Jan. 27, 1970 N. O. NILSMAR ET AL 3,491,682

PRESS CONCENTRATOR

Filed Jan. 24, 1968 4 Sheets-Sheet 1

Fig. 1

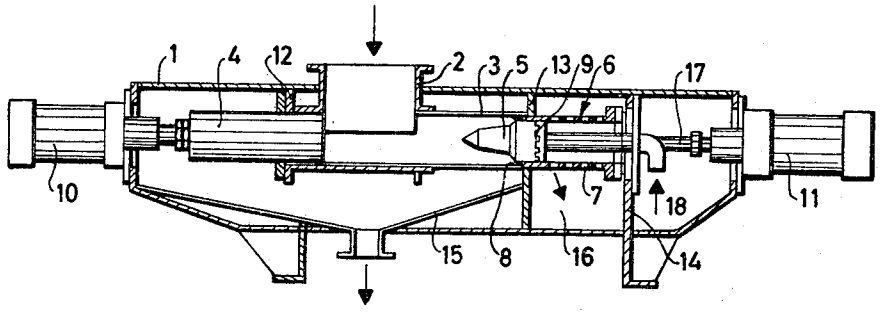

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Fig. 2

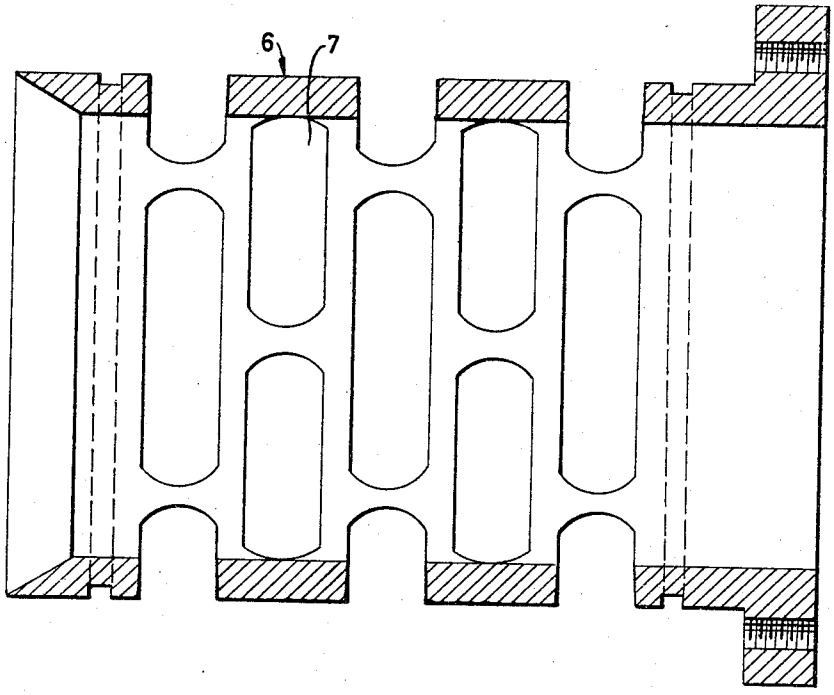

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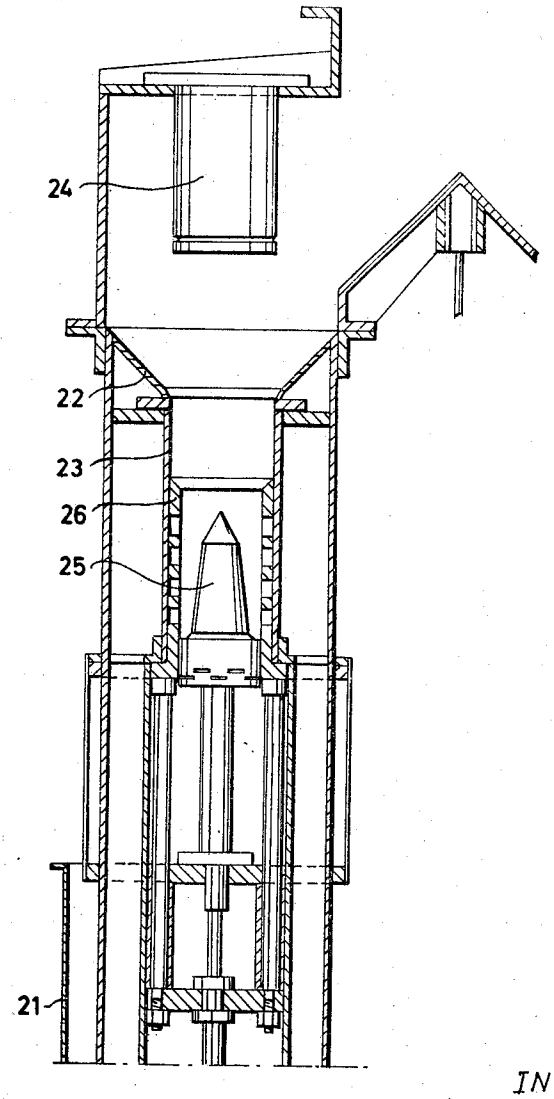
Fig. 3



