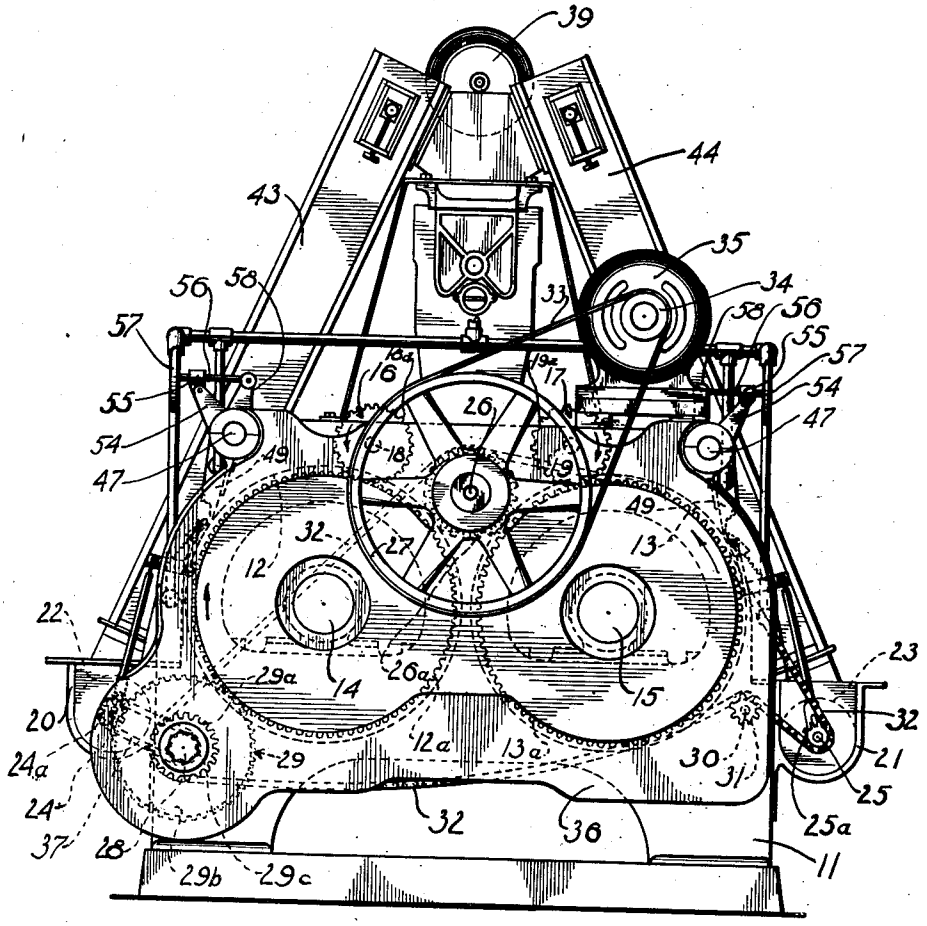
June 27, 1944. G. OVERTON 2,352,220

DEHYDRATING MACHINE

Filed Nov. 28, 1941 4 Sheets-Sheet 1

Fig. 1



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DEHYDRATING MACHINE

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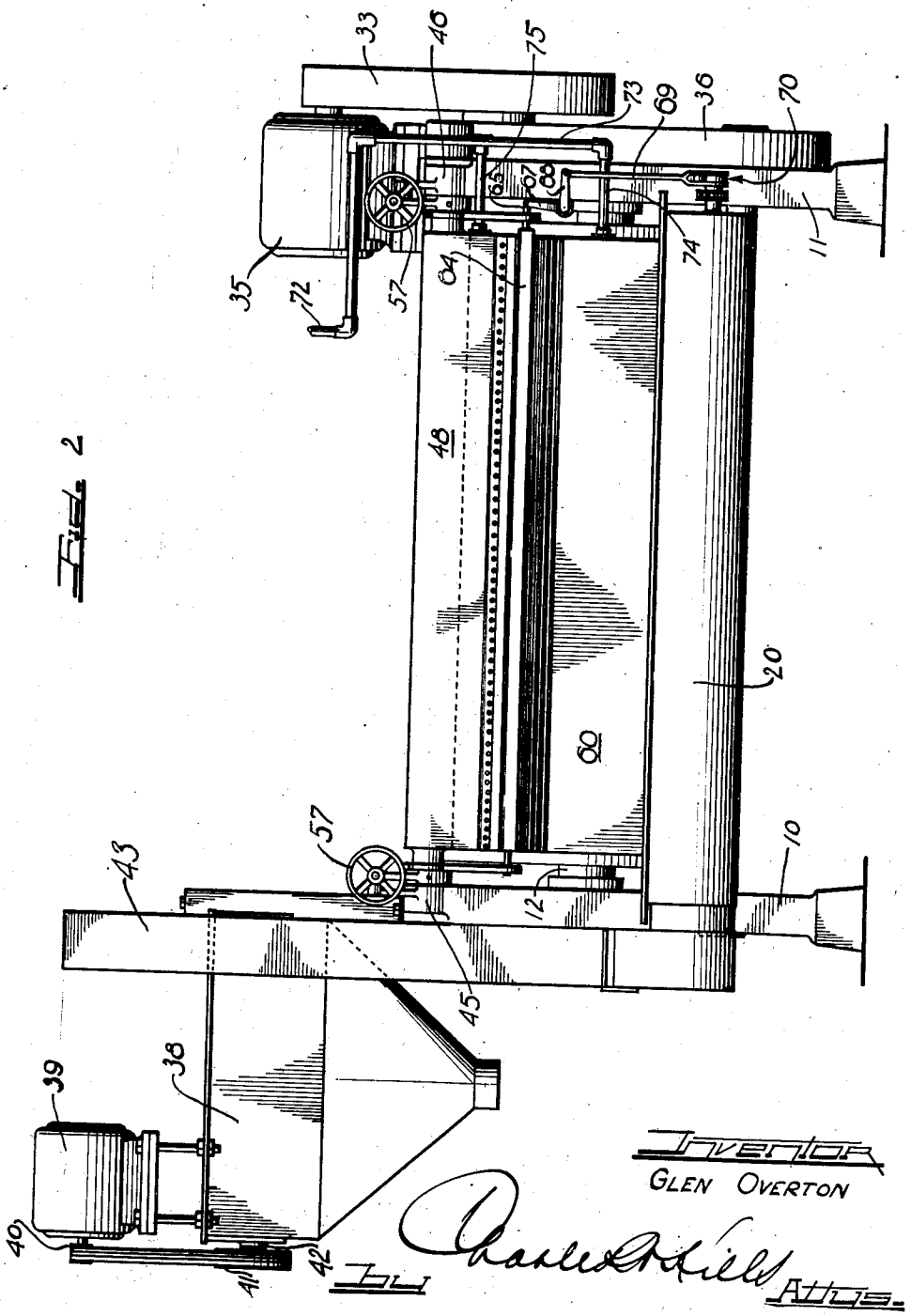


