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BROKE DISPOSAL UNITS FOR PAPERMAKING MACHINES

Filed Oct. 25, 1954

2 Sheets-Sheet 1

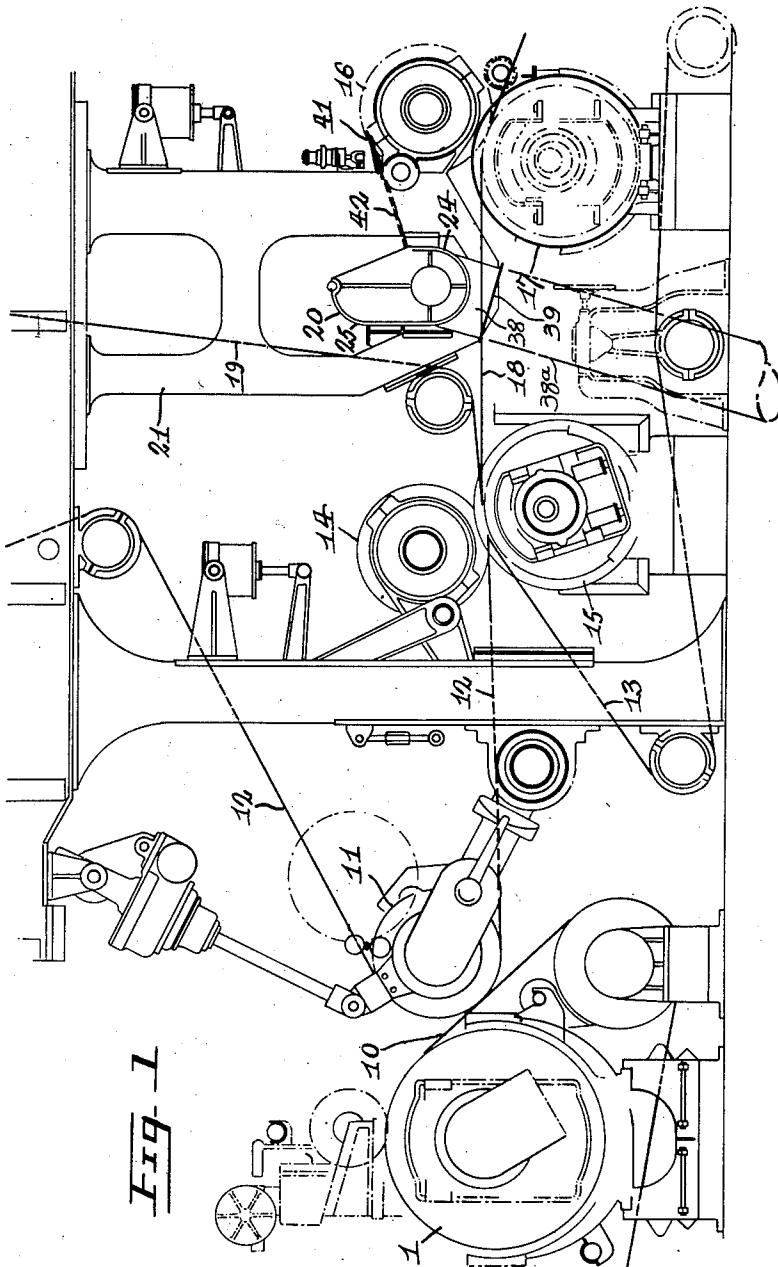


Fig-1

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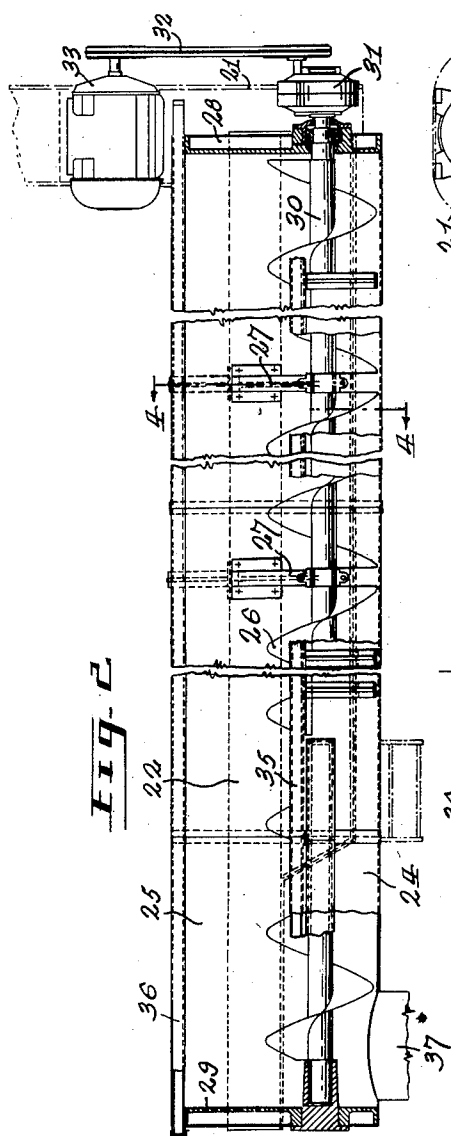


Fig. 2

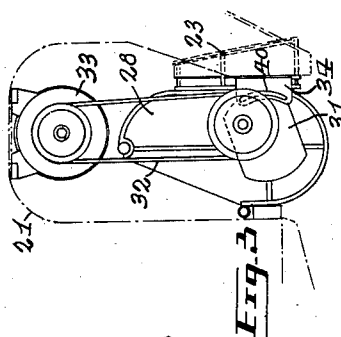


Fig. 3

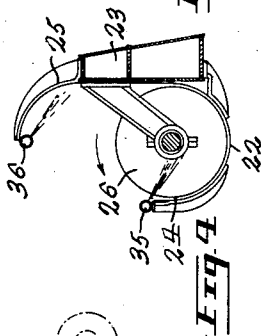


Fig. 4

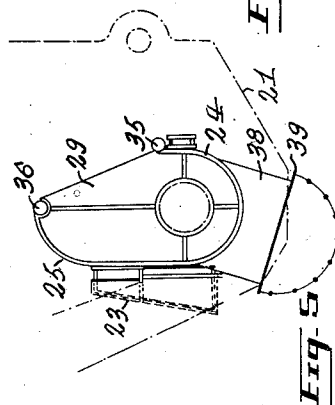


Fig. 5

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BROKE DISPOSAL UNITS FOR PAPERMAKING MACHINES

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2 Claims. (Cl. 92—44)

This invention relates to paper machines and particularly to improvements in the handling of "broke" material remaining when a lead strip is cut from the formed web of paper at the press section to facilitate the threading of the web through the machine.

The accumulation of "broke" material at the first press presents a serious disposal problem and many types of mechanisms have been devised to take care of it, including various types of conveyor belts, some having special types of gathering arms. The problem was less serious when the lead strip of the paper web was cut at the delivery end of the Fourdrinier and fed into the press section, in this case the "broke" dropped down into the "broke" pit beneath the couch roll. With the suction pick-up roll arrangement now in use, where the paper web is picked up from the Fourdrinier wire and carried through the transfer press to the first press before the lead strip is threaded through the rest of the machine, the bottom felt effectively blocks the "broke" from falling down to the base of the machine. The "broke" has therefore to be taken care of in a limited space above the travelling webs of paper and felt. This has been attempted by installing various types of conveyors to take the "broke" out to the side of the machine where it is usually handled by manual means to return it to the beaters or other section of the system for re-processing. Most such conveyors have, of necessity, been of small capacity due to the limited space available within the machine at the point where the "broke" material accumulates and, in any case, the manual handling of the "broke" after it has been removed to the side of the machine proves inadequate after a few minutes. Under certain unavoidable conditions the accumulation of "broke" can be such as to necessitate the slowing down or even stopping of the machine until accumulation has been cleared away.

The primary object of the present invention is to remove and re-process the "broke" immediately at the point where this material is removed from the web of paper.

A further object of the invention is to remove and re-process the "broke" automatically by mechanical means and direct the resultant back into the pulp system without further processing.

A further object of the invention is to combine in one operation, the breaking down of the "broke," the beating of the "broke" and conveying it directly back into the system.

