

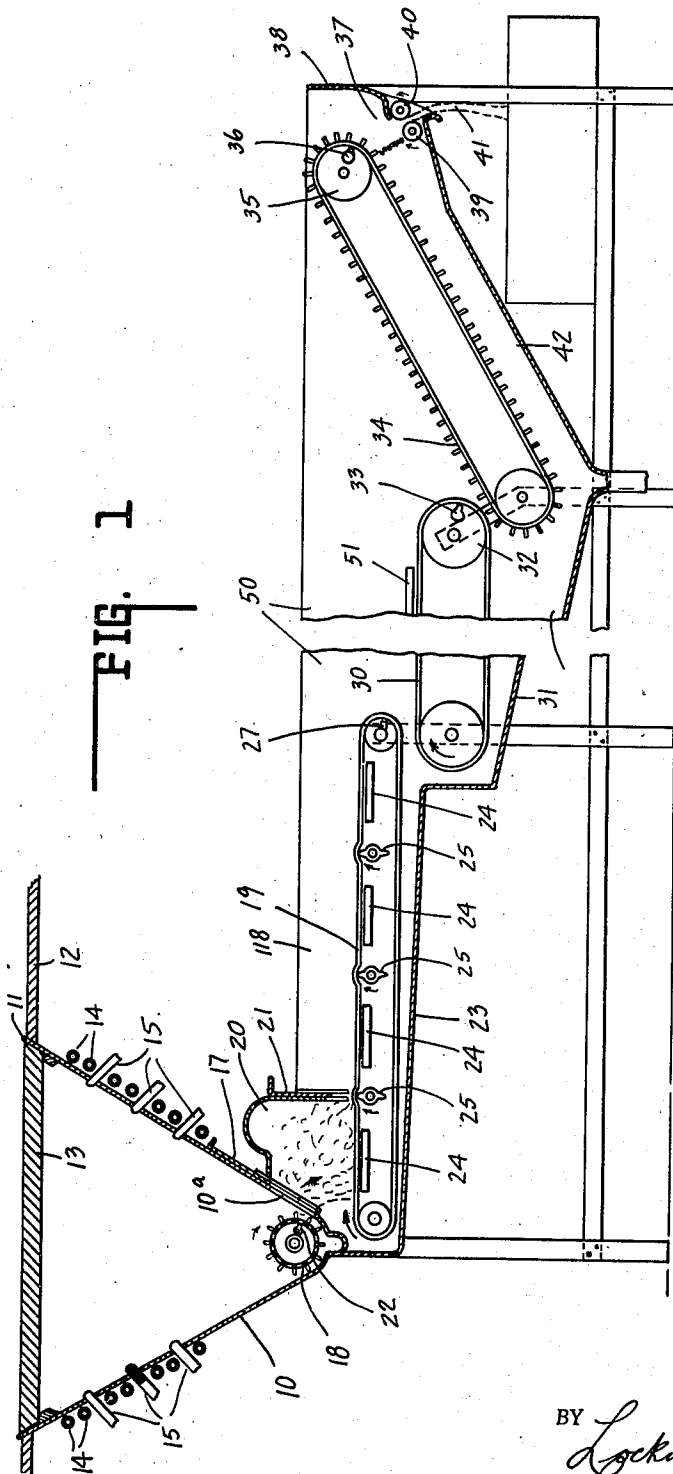
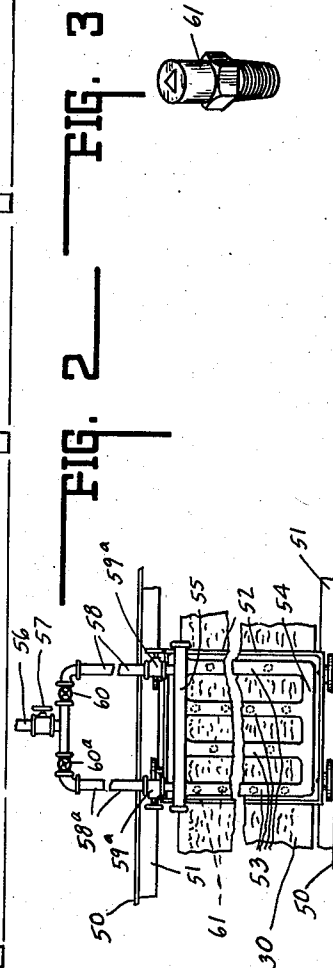
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WASTE RECLAMATION

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WASTE RECLAMATION

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This invention relates to the method of renovating used journal box waste.