Fig. 2

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DEHYDRATING MACHINE

Filed Nov. 28, 1941 4 Sheets-Sheet 3

Fig. 4

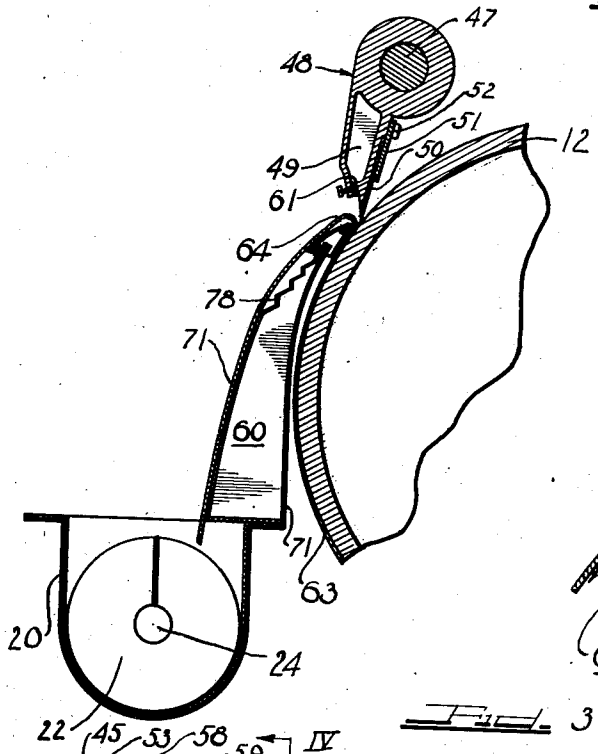


Fig. 5

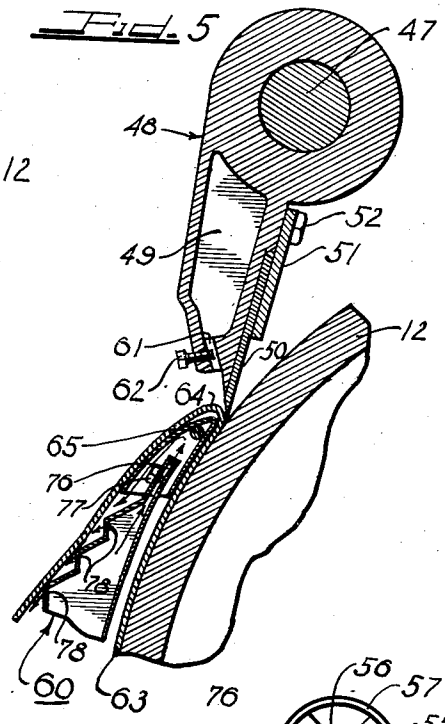
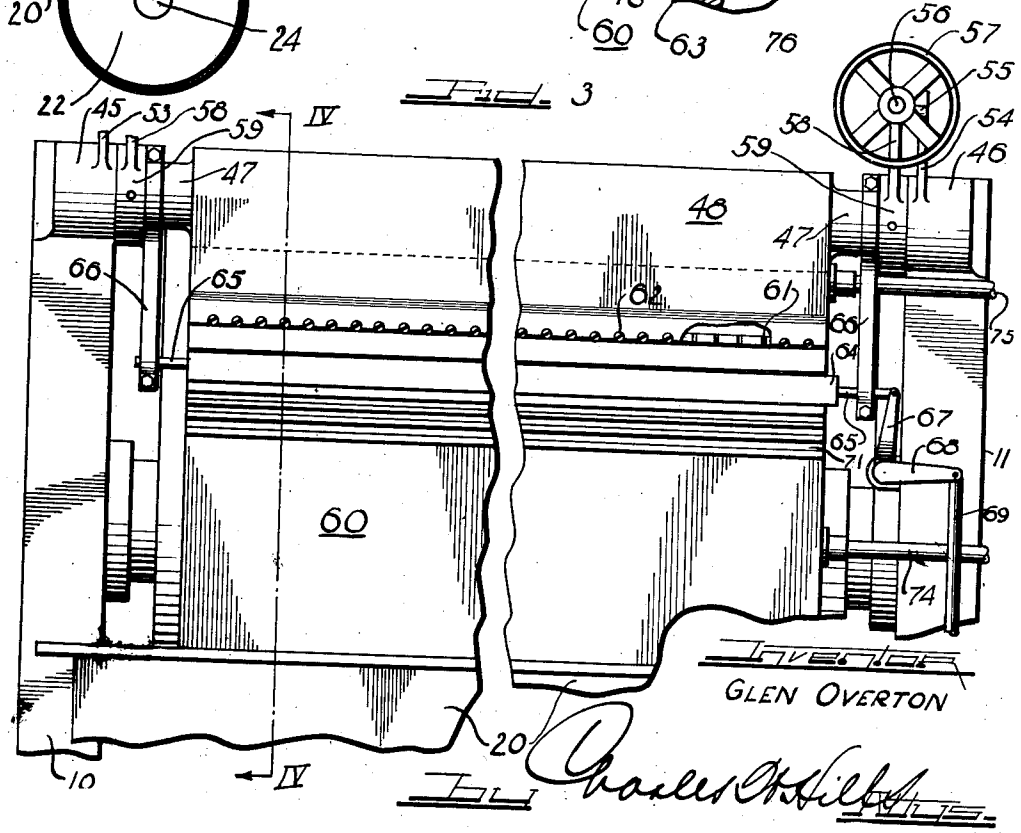


