Oct. 9, 1945. E. A. POIRIER 2,386,632

STOCK SELECTING APPARATUS FOR USE WITH PAPER MACHINES

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Fig. 1.

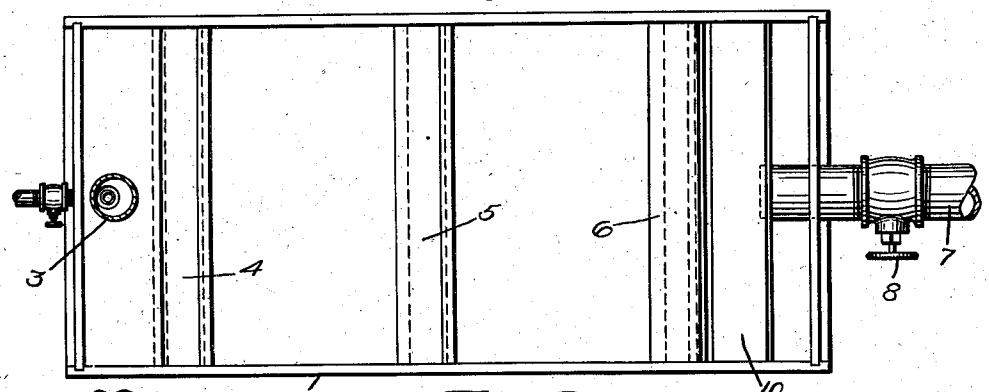


Fig. 2

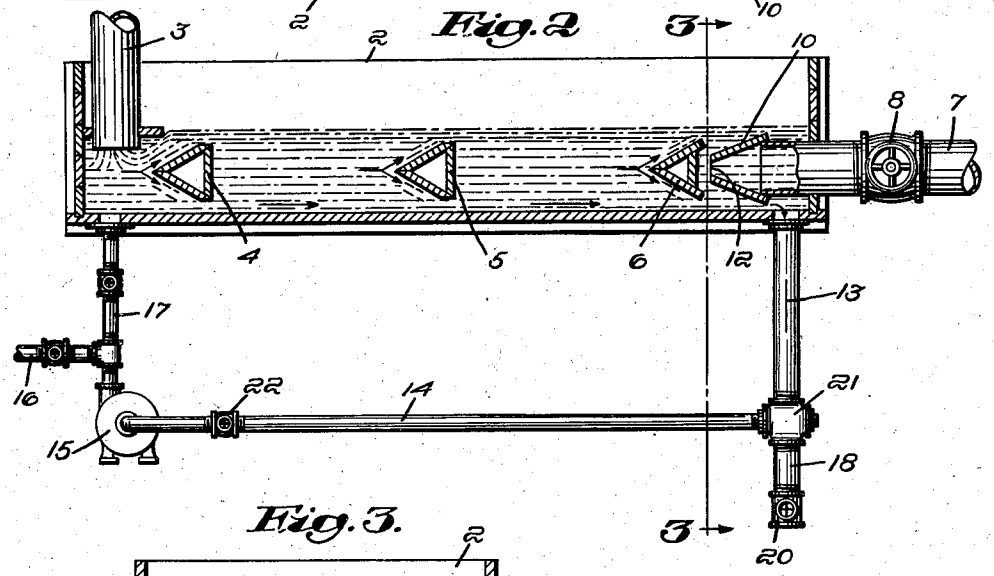
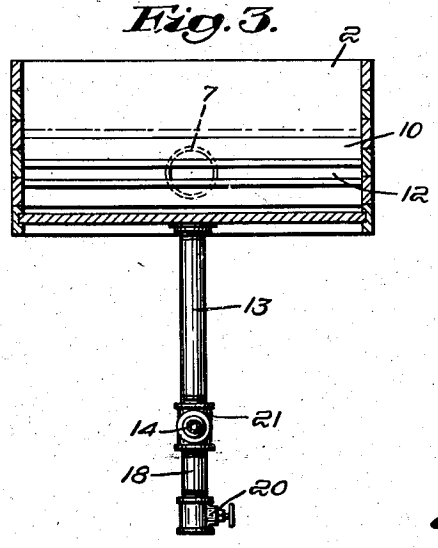


Fig. 3.



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Fig. 4.