One chief object of this invention is to renovate journal box waste so that the same may be used again, such renovation including initially the subjection of the waste to heat to facilitate the drainage of surplus oil and the like, in the waste and without danger of spontaneous combustion; second, the distribution and dispersion of the waste from which surplus oil has been drained and the agitation of such waste for the mechanical discharge of metal particles and entrapped droplets of surplus oil, followed by the pressure washing of the waste for final cleaning thereof and then the removal of the pressure cleaning liquid (oil) to provide clean waste capable of reuse.

Another object of this invention is to reduce manual handling of the waste to a minimum in the renovating process.

A third object of the invention is to reduce the element of fire hazard to a minimum.

A fourth object of the invention is to eliminate the conventional picker-finger action heretofore employed in machines for cleaning journal box waste.

Other objects and features of the invention will be set forth more fully hereinafter.

The full nature of the invention will be understood from the accompanying drawing and the following description and drawing:

In the drawing,

Fig. 1 is a somewhat diagrammatic side elevation of apparatus suitable for practicing the process, the several auxiliaries essential to the apparatus operation being intentionally omitted for clearness.

Fig. 2 is a diagrammatic top plan view of the pressure cleaning portion of the apparatus.

Fig. 3 is a perspective view of one form of pressure nozzle.

In Fig. 1 of the drawing, there is illustrated a hopper 10 which has an open mouth 11 which preferably is considerably elevated such as at one floor level 12. A closure 13 is provided to completely close this hopper. This hopper is suitably heated by means of steam coils, or the like, 14 connected to a suitable source of heat. It may, however, be heated by electrical means when desired, the critical condition being that only heat be transferred to the contents of the hopper.

The hopper includes certain nozzles discharging upwardly and these are designated by the numeral 15. These nozzles are included in a

closed system and that system utilizes a comparatively inert fluid, such as carbon dioxide gas. The purpose of this is to prevent spontaneous combustion occurring in the hopper during the heating interval.

The journal box waste is usually received in drums, or the like, and is deposited on a sorting table from which the larger metal fragments, such as pieces of bolts, loose nuts, et cetera, may be hand picked from the mass of waste, and then this waste is discharged into the hopper until it is filled to the desired level. The cover 13 then is applied thereto and secured thereto in substantially leakproof relation so that access of the air thereto is substantially impossible. When the hopper has been filled to the desired degree, the carbon dioxide gas is circulated under sufficient pressure which prevents spontaneous combustion occurring within the hopper and at the same time, since the nozzles are directed upwardly and since the carbon dioxide is introduced under pressure, prevents packing of the waste incident to its storage in the hopper.

It is to be understood that the waste in the hopper is heated from twelve to fifteen hours at 160° to 175° F., and in this heating operation the oil is thinned or it is rendered more fluid so that the surplus oil in the waste drains down the inclined sides of the hopper to the lower and throat portion and the drained oil is discharged by means of the screened collecting trough 16 to a waste oil reservoir, not shown.

At the end of the heating period, the gate 17 is opened and the rotary discharge element 18 is operated, it being understood that when the gate is opened and the rotary element 18 is operated, the heat application is discontinued and the carbon dioxide application also is discontinued but the cover 13 is not removed. Rotation of the discharge element 18 serves to discharge the heated, oil drained, waste to a trough arrangement 19, the bottom of which is formed by an open work type endless conveyor 19, and to the upper run thereof.

Adjacent the upper end of this conveyor is a housing arrangement forming a supplementary chamber 20 and associated with the lower or remote end thereof is an adjustable gate member 21. This gate member 21 determines the thickness of the layer of waste that is carried by the upper run of the conveyor 19 and this chamber 20 serves as a supplementary reservoir as well as a collection element because the discharge device 18 is of positive character.

In order to free the rotary discharge device

18 of the waste so that it will not carry around, there may be provided an air blast or compressed air discharging arrangement 22 which blows outwardly through the opening 10a adjacent the chamber 20 and the trough structure 118. This clears the rotary element 18 and discharges the waste outwardly and the depth on the conveyor 19 is determined by the position of the gate 21.