Fig. 3



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Fig. 1

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DEHYDRATING MACHINE

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Fig. 7.

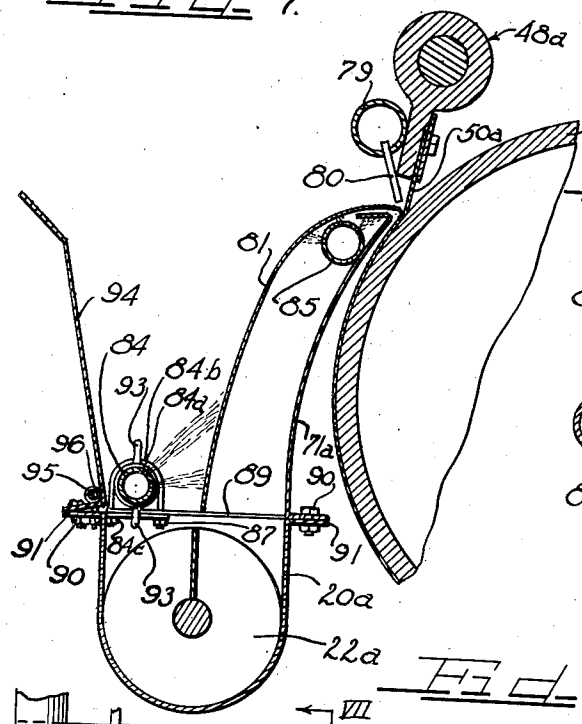


Fig. 8.

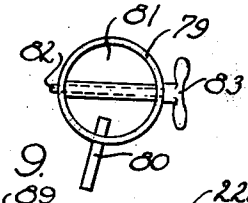


Fig. 9.

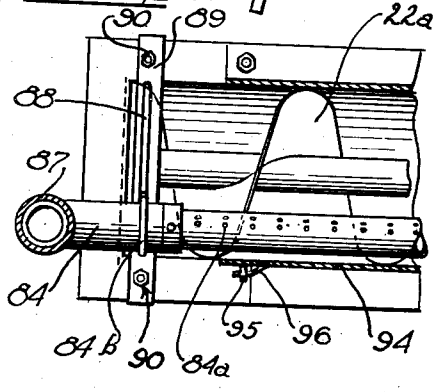
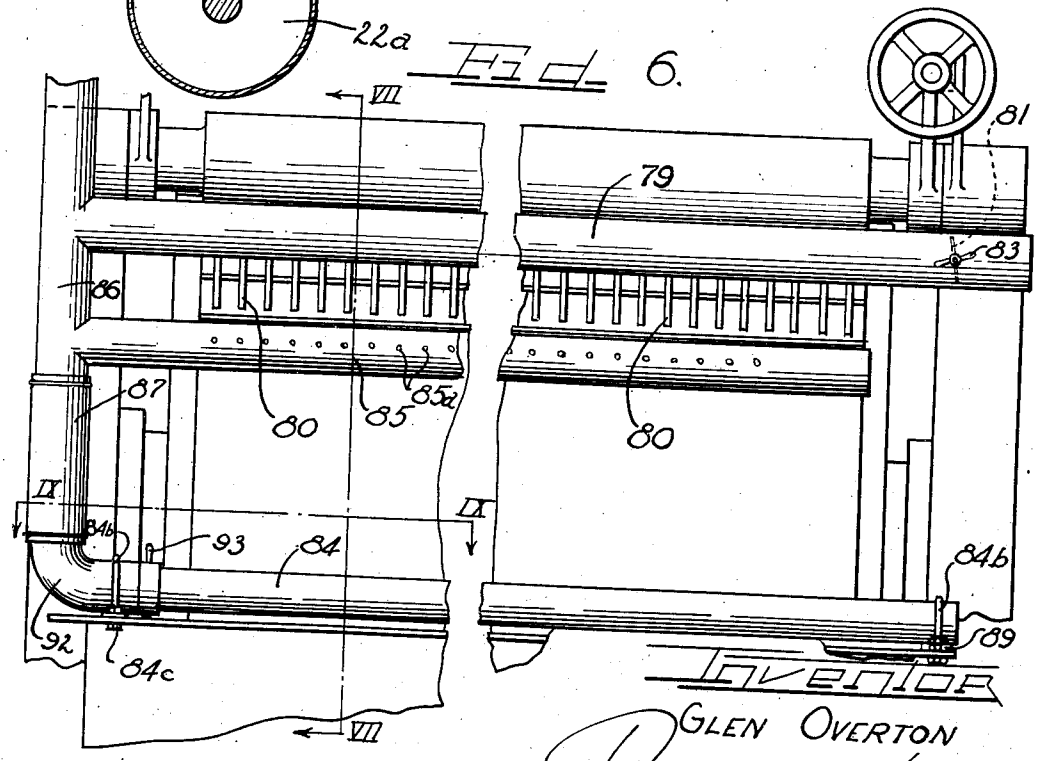


Fig. 6.