A further object is to eliminate the accumulation of "broke" at the side of the paper machine and the necessity for manual handling.

A further object is to eliminate the step of having to pass the "broke" material through a system of separate beaters before it can be reused in the system.

These and other objects will be apparent of the following specification and the drawings accompanying in which—

Fig. 1 is a longitudinal diagrammatic section of the paper machine between the end of the Fourdrinier wire

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and the first press section and showing the location of "broke" disposal mechanisms.

Fig. 2 is a longitudinal section of the "broke" disposal mechanisms having parts of the trough cut away to show the means for beating and conveying the "broke" to the disposal outlet.

Fig. 3 is a rear end view of the disposal mechanism shown in Fig. 2 and showing the driving means.

Fig. 4 is a vertical section on the line 4—4 of Fig. 2 showing the conveyor support and water sprays.

Fig. 5 is a front end view of the disposal mechanism showing the pipe outlet for the treated "broke."

Referring to the drawings, the web of paper is formed on the Fourdrinier wire section 10 and is picked up from there by the pick-up roll 11 on the top felt 12. The web is then carried on the under side of the top felt 12 and is sandwiched between it and the bottom felt 13 as they pass through the nip between the top press section roll 14 and the suction transfer roll 15. The paper web is now carried forward on the bottom felt into the first press section which is comprised of a top press roll 16 preferably a granite roll and the suction press roll 17.

Located above the top run 18 of the bottom felt 13 and forward of the vertical rise 19 of the top felt 12, is the "broke" disposal mechanism 20 which is supported on the side frame members 21. The "broke" disposal mechanism consists of a longitudinal semi-circular bottomed trough 22 supported on the bracket 23 and extends the full width of the machine. The front wall 24 of the trough 22 extends slightly above the centre line of the bottom trough while the rear wall 25 extends upwardly for a considerable height and is curved forwardly to in line with the vertical centre line of the trough to form a collector face for the accumulating "broke."

The top edge of the front wall 24 is located just slightly under the level of the rear tail plate 42 of the doctor 41 in order that the "broke" skinned from the top press roll 16 will flow freely into the disposal unit 20 before it has time to accumulate on the tail plate 42 to the extent that the doctor will swing away from the press roll 16 and so allow the web to wrap around the roll 16.

A spiral conveyor 26 is mounted on suitable brackets 27 supported on the rear wall 25 of the trough 22. This spiral conveyor 26 extends the full width of the trough 22 and for convenience may be divided into two or more sections, depending on the width of the machine and to some extent on the diameter and weight of the conveyor itself. End walls 28 and 29 also support the shaft 30 of the conveyor 26 and prevent the contents of the trough from spilling out. The shaft 30 extends through the rear end wall to connect with the drive mechanism, which is here shown as consisting of a speed reducer 31 driven by a belt 32 from an electric motor 33. The speed reducer 31 as being adjustably mounted to a radius bracket 34, the slot 40 of which is at a radius to the shaft 30 of the conveyor. Such adjustment ensures proper tension of the belt 31 which can be adjusted to suit the weight of stock being handled by the spiral conveyor 26.

Supported at the top edges of the front and rear walls 24 and 25 are the water spray pipes 35 and 36, the spray from the pipe 35 being directed into the centre of the spiral conveyor 26 while the spray from the pipe 36 is directed against the rear wall 25 of the trough. The action of the combined water sprays from the pipes 35 and 36 converts the inflowing paper to a hydrated condition within the mouth of the broke disposal unit defined by the pipes 35 and 36, packing the formed pulp mass down into the conveyor 26 which quickly disposes of the mass of pulp without any tendency of the incoming paper being backed up against the inward flow of the paper on the tail plate 42 and doctor 41.

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The outlet 37 from the trough 22 is located at the front end and is in the form of a round pipe 38, flanged at 39 to which a pipe 38a can be connected to carry the treated "broke" material back into the pulp system of the machine.

While one form of apparatus has been described in detail, it must be understood that various modifications can be made without in any way departing from the spirit of the invention, for instance, the general shape of the trough can be altered to suit the lay-out of the adjacent sections of the paper machine; the spiral conveyor could discharge at the rear of the machine or could be made in contra rotating sections carrying the "broke" material to a centrally located outlet if that were more suitable of any particular machine.