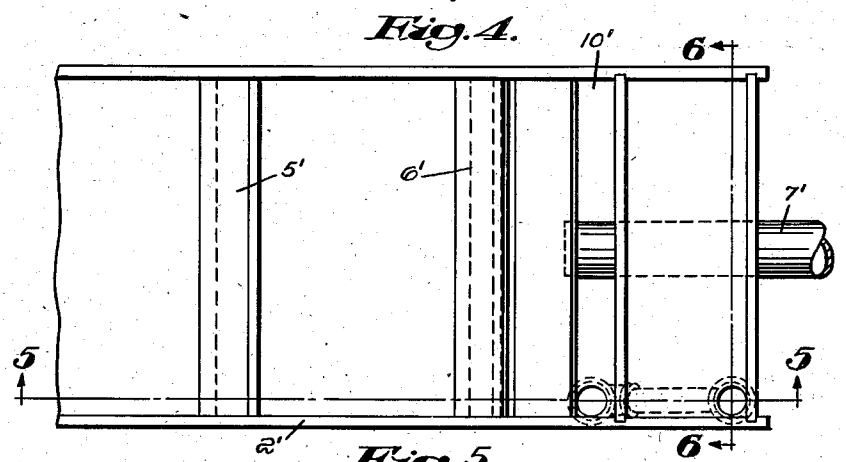


Fig. 5.

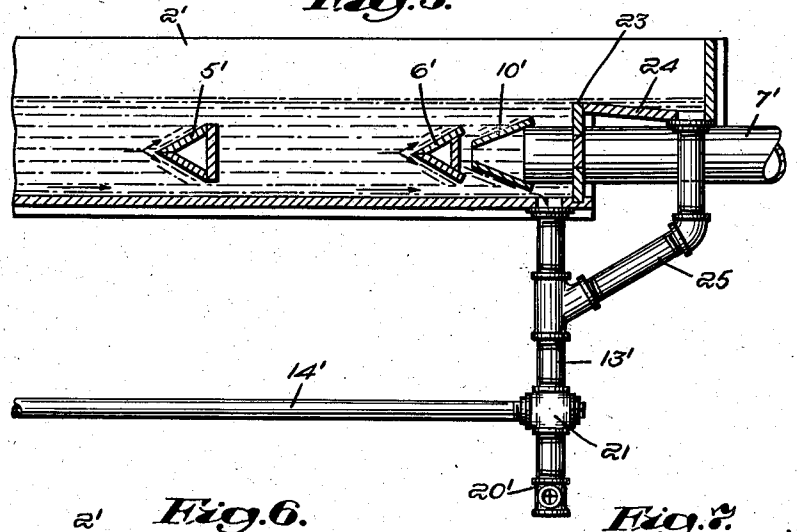


Fig. 6.

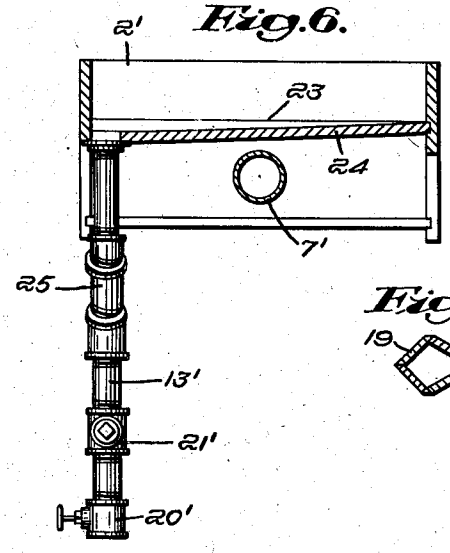


Fig. 7.

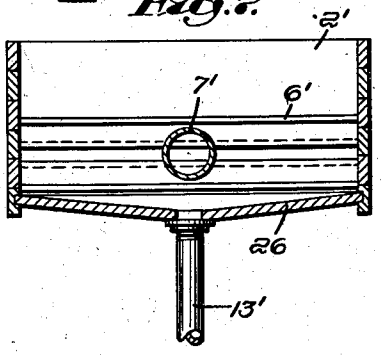


Fig. 8.

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2,386,632

STOCK SELECTING APPARATUS FOR USE WITH PAPER MACHINES

Ernest A. Poirier, Waterville, Maine

Application May 19, 1942, Serial No. 443,568

6 Claims. (Cl. 92—28)

An important cause of flaws and defects in paper is the presence of dirt in the stock. Notwithstanding the pains taken in the preparation of paper stock for delivery to the paper making machine to remove the particles of material too coarse to go into paper and other foreign substances which unavoidably become associated with the fiber, it frequently happens, nevertheless, that particles of dirt are present in the stock when it is delivered to the Fourdrinier wire or to the paper making cylinder. Some of these particles of foreign materials are heavier than water and some are lighter, but both are equally objectionable in the finished sheet.