INVENTOR

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ATTY.

Patented June 27, 1944 2,352,220

UNITED STATES PATENT OFFICE

2,352,220

DEHYDRATING MACHINE

Glen Overton, Dowagiac, Mich., assignor to Louisville Drying Machinery Company, a corporation of Kentucky

Application November 28, 1941, Serial No. 420,776

17 Claims. (Cl. 34—13)

This invention relates to dehydrating machines and is directed more particularly to apparatus for removing dried sheets or films from that type of machine in which the material to be dried is spread in relatively thin film form on a heated rotating drum.

In the past several difficulties have been encountered when heat decomposable slurries, solutions and the like were dried on drum driers.

One of the most important of these difficulties concerns the overheating and cooking of the material treated due to the presence of residual heat in the material after the drying operation has been completed. For example, in the treatment of distillery slops, which have a high sugar content, it is found that after the dehydrating operation had been completed this residual heat continues to cook the material with the result that caramelizing sets in. In effect, this action of residual heat upon the material which has been dried often changes the characteristics of the material detrimentally to render it relatively useless for the purpose for which it is subsequently intended and often renders it hard to handle.

Still another difficulty which is encountered in the use of machines of the above character concerns the problem of removing the film from the drying drum when the drying operation has been completed. In order that machines of the above character operate with maximum efficiency and dehydrate the greatest amount of material possible in a given period of time, it is necessary that the dried film be removed quickly and cleanly so that the surface of the drum is ready to again have a moist film applied to it.

Another difficulty encountered in the operation of machines of the above character concerns the ultimate discharge of the dried material from the drying mechanism to conveyors which transport it away. In the past it has been found that the relatively thin film broke, buckled, and rolled or folded over itself thereby delaying the free discharge of the film from the dehydrating apparatus and causing accumulation thereof before it reached the conveyor mechanism.

To the end that the above set forth difficulties may be avoided, and as an important object of the invention there is provided herein an improved dehydrating apparatus wherein the dehydrated film is effectively cooled immediately upon its removal from the hot dehydrating drum; wherein the film is easily, quickly, completely and efficiently removed from the drum; and wherein the film is efficiently aided in its progression from the drying apparatus toward a conveyor to avoid rolling over or balling up on the drum.

Another object of the invention is to provide a new and improved doctor blade and doctor blade assembly for a drum drier.

Still another object of the invention is to provide a new and improved apron and apron assembly for a drum drier.

A further object of the invention is to provide an apparatus of the above character wherein the progression of the dried film toward the conveyor is enhanced without mechanical manipulation.

Still another object of the invention is to provide apparatus of the above character with means whereby cooling air, which has been freed from condensed moisture, is impinged against the dried film, this impingement being accomplished by impinging air against one or both surfaces thereof.

It is a more specific object of the invention to provide dehydrating apparatus of the above character with a doctor blade assembly which has associated therewith a cool air channel and downwardly projecting jets whereby the removal of the dried film from the surface of a drying drum by the doctor blade will be facilitated by the impingement of air against the material as it bends away from the surface of the drum. Under such conditions, it will be understood that the impinging cool air not only cools the adjacent surface of the film simultaneously with its removal from the drum, but also tends to raise it away from the surface of the drum to aid the action of the doctor blade.

Another object of the invention is to provide an improved cooling air system which also serves to guide the film into a suitable disposal conveyor after it is removed from the drum surface.

Still another specific object of the invention is to provide an improved apron construction for the dehydrating apparatus which has associated therewith a cool air duct whereby cool air is directed against the film to cool it and also to raise it away from the surface of the apron whereby the film falls more freely by gravity toward the conveyor without buckling or breaking and thus piling up.

Another important object of the invention is to provide means for oscillating or vibrating the apron or a part thereof to further facilitate the progression of the film thereover and to prevent the film from adhering thereto.

In accordance with other features of the invention, there is provided an improved arrangement

of air ducts whereby drying air is impinged against both surfaces of the portion of the film which has been removed from the drier in order that it be guided toward a suitable conveyor and in order that a maximum drying effect may be obtained. As shown herein, one of the air ducts may be adjustably mounted for movement to the other side of the film so that the lifting force of the flow of air therefrom may be utilized to enhance the progress of the film toward the conveyor.

In accordance with another feature of the invention, an auxiliary apron is provided for deflecting the first run of film away from the disposal conveyor in the event that the drier is not hot enough to dry the film the desired amount.

Other objects and features of the invention will become apparent from the following specification and the attached drawings, in which:

Figure 1 is a side elevational view of the machine generally;

Figure 2 is a front elevational view thereof;

Figure 3 is an enlarged fragmentary view similar to Figure 2 with parts broken away;

Figure 4 is a cross sectional view taken along the line IV—IV of Figure 3; and

Figure 5 is an enlarged fragmentary view similar to Figure 4.

Figure 6 is an enlarged fragmentary front elevational view of a modified form of apparatus embodying the invention.

Figure 7 is a cross sectional view taken on the line VII—VII of Figure 6.

Figure 8 is an end view of the upper air duct taken from the right of Figure 6.

Figure 9 is a cross sectional view taken on the line IX—IX of Figure 6.

It is to be understood that the embodiments shown and described herein are for illustrative purposes and may be changed or modified without departing from the spirit and scope of the invention as set forth in the accompanying claims.

As shown in Figures 1 and 2, the dehydrating apparatus includes generally a pair of spaced supporting members 10 and 11 between which extend the various mechanisms for treating materials in a manner to be described presently.

The drying mechanisms include, primarily, drying drums 12 and 13 mounted for rotation with journals 14 and 15 respectively, these journals having the ends thereof suitably mounted for rotation in aligned bearings formed in the supporting members 10 and 11.

