passage of air across the cylinder, the housing is provided with outlets 29 disposed, suitably, just opposite the inlet openings 25.

A suction is applied to the air passing from these outlets and the air withdrawn from the cylinder by suitable means, such as suction blowers 30. By regulating the suction so produced and the inlet volume of the air, a very slight draft inwardly into the housing may be maintained, so as to avoid blowing dirt or other material out of the machine through such incidental openings as that for the chute 13 and the driving belts 15. In addition, the excess of suction capacity over that of the inlet blowers 31 prevents recirculation of air within the cylinder and draws the air directly and rapidly across the space within the cylinder, to the outlet therefrom.

For some purposes the outlet air may be withdrawn entirely through that one of the outlets 30 nearest to the discharge end of the cylinder, so as to promote the forward movement of the air through the cylinder. For most purposes, however, the use of outlets extending completely along the cylinder gives superior results, particularly when the inlet air is directed by passage through parallel vanes 26 set to extend transversely and forwardly with respect to the longer axis of the cylinder, forwardly referring to the general direction of movement of the articles through the cylinder, that is from left to right in Fig. 3.

Means are provided preferably for introducing an additional air stream through the pipe 32 constituting an additional inlet, through the housing over the feed end of the cylinder and adjacent to the upwardly moving side of the cylinder. In other words, the inlet for the additional air is off-center with respect to the end portion of the housing, the offset being in the direction of the upwardly moving side of the cylinder. The blast of air so directed longitudinally into the cylinder assists in separating and suspending the laundry articles in the air moving within the cylinder.

While motors and housings for blowers to impel or withdraw the air are shown, it will be understood that other conventional air-impelling means for producing a rapidly moving air stream may be used. Also, conventional framework and accessories for the machine may be used.

Also, various speeds of air may be employed. For a cylinder 10 feet long by 3 feet in diameter, of the kind described, I prefer to blow in approximately 10,000 cubic feet of air a mintue, the vacuum blowers on the outlets from the cylinder being set to withdraw about 11,000 to 12,000 cubic feet in the same time. The control by which the vacuum blowers are set to withdraw more air than introduced by the inlet blowers 31 is conventional. Thus, the vacuum blowers may be larger than the others or may be of the same size but rotated at higher speed. Also, less resistance may be interposed to the passage of air through the vacuum blowers, the vanes 26, for instance, being omitted from the vacuum blower system but being present and constituting in effect dampers in the air line from the inlet blowers. For longer or smaller cylinders, the volume of air may be varied, say, more or less in proportion to the size of the cylinder.

Likewise various speeds of rotation of the cylinder may be used. A suitable speed is around 25 to 35 revolutions per minute. At higher speeds

than about 40 R. P. M., centrifugal force tends to pack and hold the articles against the cylinder wall.

Various elements of the machine described above may be omitted if their functions are not desired.

The method of removing hair from laundry articles has been described in part in connection with the description of the machine. Barbers' towels or the like carrying adhering hair are fed to the machine and simultaneously tumbled and blown as described. The air stream passing through the upside of the apertured cylinder blows the articles from the cylinder wall, separates the towels from each other, opens up initially folded or wadded articles, and blows the towels towards the air outlet or down side of the cylinder. Ordinarily a given article is subjected to this series of steps repeatedly, as it advances irregularly through the cylinder, under the influence of the forward component of the velocity of the air. The articles are finally delivered, practically free from hair, to the conveyor at the discharge end of the machine.

The articles so treated are then ready for subsequent laundry treatment.

For some purposes the method may be varied from this series of steps which gives the best results, so long as the laundry articles are simultaneously tumbled and blown with a rapidly moving stream of air.

It will be understood, also, that the details given are for the purpose of illustration, not restriction, and that variations within the spirit of the invention are intended to be included within the scope of the appended claims.

I claim:

1. A machine for removing hair from laundry articles which comprises a tumbler having feed and discharge ends and having the longest axis extending approximately horizontally, means for rotating the tumbler on said axis, means for continuously delivering the said articles into the feed end of the tumbler, means for removing the articles from the discharge end of the tumbler, and means for introducing a rapid stream of gas into the tumbler, causing the gas to impinge upon the articles and to pass transversely across the space within the tumbler, forwardly towards the discharge end of the tumbler, and out of the tumbler.

2. A machine for removing hair from laundry articles comprising a hollow cylinder extending approximately horizontally and having feed and discharge ends, means for rotating the cylinder, means for delivering the said articles into the feed end thereof, means for introducing a rapid stream of air through the side of the cylinder, means for directing the air stream transversely and forwardly within the cylinder, so that the air stream moves towards the side of the cylinder opposite the side through which the air is introduced and towards the discharge end of the cylinder, and means for removing the air from the cylinder.