Beneath the endless conveyor is a trough extension hopper arrangement 23, the lower end of which discharges to the waste oil reservoir, not shown, and discharges thereto by gravity. Beneath the upper run of the endless conveyor 19 there may be positioned heating elements 24 to maintain the conveyor in heated condition as well as the waste thereon.

Also associated with the upper run of this conveyor and mechanically driven in timed relation with the movement of the conveyor, are the "knocking" elements 25. These may be of any desired number and of any desired type. They may constitute cam-like members which tap the bottom face of the upper run of the conveyor 19 and thus agitate the waste on the conveyor, which agitation serves to separate the waste fibres so that the waste material appears somewhat batt-like in appearance and incident to such formation, oil droplets and the like, which have not drained from the waste in the hopper now are discharged from the waste through the open work character of the conveyor 19 and are collected in the trough hopper 23. Also, this agitation of the conveyor sufficiently agitates the waste thereon so that certain of the metal particles are mechanically freed from the waste and fall through the open work upper run of the conveyor. If desired, all of the material passing through the upper run of the conveyor may be diverted to one side or the other of the trough 23 so as not to be required to pass through the lower run of this conveyor. Such a diverter would merely be a laterally inclined baffle and for clearness an illustration of the same is intentionally omitted in Fig. 1. Such a diverter may also be used with the washing conveyor later specified herein.

The heated waste and conveyor 19 passes over a perforated or hollow roller 26, at the lower end of the endless conveyor, and associated therewith is an air discharge arrangement 27 similar to that indicated at 22 with reference to the rotary discharge 18, previously described. The pressure, however, is only sufficient to free all the waste from the endless conveyor 19. It does not have the projecting power that is utilized in the element 22. The waste, therefore, discharges from the endless conveyor to a second and slightly lower endless conveyor designated by the numeral 30. This is mounted in a drain trough arrangement 31. The waste, therefore, is again applied to the endless conveyor 30 in comparatively loose batt-like form and it, while moving on the conveyor 30, is subjected to a pressure washing operation by means of nozzles above the same and which force hot oil through the waste. This hot oil washes the dirt and fine metal powder, dust, et cetera, from the waste so that by the time the waste reaches the end of this conveyor 30 it is substantially clean and ready for reuse except it contains an excess of oil.

The endless conveyor 30 at its lower end, as it were, is associated with a foraminated drum 32 similar to the foraminated drum 26, and there also is associated therewith an air pressure discharge arrangement 33 similar to that indicated by the numeral 27, previously referred to. This

structure, therefore, discharges the clean but oil saturated waste to an upwardly inclined endless conveyor 34. The major portion of the oil forced through the waste on the open work type conveyor 30 is collected by the drain arrangement 31 together with all metal powder, dirt, et cetera, removed by said oil. The endless conveyor or elevator 34 carries the cleaned but oil saturated waste upwardly to the discharge end, which is defined by the foraminated drum 35 similar to the foraminated drum 32. Air pressure in a sufficient amount is supplied as at 36 to free all the waste from the endless conveyor 34. It will be apparent that while on the upper run of the conveyor 34 the oil which has not passed through the waste while on the conveyor 30, drains therefrom except such as the waste fibres will absorb or which adheres thereto by reason of capillary attraction and/or the surface tension.

This waste, discharged at the upper end of the elevator, is collected by a hopper 37 and same may include a guard extension 38 which is highly desirable when the pressure discharge 36 is utilized. The waste collected in the hopper then is fed between the wringer rolls 39 and 40 and discharges as a clean waste mass as at 41. The oil expressed from the waste collected by the hopper 37 drains downwardly away from the wringer rolls into the discharge 42, the lower end of which, like the lower end of the collection arrangements 16, 23 and 31, all lead to the waste oil reservoir.

The waste oil reservoir is of considerable capacity and the oil then is taken from this reservoir and purified in any one of several ways well known to the renovating industry, and this clean oil then is supplied to a second or clean oil reservoir, from which it is drawn for pressure washing purposes.

It will be apparent from the preceding description that other than the regulation of the controls for regulating pressures, and the like, that the only manual operation required is the preliminary sorting of the waste and manual filling of the hopper.

It is to be understood that the hopper is of sufficient capacity to receive waste that can normally be processed during one day's operation so that the waste, supplied to the hopper at a higher elevation, such as a second floor at the end of one day's operation, is heated during the night so that it is ready for cleaning or renovating the following day, the cleaning or renovating occurring on the lower floor and by means of the apparatus previously described.