Above each of the drying drums 12 and 13 is a spreader roller 16 and 17 respectively. These rollers are mounted on journals 18 and 19 respectively which also are mounted to rotate in aligned bearings formed in members 10 and 11.

Adjacent each of the drums 12 and 13 is a conveyor trough 20 and 21 respectively, each having therein a screw conveyor 22 and 23 respectively mounted on journals 24 and 25 and each having sprockets 24a and 25a respectively, fixedly secured thereto.

Additionally, there is mounted on suitable bearings formed in the member 11 a journal 26 upon which a drive pulley 27 and a drive sprocket 26a are fixedly secured, a journal 28 upon which a multiple sprocket drive 29 is mounted and a stud 30 upon which an idler sprocket 31 is mounted.

As shown in Figure 1, a drive chain 32 meshes with the drive sprocket 26a, the sprocket 29a of the multiple sprocket drive 29, sprocket ring 13a mounted upon the end of the drum 13, idler sprocket 31, sprocket 25 of the screw conveyor 23, and again with the ring 13a of the drum 13.

Like the drum 13, the drum 12 is provided with a sprocket ring 12a, the latter meshing directly with the sprocket 29b of the drive 29.

Preferably the spreader rollers 16 and 17 are also provided with some driving means, and as shown herein they also are provided with sprocket rings 18a and 19a respectively which are adapted to mesh directly with the sprocket rings 12a and 13a respectively. As shown in Figure 1, the multiple sprocket drive 29 has a third sprocket 29c mounted thereon, and this sprocket has meshed with it a chain 37 which in turn meshes with the sprocket 24a whereby the conveyor screw 22 is rotated in the housing 20.

A drive belt 33 extends around the drive pulley 27 and around a pulley 34 mounted on the shaft of a motor 35. The motor is suitably mounted as on a standard extending upwardly of the supporting member 11. As will be seen from Figure 2, the above described assembly may be housed in a suitable safety cover 36.

From the foregoing, it will be seen that the drying drums 12 and 13, spreader rollers 16 and 17, and conveyors 22 and 23 will all be rotated by the motor 35 through the chain and sprocket assembly above described, the drums rotating in the direction of the arrows shown in Figure 1.

Any suitable drying medium such as hot air or steam may be passed into the interior of the drums in any suitable manner, and the material to be treated may be suitably fed to the drum surfaces as at the nip formed by the drums and by the spreader rollers. After passing between the rollers, the material adheres to the drum surface as a thin film or sheet in which condition it may be readily dried.

To the end that the dried material such as distillery slop, dried milk, or fish refuse may be collected, agitated, and disposed of after the drying operation, there may be provided, at the disposal end of housings 20 and 21 and the screw conveyors 22 and 23, elevators 43 and 44 respectively which feed the materals into a hopper 38 in which is arranged a suitable agitator driven by a motor 39 through belt 40, pulley 41, and shaft 42.

As previously stated, the efficiency of the output of apparatus of the above character depends to a great extent upon the efficiency of the disposal of the treated material from the drum and the efficiency of the transmittal thereof from the drum to the conveyor. Furthermore, as stated above, the drying is attained by subjecting the material to high temperatures which if maintained for too long a period, cook the material, this cooking often affecting it detrimentally.

Referring to Figures 1, 2, and 3, the upper ends of supporting members 10 and 11 terminate in bearings 45 and 46 in which doctor rods 47 are mounted for rotation. A similar film handling mechanism is provided for each drum, and for convenience like numerals will be applied to like parts on both sides of the machine. A doctor bar 48 is fixedly mounted upon the doctor rod 47 and in accordance with the invention, a suitable compressed air duct is associated with the bar 48. In the present embodiment, the bar 48 is hollowed out to provide an air passage as at 49, is recessed on its back surface to receive a removable doctor blade 50, and is provided with a longitudinally extending blade retaining plate 51 which is held in position by bolts, one of which is shown at 52.

To the end that the pressure with which the edge of the blade 50 bears against the surface

of the respective dryer drum may be regulated, a suitable adjustment may be provided, and for that purpose, as is shown herein, there is provided an arm 53 and 54 mounted upon the bearings 45 and 46 respectively. Each of the arms 53 and 54 terminates at its upper end in an offset bearing 55 as shown associated with the arm 54 in Figures 1 and 3. A rotating, threaded spindle 56 is extended through the respective bearings 55 and terminates in a hand wheel 57 at its outer end. The spindle 56 is rotatably anchored to an arm 58 at its inner end, the respective arm 58 being mounted on a bushing 59 which is fixedly secured at each end of the doctor rod 47. Thus, it will be seen that rotation of the hand wheels 57 will cause rocking of the respective arm 58 and rotating movement of the respective rod 47 and thus movement of the edge of the respective blade 50 toward or away from the surface of the respective drum.

To the end that the specific objects of the invention may be attained, there is provided herein, as above set forth, an improved doctor bar 48 and also an improved apron shown generally at 60.

Referring particularly to Figures 4 and 5, the cool air duct 49 of the doctor bar 48 is provided with a plurality of air outlet passages 61 which extend entirely across the bar for purposes to be described presently. In order to obtain proper distribution of the air from the channel or duct 49, each of the passages 61 is provided with a valve screw 62. The passages 61 are positioned in the doctor bar 48 at such an angle that the onrushing air from the channel 49 is directed downwardly against the leading face of the doctor blade 50 and toward the cutting edge thereof.

As shown in Figures 4 and 5, the film 63 of dried material is being carried upwardly on the surface of the drum 12 when it engages the doctor blade 50 to be separated from said surface. As previously stated, the film 63 adheres to the surface of the drum during the drying operation and is often tacky, thereby rendering it difficult to remove from the surface of the drum by means of the knife alone. It will be understood that any resistance to this removal will, of course, result in a rolling or buckling of the film and thus the clogging of the machinery in the vicinity of the point where the doctor blade engages the surface of the drum.