3. A machine as described in claim 2, the cylinder having a wall provided with closely spaced apertures, of size of opening smaller than the said articles, constituting passages for air and the air stream being introduced through the upwardly moving portion of the rotating cylinder.

4. A machine as described in claim 2, comprising means for introducing the said stream of air at closely spaced positions along practically the entire length of the cylinder.

5. A machine as described in claim 2, the said means for directing the air stream including a series of spaced approximately parallel plates constituting vanes disposed in the stream of air, and means for controlling the angular direction of the vanes with respect to the axis of the cylinder.

6. A machine as described in claim 2, the said means for directing the air stream including a series of spaced approximately parallel plates constituting vanes extending transversely and forwardly with respect to the axis of the cylinder in the general direction of movement of the articles within the cylinder, a blower for forcing the air between the vanes and into the cylinder, and means for withdrawing air from the cylinder.

7. A machine for removing hair from laundry articles comprising an approximately horizontally disposed cylinder having a wall provided with spaced apertures, means for rotating the cylinder, baffles extending transversely, each part way across the space within the cylinder, means for supplying the said articles to one end of the cylinder and means for introducing a rapid stream of gas through the wall, passing the air transversely across the space within the cylinder, and removing the air from the cylinder.

8. A machine for removing hair from laundry articles comprising an approximately horizontally disposed cylinder having a wall provided with spaced apertures, means for rotating the cylinder, lifting elements secured inside the wall, air-permeable baffles extending transversely, each part way across the space within the cylinder, in staggered relation to each other, means for supplying the said articles to one end of the cylinder and means for introducing a rapid stream of gas through the said wall on the upwardly moving side of the cylinder, passing the air transversely and forwardly of the cylinder, and out, through the downwardly moving side of the cylinder.

9. A machine for removing hair from laundry articles comprising an approximately horizontally disposed cylinder having a wall provided with closely spaced apertures for admitting air, means for rotating the cylinder, baffles extending transversely, each part way across the space within the cylinder wall, means for feeding the said articles to the cylinder, and means for introducing a rapid stream of air through the apertures of the wall on the upwardly moving side thereof, passing the air transversely and forwardly of the cylinder, and then out, through the downwardly moving side of the cylinder.

10. A machine as described in claim 7, the said baffles extending each more than a fourth and less than half way across the cylinder.

11. A machine for removing hair from barbers' towels comprising an approximately horizontally disposed cylinder of gauze wall, means for rotating the cylinder, longitudinally extending lifting flights secured inside the gauze wall, baffles extending transversely, each part way across the space within the cylinder wall, in staggered relation to each other, means for supplying to one end of the cylinder the towels carrying hair, means for removing the towels from the other end of the cylinder, and means for introducing a rapid stream of air through the gauze wall on the upwardly moving side of the cylinder, passing the air transversely and forwardly across the space within the cylinder, and out, through the downwardly moving side of the cylinder.

12. A machine as described in claim 2, the cylinder having a wall provided with closely spaced

apertures constituting passages for air; the machine including a housing constructed of substantially air-tight material disposed around the sides and ends of the cylinder, in spaced relationship thereto, provided with an opening adjacent to the side of the cylinder for the admission of air, and provided with an additional opening in the portion of the housing disposed over the feed end of the cylinder, the additional opening being off-center, in the said portion of the housing, in the direction of the upwardly moving side of the rotating cylinder; and means for passing air through the said additional opening, so as to form a stream of air directed approximately longitudinally of the cylinder and against the said articles as they are carried on the upwardly moving side of the cylinder.

13. A machine as described in claim 7, the baffles being approximately of the shape of segments of a member of circular exterior, with the straight side of the segment extending across the cylinder at a position near the middle thereof, and the arc of the segment being adjacent to the inside wall of the cylinder.

14. A machine for removing hair from laundry articles comprising a hollow cylinder having a wall provided with closely spaced apertures extending practically around and from one end of the cylinder to the other, means for rotating the cylinder, means for feeding laundry articles carrying hair to the cylinder, a housing constructed of substantially air-tight material disposed around the cylinder in spaced relationship thereto and provided with openings for feeding and discharging the said articles, means including an inlet blower for forcing air through the said apertures on the upwardly moving side of the cylinder and causing the air to move transversely across the space within the cylinder and forwardly towards the discharge end thereof, and means including a suction blower for withdrawing air from the cylinder, the suction blower being of greater capacity than the inlet blower and so adapted to withdraw air in larger volume per unit of time than delivered by the inlet blower.

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