The present invention is especially concerned with the problem presented by these considerations, and it aims to devise a thoroughly practical solution for it. The invention involves both a novel method of removing from paper making stock these particles of dirt that cannot be taken out by the common screening operations. It also includes a novel apparatus operating in accordance with this method.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a plan view of an apparatus constructed in accordance with the invention;

Fig. 2 is a vertical, longitudinal, sectional view of the apparatus shown in Fig. 1;

Fig. 3 is a vertical, transverse, sectional view taken approximately on the line 3—3, Fig. 2;

Fig. 4 is a plan view of the right-hand end portion of a trough like that shown in Fig. 1 but provided with a somewhat different arrangement for carrying away the floating dirt;

Figs. 5 and 6 are vertical, sectional views approximately on the lines 5—5 and 6—6, respectively, of Fig. 4; and

Fig. 7 is a view similar to Fig. 6 illustrating a further modification.

Figure 8 is a vertical, transverse, sectional view of a modified form of the deflector.

The present invention provides a method in which the lighter dirt is floated off from a stream of stock in which it is carried, while the heavier dirt is settled out or trapped, and both are thus separated from the main body of good stock.

Referring to the drawings, the construction there shown comprises a box or trough 2 adapted to guide a stream of paper making stock which may be delivered thereto by the supply pipe 3, or in any other convenient manner. Positioned transversely in this trough are several deflectors indicated at 4, 5 and 6, respectively, each of tapered or triangular cross-sectional form, and each extending across the trough from one side thereof to the other, with their thinner edges pointing up-stream. An outlet or discharge pipe 7 carries away the good stock and it is equipped with a valve 8 so that in connection with the usual controlling apparatus used to regulate the delivery of stock to the trough through the pipe 3 a substantially constant level of stock will be maintained in the trough and that level will be sufficient to keep the deflectors 4, 5 and 6 continuously submerged. The discharge or delivery conduit 7 leads from an outlet header or conduit 10, which is similar to the deflectors 4, 5 and 6, and is similarly positioned, but it is provided with a narrow intake slot 12 extending across the trough from one side thereof to the other. This inlet is located immediately behind the rearmost deflector 6 with the rearward side of the latter extending both above and below the inlet.

It should be observed that the deflectors are positioned a few inches above the bottom of the trough so that as the stock flows through it these members 4, 5 and 6 divide the portions of the stream in which they are positioned into upper and lower portions or layers flowing, respectively, above and below the deflectors. Their action is such that they tend to direct the light weight dirt into the upper layer or layers of the stream and to guide the heavier particles into the lower layers flowing along the bottom of the trough. Such separation of the two kinds of dirt into the upper and lower strata of the stream may be further facilitated by so controlling the rate of flow that a gravity separation of the heavier dirt into the lower layers also will occur. The result of this action is that when a given cross-sectional portion of the stream reaches the outlet header 10, the two kinds of dirt will be very thoroughly segregated from each other and floating dirt will be guided over or above the outlet slot 12, while the heavier dirt will be guided below it.

It should also be observed that the header 10 forms a kind of dam or obstruction at the tail portion of the trough. A tailings discharge pipe 13 opening into the bottom of the trough at this end carries away both the lower layer of the stream, with the dirt entrained therein, and also the upper layer which overflows the rearward edge of the header 10. Another pipe 14 carries this material to the intake end of a rotary pump 15 which discharges it through either of the pipes

16 or 17, as desired. The former may lead to a settling tank, to some earlier preparatory machinery, or to any other desired point, while the latter conducts the material back into the trough 2. Both of these pipes 16 and 17 are equipped with control valves by means of which the delivery of the stock to one point or the other can be determined at will. A short vertical section of pipe 18 leads downwardly from the junction of the pipes 13 and 14 and forms a trap in which the very heavy particles of dirt will collect. This pipe also is equipped with a valve 20 by means of which the trap may be cleaned out whenever desired. Additional valves 21 and 22 may be connected into the system to facilitate control, washing out, and the like.

As above indicated, the rate of flow of the stock through the trough should be sufficiently slow to facilitate, or at least to permit the separating action above described. In some cases, due to the nature of the dirt, the rate of flow must be very slow as, for example, one-half or one-third of a foot per second, while in other cases it can be speeded up to in the neighborhood of five or six feet per second, or possibly somewhat more. With those forms of dirt having a specific gravity close to that of water, the velocity of flow has a very important bearing on the operation of the apparatus, and unfortunately much of the dirt which proves more troublesome in paper making is of this variety. With any but extremely slow speeds the deflectors should be streamlined, somewhat as indicated at 19 in Fig. 8, in order to avoid excessive turbulance or eddying immediately behind them.

