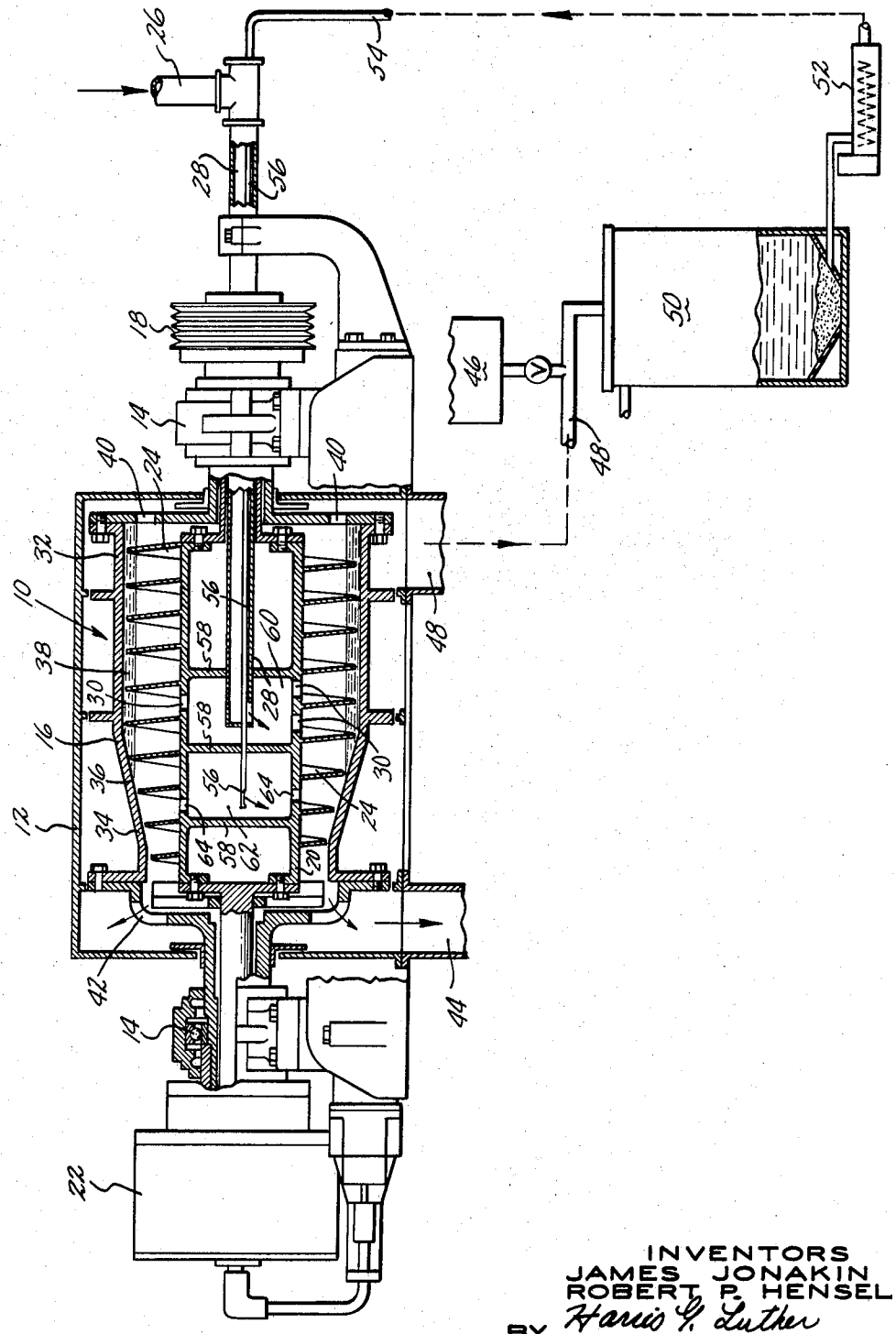
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RECOVERING FINES IN A MECHANICAL DEHYDRATOR

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RECOVERING FINES IN A MECHANICAL DEHYDRATOR

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1 Claim. (Cl. 210—54)

This invention relates to an improvement in the method of separating solids and liquids.

An object of this invention is a method for recovering fines from the effluent of a mechanical separator.

A further object is a method utilizing the layer of separated solids in a mechanical separator as a filter bed for flocculated fines in the liquid discharge of said separator.

A more specific object is a method depositing a mixture of flocculated fines and liquid, from the liquid discharged from a centrifuge, onto the solids on the beach of said centrifuge to filter said mixture and recover said fines.

Other features and advantages will be apparent from the following specification and claim and from the attached drawing which illustrates a now preferred embodiment of the invention and in which the single figure is a side elevation, partly in section of a centrifuge and flocculator embodying the invention.

In mechanically separating water from the coal in a pipeline slurry an appreciable portion of the coal is discharged as fines with the liquid effluent from the mechanical separator. These fines must be recovered from the effluent as completely as possible and fed to the furnace in order to avoid a direct loss in, and a reduction in the overall efficiency of, the system of dewatering a pipeline coal slurry and feeding the dewatered, or partially dewatered, slurry to, and burning the same in, a furnace of a vapor generator.