To the end that the resistance of the film to easy removal from the surface of the drum by the doctor blade may be overcome, the valves 62 may be so regulated that the compression of air in the air channel 49 will provide a rush of the air through the ducts 61 and downwardly into the nip which is formed between the surface of the drum and the curled film which has already been removed from that surface.

Thus, it will be seen that the impingement of the air is effective to impart a lifting tendency to the film as it reaches the blade 50, whereupon the blade completes the removal from the surface.

It will also be understood that this impingement of cool air against what was previously the under surface of the film will effectively cool that surface simultaneously with its removal from the hot surface of the drum to prevent continued cooking of the residue due to the inherent heat which has been created by the heat from the drum.

The apron shown generally at 60 is provided primarily for the purpose of receiving the film as it is removed from the surface of the drum and directing it away from the oncoming film which is yet to be removed and toward the conveyor housings 20 and 21. In the past it has been found that the film, which as above mentioned is often tacky, will adhere to the surface of the apron thus buckling and piling up to prevent the free discharge of the dried material from the surface of the drum to the conveyor.

In the present instance, the apron includes a tip portion 64 which has a tapered, yet substantially rounded following edge for receiving the film 63 in sliding relationship after it has been removed from the surface of the drum and bent back upon itself. The portion 64 may be suitably formed from sheet metal and like the drum extends from the supporting element 10 to the supporting element 11.

To the end that the removal of the film from the drum 12 may be facilitated by being preliminarily loosened, the tip portion 64 of the apron is mounted upon a rod 65 extending therethrough, the ends of this rod being supported by depending supporting elements 66 which are, in turn, supported at their upper ends by the doctor rod 47. Lateral vibratory movement is imparted to the tip 64 by means of a lever 67 which is secured pivotally to one end of the bar 65, the lever 67 comprising one arm of a bell crank, the lever 68 comprising the other arm thereof. A pitman 69 is pivotally secured to the outer end of the lever 68 and has its remote end suitably rotatably connected with an eccentric shown generally at 70 (see Fig. 2), the latter being mounted at the end of the conveyor shaft 24 to rotate therewith.

From the foregoing, it will be seen that when the motor 35 is turned on, the shaft 24 will be rotated as previously described, and the tip portion 64 of the apron will be vibrated laterally by virtue of the eccentric 70 and the bell crank levers 67 and 68.

The apron 60 further comprises a depending portion 71 which is preferably hollow and has compressed cooling air supplied thereto from any suitable source such as through connections 72, 73, and 74 (see Fig. 2), a branch pipe 75 being adapted to supply the compressed air into the channel 49 of the doctor bar 48.

As shown clearly in Figures 4 and 5, the hollow portion 71 of the apron terminates at its upper edge in a compressed air discharge passage 76 which directs the air into the hollow tip portion 64. This passage may extend longitudinally of the hollow portion 71 of the apron or may, if desired, comprise a plurality of spouts extending thereacross, each spout being provided with a regulating valve 77 to insure proper distribution of the compressed air for the purpose to be described presently.

The hollow portion 71 of the apron 60 is further formed toward its upper, outer side with a receding stepped formation, the substantially vertical portions of the steps each being provided with an air discharge outlet 78 directed toward the adjacent surface of the film 63 passing over the apron and substantially downwardly in the direction of the path of travel of the film. With such a construction it will be seen that due to the compression within the apron portion 71 the air therein will be discharged upwardly into the tip portion 64 and then downwardly over the outer side of the corrugated formation while at the same time the air will be discharged through the ports 78 to impinge against the adjacent surface

of the downwardly moving film of dried material with a glancing action in a downward direction, this particular direction of the air being caused first by the somewhat downward projection of the passages or ports 78 and further by the downward movement of the compressed air from beneath the tip portion 64 as indicated by the arrows in Figure 5.

The total effect of the last described impingement of air against the leader surface of the film is to cool this surface immediately after separation of the film from the drum, to tend to blow the film loose from the engaged outer wall of the apron, and to impinge against the film in the direction in which it is moving thereby aiding in its progression downwardly toward the conveyor.

From the foregoing, it will also be seen that the film 63 is being effectively dried by the heat of the drum up to the time that it reaches the blade 50, whereupon it is removed from the surface by the blade 50 and by the air discharged through passages 61 and simultaneously the surface of the film which lays adjacent the heated surface of the drum during the dehydrating operation is immediately cooled. Thereafter the other surface of the film is impinged upon by the cooling air which is discharged from the passages 76 and from the passages 78, whereby the cooling operation is carried further, this latter impingement also serving to progress the film over the apron in a manner to prevent buckling and rolling thereof to delay the discharge of the dried and cooled film 63 to the conveyor.

Another highly important feature of the invention may be attributed to the impingement of air against the under surface of the film as it is discharged from passages 76 and 78. It is to be noted that the progression of the film over the apron downwardly toward the conveyor is accomplished without the aid of any mechanical handling devices such as rollers or the like. Instead, the facilitated progression downwardly of the film is accomplished solely by the impingement of air thereagainst. Thus, mechanical handling and manipulation of the firm and the resulting possibility of clogging or breakage thereof is entirely avoided.

As previously stated the cooling air, under certain conditions, contains moisture in sufficient amount so that condensation occurs within the ducts with the result that the moisture is impinged upon the film as it is removed from the drum, to the end that the dehydrating function of the drum is, in a measure, defeated.

In order that the detrimental effects of this condensed moisture may be obviated, the construction shown in Figures 6 and 7 may be utilized.