In the construction shown in Figs. 1 to 3, there is some tendency for the dirt to collect in the apparatus, thus requiring a shutting down and cleaning out of the apparatus at the end of, say, eight or ten hours run, or possibly longer, depending upon circumstances. And this is not objectionable for many conditions. However, the construction shown in Figs. 4, 5 and 6 will permit a longer period of operation without washing out. Here a rather higher level of the stream in the trough is maintained than that shown in Fig. 2 and the uppermost layer of the stream flows over a dam 23 and down an apron 24, carrying the floating dirt with it. The water and dirt so discharged are led away through a pipe 25 into the pipe 13' corresponding to that shown at 13 in Figs. 2 and 3. Preferably the apron is tilted, as indicated, for example, in Fig. 6, to facilitate the drain-off of the surface water.

Also, in order to deal with the tendency of the heavier dirt to collect in the right-hand corners of the box, the section of the bottom from which the discharge pipe 13' leads, may be inclined, as shown at 26 in Fig. 7, such inclinations starting at both right hand corners and leading downwardly to a middle point at which the pipe 13' is connected. These modifications permit a longer period of operation without interruption for washing or cleaning.

While I have herein shown and described preferred embodiments of my invention, it will be evident that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In an apparatus for separating dirt from paper making stock, the combination of a trough for guiding a stream of said stock along a predetermined path, a plurality of deflectors located in said trough transversely thereof in position to be submerged in said stream, each of said deflectors being wedge-shaped and positioned with its thin edge directed upstream, a delivery conduit having an intake positioned near the tail end of the trough at a substantial distance below the surface of the stock therein, said intake being in the form of a narrow slot located transversely in the trough, a deflector positioned immediately in front of said intake and having portions extending both above and below said slot, means opening into the bottom of said trough in the neighborhood of said intake for conducting away the heavier dirt which is carried along the bottom of the trough by said stream and means additional to said last mentioned deflector for diverting floating dirt away from said intake.

2. In an apparatus for separating dirt from paper making stock, the combination of a trough for guiding a stream of said stock along a predetermined path, a plurality of deflectors located in said trough transversely thereof in position to be submerged in said stream, each of said deflectors being wedge-shaped and positioned with its thin edge directed upstream, a delivery conduit having an intake positioned near the tail end of the trough at a substantial distance below the surface of the stock therein, said intake being in the form of a narrow slot located transversely in the trough, a deflector positioned immediately in front of said intake and having portions extending both above and below said slot, means opening into the bottom of said trough in the neighborhood of said intake for conducting away the heavier dirt which is carried along the bottom of the trough by said stream, and a dam positioned across said trough near said intake slot and over which said surface layer flows behind said intake.

3. In an apparatus for separating dirt from paper making stock, the combination of a trough for guiding a stream of said stock therethrough, a plurality of deflectors positioned in said trough where they will be submerged in said stream, said deflectors being shaped to exert a separating action on the lighter and heavier materials carried by the stream serving to divide the portions of the stream in which they are located into upper and lower portions containing, respectively, the lighter and heavier impurities, and a delivery conduit having its intake in said trough at an intermediate level in the stream, one of said deflectors being positioned in front of and close to said intake of the delivery conduit.

4. In an appartus for separating dirt from paper making stock, the combination of an elongated trough for guiding a stream of said stock therethrough, a delivery conduit having an intake positioned at an intermediate level in said stream, a deflector positioned in said trough upstream from said intake and serving to divert heavy dirt into the lower portion of the stream and the floating dirt into the upper portion, and means for diverting the surface portion of said stream, together with the dirt carried thereby, away from said intake end, whereby the portion of the stream entering said conduit will be kept substantially free of both heavy and floating dirt.

5. In an apparatus for separating dirt from paper making stock, the combination of an elongated trough for guiding a stream of said stock therethrough, a delivery conduit having an intake end positioned at an intermediate level in said stream, said intake end being in the form of a narrow slot located horizontally in the trough

and extending transversely thereof, a dam down stream from said slot over which the surface layer of said stream is discharged, and means for continuously draining off the bottom layer of stock, together with the heavier dirt carried thereby.

6. In an apparatus for separating dirt from paper making stock, the combination of an elongated trough for guiding a stream of said stock therethrough, deflecting means submerged in said stream of stock serving to divide the stream into upper and lower portions, both portions being of substantial depth and the upper portion carrying the lighter impurities and the lower portion the heavier impurities, a delivery conduit having an intake slot positioned horizontally in said trough at an intermediate level in said stream approximately in a plane between said upper and lower portions, said conduit being located down stream from said deflecting means, said means including a deflector positioned directly in front of, and close to, said intake slot, where it serves to deflect solid material carried by the stream both above and below said slot and thus to keep the portion of the stream entering said slot substantially free of both light and heavy impurities, means for drawing off the heavy impurities, and additional means positioned down stream from said intake slot for discharging the floating impurities.

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