As shown in my co-pending application Serial No. 159,600 filed December 15, 1961, entitled Drying and Burning of Pipeline Coal, on which the structure of this application is an improvement and which may be referred to for further details of the system, previously the effluent has been passed through a flocculator to flocculate the fines and the mixture of the water and flocculated fines has been pumped back to the inlet of the mechanical dewaterer and mixed with the incoming slurry and then fed to the mechanical dewaterer with the slurry. While this will produce a generally satisfactory removal of the fines we have found that by feeding this mixture of flocculated fines and water separately to the mechanical dewaterer, instead of mixing it with the incoming slurry, and then feeding this separate stream of flocculated fines and water onto the layer of coal on the beach of the mechanical separator, where the layer of coal is supported independent of the pool of separated liquid in the mechanical separator, that the coal layer will act as a filter bed to efficiently filter the flocculated fines from the water in a single pass and improve and speed up the recovery of the fines.

As shown in the figure, a centrifugal separator indicated generally at 10 is supported for rotation inside of a casing 12 on bearings 14. The drum 16 of the centrifuge may be rotated by any suitable means such as a pulley 18. A second drum 20 mounted concentric with drum 16 is supported in any suitable manner such as by bearings, not shown, inside of the bearings 14 for rotation inside of the centrifuge drum 16. A gear box 22 connecting the drums 16 and 20 will rotate the drum 20 with the drum 16 but at a slightly different rate. A screw conveyor 24 mounted on the exterior of drum 20 extends between drum 20 and drum 16 and will force coal separated from a pipeline coal slurry, fed through pipe 26 and the stationary shaft 28 into the interior of drum 20 and

through openings 30 into the interior of the drum 16, lengthwise of the drum from the larger diameter 32 of the drum 16 toward the smaller diameter 34 of the drum 16. The drum 16 is provided with a tapered portion 36, connecting the larger diameter portion with the smaller portion, to provide a beach supporting a layer of coal removed from the pool of liquid 38 that collects in the larger diameter of the drum 16. Liquid separated from the coal is discharged through openings 40, which openings will determine the depth of the pool.

The separated coal is forced along the beach by the screw impeller 24 and is discharged through the opening 42 into the coal discharge chute 44 and fed to a pulverizer, not shown, as indicated in my above identified co-pending application.

The effluent discharged from the orifice 40 contains an appreciable amount of very fine coal which is carried along with the effluent. A flocculant such as "Separan" sold by Dow Chemical Company of Midland, Michigan, is mixed with the effluent discharge through conduit 48 and fed to the flocculator 50 where the fines are flocculated or coagulated and settle to the bottom of the flocculator. These flocculated fines along with sufficient water to provide a pumpable mixture, such as 30% fines and 70% water, is pumped by a pump 52, such as a gear or screw pump, through a conduit 54 and into a stationary conduit 56 supported inside of conduit 28.

The drum 20 is divided by a partition 58 into a compartment 60 and a compartment 62. The conduit 28 terminates in compartment 60 and delivers the pipeline slurry from conduit 26 into compartment 60 from which it is discharged through orifices 30 into the larger diameter portion of the drum 16. Conduit 56 extends completely through compartment 60 and through the center partition 58 into compartment 62 and discharges the mixture of flocculated fines and water into the compartment 62 from which compartment they are discharged through orifices 64 under centrifugal force onto the layer of coal on the beach 36. This coal layer which is removed from and separate from the liquid pool 38 acts as a filter or screen for this mixture of water and flocculated fines, the water passing or filtering through the layer or bed of coal and along the beach to the pool 38. The fines after being flocculated are then flocs large enough so that they will not pass readily through the compacted layer of coal on the beach 36 and hence are quite readily filtered or screened out to provide substantially a 100% recovery of the fines. The filtered or screened fine flocs are fed along with the separated coal by the screw conveyor 22 along the beach and are discharged through the solids discharge orifice 42 and fed along with the separated coal through conduit 44 to the furnace.

This combination of flocculating or coagulating fines in the effluent and then utilizing the layer or bed of coal as a filter in the mechanical separator gives an improved recovery of the fines both in time and in quantity without any additional equipment or any additional operating expense.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit and that various changes can be made which would come within the scope of the invention which is limited only by the appended claim.

We claim:

A method of recovering fines from the effluent of a centrifuge dividing a coal slurry into a partially dewatered coal layer in the centrifuge and an effluent containing water and coal fines, comprising, the steps of forming materially larger particle units of the fines in said effluent by passing said effluent including said fines through a floc-

culator and flocculating said fines into enlarged flocs of fines, feeding a slurry of said enlarged flocs and water onto the layer of partially dewatered coal in said centrifuge and utilizing said coal layer as a screen and filter, screening said enlarged flocs by said coal layer and filtering the water from said slurry of enlarged flocs through said layer.

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