In the operation of this invention, as the paper web is picked up from the Fourdrinier wire by the suction pick-up roll 11, just beyond the suction couch roll 1 of the Fourdrinier 10, it is first carried along on the under side of the top felt 12 to where it is sandwiched with the bottom felt 13 in the nip of the top press roll 14 and the suction transfer roll 15 together forming the transfer press section. From there it is carried along on the top of the bottom felt 13 after it leaves the nip of the suction transfer press section and is cut to form a lead strip. The "broke" from the cut web skinned from the top roll 16 by the doctor 41 will pile up above and behind the roll 16 and so be carried over the tail plate 42 of the doctor 41 and over the front wall 24 of the trough 22. The rotation of the spiral conveyor 26 is anti-clockwise as seen in Fig. 4 of the drawings, drawing the material down through the water spray from the pipe 35 and into the body of the conveyor. The "broke" material is thus thoroughly hydrated and, through the action of the conveyor on the wet mass, is macerated into a fluid pulp equal to that normally produced in the beater section of the process in the preparation of paper pulp. The speed of rotation of the spiral conveyor 26 and the volume of water allowed through the spray pipes 35 and 36 is governed by the type of stock being made on the machine, and the pitch of the conveyor itself is such as to allow the necessary time element for the "broke" to have the required pulp consistency before it is finally passed to the outlet 37 of the trough 22 which is located at the front end of the trough and is discharged through the pipe 38a back into the pulp system of the machine entirely clear of the edge of the running felt and paper web. From the outlet 37 the pulp can be fed directly back into the pulp system without any further treatment.

It will therefore be seen that by the introduction of the present invention considerable savings both in material and labour are obtained. There is no accumulation of "broke" within the body of the machine, the "broke" being fed directly into the conveyor as it comes off the press sections; there is no accumulation of "broke" at the side of the machine and therefore manual handling of bulky material is eliminated. Due to the beating and hydrating action in the conveyor the previous step of returning the "broke" to the beater sections is eliminated thus resulting in considerable savings in sections of the mill other than in the actual paper machine itself.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

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1. In a paper machine, in combination a Fourdrinier section including a suction couch roll, a suction pick-up roll picking up the paper web from the delivery end of the Fourdrinier section, a transfer press section, a first press section, a lower looped felt carrying the paper web through said transfer press section and first press section, doctor means associated with said first press section separating the broke from the lead strip of the paper web, a broke disposal unit located above said lower felt and between said transfer press section and first press section, said broke disposal unit comprising a trough having a short front wall facing said first press section and a rear wall projecting upwardly and curved forwardly over and above said trough to provide a collector face and with said front wall forming a pulping chamber for the broke, a spiral conveyor in the base of said trough, a water spray on the edge of said front and rear walls of said trough said water sprays being directed inwardly of the broke disposal unit to convert the broke above the conveyor into a hydrated pulp mass, an outlet from said trough beyond the side of said lower felt, and a tail plate between said doctor means and the front wall of said trough transferring the broke directly to said broke disposal unit clear of said lower felt.

2. In a paper machine, in combination, a Fourdrinier section including a suction couch roll, a suction pick-up roll, a transfer press section, an upper felt looped about said suction pick-up roll and passing through said transfer press section and picking up the paper web on its under side from the delivery end of the Fourdrinier section, a first press section, a lower looped felt carrying the paper web on its upper surface through said transfer press section and first press section, doctor means associated with said first press section separating the broke from the lead strip of the paper web, a broke disposal unit located above said lower felt and between the upward run of the upper felt as it leaves the said transfer press section and the first press section, said broke disposal unit comprising a trough having a short front wall facing said first press section and a rear wall projecting upwardly and curved forwardly over and above said trough to provide a collector face and with said front wall forming a pulping chamber for the broke, a spiral conveyor in the base of said trough, a water spray on the edge of said front and rear walls of said trough, said water sprays being directed inwardly of the broke disposal unit to convert the broke above the conveyor into a hydrated pulp mass, an outlet from said trough beyond the side of said lower felt, and a tail plate between said doctor means and the front wall of said trough transferring the broke directly to said broke disposal unit clear of said lower felt.

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