Reference now will be had not only to the central portion of Fig. 1 but also to Fig. 2. In said figures, it will be remembered the endless conveyor 30 is of foraminated or openwork type and this may be of any one of several well known constructions, so that a detailed illustration thereof is unnecessary.

The side walls of the collecting element 31 are extended upwardly as indicated at 50 and secured thereto are trackways 51. These trackways 51 mount a carriage 52. This carriage 52 is of open-frame type and supports a plurality of conduits 53 which are spaced apart but a few inches. These are connected together at one end by a header arrangement 54 and at the opposite end by a header arrangement 55. This header structure is connected to a pressure supply line 56 controlled by a valve 57 by means of a flexible conduit 58, the latter being controlled by a valve 59 at one end and the valve 60 at the

other end. A similar duplicate connection is provided and the parts bear the subscript "a."

The flexible connections 58 may be of metal wire reenforced synthetic rubber construction, such synthetic rubber suitable for that purpose being neoprene "E." This synthetic rubber is highly resistant to oil—in other words, does not deteriorate in the presence of oil.

The purpose of the dual connection from the main supply 56 to the header 55 is to insure continuity of supply in the event of failure of one of the connections by reason of leakage and the valves permit the selective supply of oil under pressure from line 56 to the header 55. The header 55, as stated, is in free communication with one end of each of the overhead tubes 53.

These conduits are tapped and threaded on their lower sides at frequent intervals and are plugged. Certain of the plugs are removed and replaced by spray heads, such as are commercially available. These spray heads discharge oil under pressure in a laterally diverging direction and in a direction transverse thereto when the nozzle is of the type illustrated in Fig. 3. As shown in Fig. 2, nozzles 61 on adjacent conduits 53 are staggered relative to each other so that nozzles 61 force a spray through the waste on conveyor 30 from one side edge thereof to the other. Accordingly, all waste is subject to pressure spray washing.

The carriage 52 may remain stationary but preferably reciprocates. The alternate positioning of nozzles in adjacent parallel conduits 53 insures complete spraying of the waste on the upper run of the conveyor 30. The conveyor 30 has a movement about $\frac{1}{2}$ " per second. The length of the stroke or reciprocation of the carriage 52 is about 4" and the carriage speed when reciprocating is such that it is approximately that of the speed of the conveyor 30.

The result of this multiple spray arrangement as well as the reciprocation thereof, as an entire unit, insures that oil under pressure, which is directly downwardly and laterally dispersed by reason of nozzle formation, passes through the waste and on the movement of the carriage in the direction of the movement of the conveyor the effect is a continuous direct pressure application through the waste.

On the return movement of the carriage the effect is an angular one because then the waste is moving in a direction opposed or opposite to that of the movement of the spray. So that, the

result of this action is perfect washing of the waste by reason of the fluid used. The fluid used, as previously set forth, is hot oil. This oil is discharged under a pressure of about 140 lbs. per square inch and is at a temperature of from 160° to 170° F.

The operation of the device has been set forth in sufficient detail in connection with the description of the apparatus illustrative of the process disclosed herein, and the process has been initially set forth herein so that it is not believed necessary to include any further description of the process and the operation of the apparatus.

While the invention has been illustrated and described in great detail in the drawing and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. Journal box waste renovation comprising advancing linearly and uniformly a relatively loose mat of journal box waste, washing such mat by a downwardly directed pressure spray of oil applied to the top of the mat, the spray cyclically advancing in the direction of mat advance for an appreciable portion of the mat travel and then moving in the reverse direction for the same distance.

2. Journal box waste renovation, as defined by claim 1, wherein the oil spray washed loose mat is subsequently subjected to a wringing action for surplus oil removal and mat compression.

3. Journal box waste renovation comprising heating journal box waste for surplus oil drainage therefrom, fluffing the drained waste, discharging same in such manner to an endless conveyor so as to form a relatively loose mat thereon, washing such mat by a downwardly directed pressure spray of oil applied to the top of the mat, the spray cyclically advancing in the direction of mat advance for an appreciable portion of the mat travel and then moving in the reverse direction for the same distance, and subsequently pressing the spray washed fluffy mat for surplus oil removal and mat compression.

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