In this construction the air duct 79 associated with the doctor bar 48a has a series of tubes 80 extending through the wall thereof throughout its length. The tubes 80 direct the flow of a stream of air from the duct 79 to the film 81 at the point of the drum 12a which is engaged by the doctor blade 50a. As will be seen from Figures 7 and 8, the tubes 80 have their upper ends extending above the inner surface of the duct 79 and, consequently, condensed moisture as it accumulates in the ducts will be entrapped therein and prevented from the discharge through the tubes 80 against the film along with the dehydrating air. To the end that the duct 79 may be cleared of condensed moisture from time to time, a valve 81 mounted on a spindle 82 and having a handle 83 is mounted in one end of the duct 79 and may be opened periodically to afford discharge of the condensed liquid.

As previously stated, the film, when removed from the drum, is somewhat tacky, and thus its progress from the drum to the conveyor is greatly facilitated by impinging air against the inner surface thereof as it falls, to aid its progress downwardly through the conveyor. Under these circumstances, the air blast is calibrated to maintain the falling film in a particular position so that it is discharged directly into the conveyor trough. If, however, the density or thickness of the film decreases after the air blast is calibrated, it will be seen that the film will be blown out of alignment with the conveyor trough by the air blast and to the end that it may be realigned without recalibration of the air flow, there is provided an auxiliary duct 84 as shown in Figures 6 and 7.

In this construction air from ducts 79 and 84 is directed against one surface of the film 81 while air from a duct 85 is directed against the rear surface thereof. The ducts 79, 84, and 85 are each connected with a main duct 86 which communicates with a suitable source of air supply and has a flexible section 87 interposed between the duct 85, having apertures 85a therein, and the duct 84 having apertures 84a therein.

While the duct 84 is normally used in the manner shown in Figure 7, that is, with the air blast therefrom being directed against the outer surface of the film as it falls into the conveyor trough 20a, it may be desirable, in the event that the film is particularly heavy, that the duct 84 be so positioned that the air blast therefrom be directed against the nether surface of the film as is the case with the duct 85. To the end that this adjustment may be made, the duct 84 is embraced by a U-bolt 84b at each end thereof, the U-bolt being slidably mounted by nuts 84c in slots 88 formed in brackets 89 mounted across the conveyor trough 20a and secured in position by means of bolts 90, which extend through longitudinal flanges 91 of the conveyor trough.

From the foregoing it will be seen that by loosening the nuts 84c, the duct 84 may be shifted laterally of the members 89, the section 87 flexing to permit this movement.

The duct 84 is connected with the flexible section 87 through an elbow 92 which is constructed at its adjacent end to receive the end of the duct 84 in leak-proof, rotatable relationship whereby the duct may be rotated for predetermining the direction of the air flow therefrom by movement of the handles 93.

Under certain circumstances, particularly when the apparatus disclosed herein is first started up, it is found that the dehydrating effect upon the film is not as great as that ultimately required. If, therefore, this first run of the film is directed into the conveyor trough, it subsequently becomes mixed with the subsequently removed film which is properly dried and increases the moisture content thereof to an undesirable point. To the end that this first run of the film may be deflected from the conveyor trough there is provided herein, as shown in Figures 6, 7, and 9, an auxiliary apron 94 which, when in the position shown in Figure 7, acts as a guard but which may be pivoted about its lower end so that it rests against the apron 71a. When in this latter position, it will be seen that the film discharged from the drum 12a will be de-

flected from the conveyor trough and may be collected so long as its moisture content is greater than that which is ultimately desired. The auxiliary apron 94 may be mounted upon the conveyor trough in any suitable manner and from Figures 7 and 9 it will be seen that, in the present instance, eyelets 95 are secured to the outer flange 91 of the trough and are adapted to receive lugs 96 which are stamped out from or secured to the outer face of the apron 94.

I claim as my invention:

1. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum and a doctor blade having a scraper edge for removing said film from the drum after the dehydrating operation, of means for directing a stream of fluid toward the scraper edge between the blade and that surface of the film which traveled in juxtaposition to the surface of the drum during the dehydrating operation to act at the point of separation of film from the drum surface by the scraper edge for maintaining said edge in clean condition, and means for directing a stream of fluid against the other surface of the film in the vicinity of the point of engagement between the doctor blade and the drum surface.

2. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum, a doctor blade for removing said film from the drum surface and a doctor bar for maintaining said blade in operative position, of a compressed air duct associated with said doctor bar having air discharge passages positioned on the side of the blade opposite the side thereof adjacent the drum and directed toward the operative edge of the blade and toward the junction of the surface of the drum with the juxtaposed surface of the film as it is being separated from the drum surface by said blade, an apron for slidably receiving said film as it is turned back upon itself, a compressed air duct associated with said apron having air discharge passages directed in the direction of the path of travel of said film to impinge air against the film.

3. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum and a doctor blade having an operating edge for removing said film from the drum after the dehydrating operation, of means for directing a stream of cooling air toward said edge between the blade and film to impinge on that surface of the film which traveled in juxtaposition to the surface of the drum during the dehydrating operation for pushing the film away from said edge and means for impinging a stream of cooling air on the other surface of the film, said streams being impinged on the surfaces before the material being treated is overheated by the residual heat imparted thereto by the heated drum.

4. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum, and a doctor blade for removing said film from the drum after the dehydrating operation, of a compressed air duct associated with said doctor blade having air discharge passages directed toward the operative edge of the blade on the side of the blade opposite the side thereof adjacent the drum whereby air discharged from said passages will maintain the blade edge in a clean condition while assisting the blade in turning the film back on itself, an apron for slidably receiving said film as it is turned back upon itself, and a compressed air duct associated with said apron having air discharge passages directed toward the film in the direction of travel thereof over said apron.

5. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of the drum and a doctor blade for removing said film from the drum after the dehydrating operation, of a doctor bar, said bar having means for mounting the doctor blade thereon, a compressed air duct extending longitudinally thereof with air discharge passages along its length directed toward the operative edge of the blade, an apron assembly adapted to receive said film in slidable engagement as it progresses thereover, said assembly including a stationary hollow portion and a hollow tip portion with a nose positioned in advance of the operative edge of the doctor blade over which the film may be folded upon itself as it is separated from the drum surface by the blade, means for oscillating said tip portion relative to said stationary portion and means for flowing cooling air through the stationary portion into the tip portion for ejection therefrom between the film and stationary portion.

6. A dehydrating machine comprising a rotatable horizontal dehydrating drum arranged for receiving liquid or semi-liquid material thereon to form a dried film or sheet therefrom, means for rotating said drum, a scraper having a leading edge cooperating with said drum for removing the film or sheet from the drum, an apron arranged for holding the removed film away from the drum, and means for directing a stream of fluid toward the leading edge of the scraper on the side of the scraper opposite the side thereof adjacent the drum to act on that surface of the film which traveled in juxtaposition to the drum at the point of separation of the film from the drum surface for assisting the scraper and maintaining the leading edge thereof in a clean condition, said scraper shielding said stream from the drum to minimize contacting of the fluid with the drum.

7. In a drum drier machine, a doctor bar swingably mounted on the machine for movement toward and away from the drum thereof, a doctor blade detachably carried by said bar for scraping the drum surface, a compressed air duct associated with said bar having discharge orifices along the length thereof for impinging compressed air on the operative edge of the blade at the side of the blade which is opposite the side thereof adjacent the drum, and individually adjustable means cooperating with each orifice for regulating the capacity thereof.

8. In a drum drier machine having a drum rotatably mounted between side frames, a hollow doctor bar swingably mounted between the side frames, a doctor blade carried by said bar having a leading edge for scraping on said drum, and said bar having a plurality of discharge passageways extending from the hollow interior thereof to points adjacent the leading edge of the blade in a direction toward said leading edge for impinging fluid on the side of the leading edge which is opposite the side thereof adjacent the drum.

9. In a drum drying machine, an apron assembly comprising a stationary apron part having a surface adapted to receive thereover the dried material from said drum, a tip disposed over the receiving end of said apron, and means for oscillating said tip relative to said apron and said drum for preventing adherence of the dried material.

10. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum, and a doctor blade for removing said film from the drum after the dehydrating operation, of a receiving trough for said film and an apron having a lower end swingably mounted on the side of the trough remote from the drum and an upper edge positioned in the vicinity of said drum to receive the film on the exposed surface thereof to deflect the same from said trough, and said apron being swingable from said position to move its upper edge away from the drum and out of the path of film to the trough.

11. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum, and a doctor blade assembly for removing said film from the drum after the dehydrating operation, of a film receiving trough and an apron member having the lower edge thereof pivotally mounted on the side of said trough remote from the dehydrating drum and being arranged to be pivoted across the top of the trough with the upper end thereof disposed adjacent the drum to receive the film as it is removed from the face thereof to deflect the film against passage into the trough.

12. The combination with a dehydrating machine having a rotatable, heated dehydrating drum, means for applying a film of material to be treated to the surface of said drum, a doctor blade for removing said film from the drum surface, and a doctor bar for maintaining said blade in operative position, of a compressed air duct associated with said doctor bar having air passages directed toward the operative edge of the blade and toward the junction of the surface of the drum with the juxtaposed surface of the film as it is being separated from the drum surface by said blade, said passages including tubular members having their inner ends disposed within said duct and extending upwardly beyond the inner surface thereof to entrap condensed liquids formed in said duct and having their outer ends between the outer face of the blade and the film.

13. In a dehydrating machine having a rotatable dehydrating drum, means for applying a film of material to the surface of the drum, means for removing said film from the surface of the drum and for turning the removed portion back upon the portion still adhering to the drum and a receptacle for receiving said film as it gravitates from the surface of the drum after removal therefrom; a compressed air duct having air passages disposed longitudinally thereof and means for mounting said compressed air duct for movement toward and away from the adjacent portion of the surface of the drum across the top of said receptacle and for rotation about its longitudinal axis to vary the direction of said air passages.

14. The method of cooling a film dried on a heated drum as it is scraped from the drum which comprises directing cool air between the film and the scraper toward the active edge of the scraper to act on the film at said active edge, and shielding the drum from said air with the scraper.

15. A dehydrating machine including a rotatable horizontal dehydrating drum arranged for receiving liquid or semi-liquid material thereon to form a dried film or sheet therefrom, means for rotating said drum, a scraper on the ascending side of the drum having a leading edge projecting between a film on the drum and the drum, said leading edge being effective for scraping the ascending film from the drum while allowing the scraped off film to descend, an apron arranged for holding the descending portion of the film away from the ascending portion thereof, and a duct associated with said scraper having orifices along the length thereof arranged for directing jets of fluid toward the leading edge of the scraper on the side of the scraper opposite that side adjacent the drum to flow toward the leading edge of the blade and act on that surface of the film which traveled in juxtaposition to the drum at the point of separation of the film from the drum, said scraper shielding said fluid jets from the drum.

16. The method of simultaneously cooling and removing film from a heated drum which comprises scraping the film from the drum, directing cool air under pressure toward the operative edge of the scraper and toward the junction of the surface of the drum with the juxtaposed surface of the film to maintain the scraper in a clean condition and to cool the film, and shielding the drum from said cooled air with said scraper.

17. The method of removing residual heat in a dried film while removing the film from a traveling heated surface without cooling the surface which comprises scraping an ascending film off of an ascending heating surface, allowing the scraped off film to descend, supporting the newly scraped off portion of the film to eliminate peeling of the film from the heating surface before it is subjected to the scraping step, directing jets of cooling fluid between the juxtaposed surfaces of the ascending film and the scraper to cool the film and aid in reversing its direction of travel, and shielding said jets from said heating surface.

GLEN OVERTON.