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PRESS CONCENTRATOR

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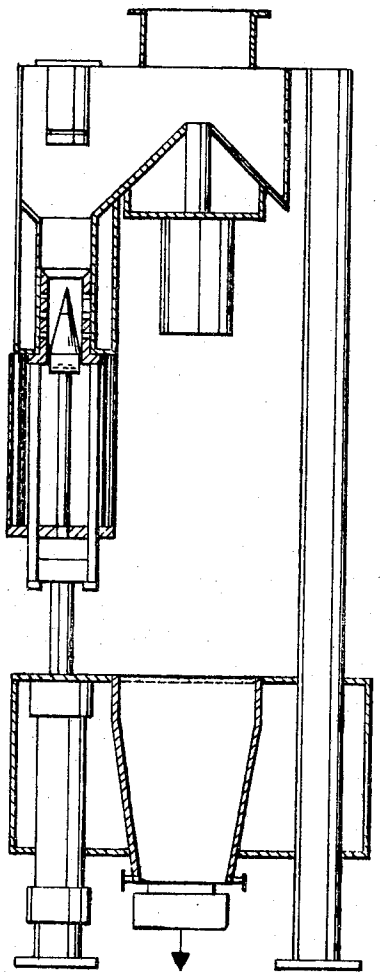
Fig. 4



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PRESS CONCENTRATOR

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Int. Cl. B03b *1/40, 9/06, 9/26*
U.S. Cl. 100—188 8 Claims

ABSTRACT OF THE DISCLOSURE

A press concentrator for sludge having a press housing, a feed funnel, a perforated drum concentrator, a press plunger, a concentrator cone, and discharge means provided with holes and movable into and out of the drum concentrator for discharging the sludge therefrom.

This invention relates to concentration means for sludges and the like, and it refers particularly to an arrangement which operates by means of a press plunger.

Concentration means of this type are previously known, comprising a press plunger reciprocating in relation to a counter pressure member, for example a concentrator cone. In most of the known arrangements the pressed material is discharged with the help of the press plunger after the counter pressure member was moved aside or past the material. In an arrangement of this type the compression normally is carried out in a non-closed chamber, by pressing the material against the concentrator cone and discharging it past the base of said cone during the press operation proper. This gives rise to channel formation and non-uniform compression of the material, so that the dry content is not uniform across the material discharge. An arrangement of this type, thus, is not satisfactory, if the concentrated material is intended for immediate burning.

The present invention relates to an improved press concentrator which is adapted continuously to deliver material with a very high dry content and which is cheap in operation, cheap to procure and requires only little space.

The invention comprises a press housing with a feed funnel and perforated drum concentrator, a pressure plunger, a concentrator cone directed to the plunger and means for discharging the concentrated sludge. The invention is characterized in that the discharge member is a reciprocating sleeve provided with a plurality of holes adapted to be filled with concentrated sludge for its discharge outside the drum concentrator.

For emptying the holes in the discharge sleeve, jets of compressed air radially directed against the sleeve immediately outside the drum concentrator are utilized.

The invention is described in greater detail in the following, with reference to the accompanying drawings showing in

FIG. 1 a longitudinal section through an embodiment of the invention,

FIG. 2 a cross-section through the discharge sleeve,

FIG. 3 another embodiment of the invention,

FIG. 4 a concentration assembly of a plurality of press concentrators.

In FIG. 1 a horizontal press concentrator is shown which comprises a longitudinal press housing **1** provided with a vertical feed funnel **2** and a horizontal drum concentrator **3** disposed below said funnel, the wall of the concentrator being provided with a great number of small holes. The drum concentrator **3** can be removed for cleaning or exchange and is mounted at a supporting

wall **12** and a partition wall **13** in the press housing. At one end of the drum concentrator a press plunger **4** can be reciprocated with the help of a presure cylinder **10**, and at the opposite end of the drum concentrator a concentrator cone **5** is mounted stationary at a second partition wall **14** in the press housing.

At the end of the drum concentrator where the concentrator cone **5** is mounted, a discharge sleeve **6** is arranged to be moved a distance into and out of the drum concentrator. The discharge sleeve **6**, which in greater detail is shown in FIG. 2, comprises a plurality of closely adjacent, preferably oblong holes **7** of outwardly tapering shape, the longitudinal direction of the holes extending in the radial plane along the circumference of the sleeve. The holes **7** are preferably staggered relative one to another, for effectively discharging the pressed material. The discharge sleeve **6** at its edge movable in the drum concentrator is chamfered to a scraping edge adapted to scrape off sludge deposits from the wall of the drum concentrator. Directly inside of the scraping edge the discharge sleeve **6** is provided along its circumference with a groove for receiving a sealing to prevent sludge from being pressed out of the drum concentrator between the latter and the discharge sleeve. This sealing groove is filled rapidly by sludge which builds up to form a very effective and cheap sealing.

The concentrator cone **5** is provided at its base portion lying within the drum concentrator **3** with a sealing groove corresponding to that in the discharge sleeve, in order effectively to seal the space between the discharge sleeve and the base of the concentrator cone.

On its base portion located outside the drum concentrator **3**, the concentrator cone **5** is provided with a plurality of radially outwardly directed compressed air passages **9** which direct compressed air from the inside outwards against the holes **7** in the discharge sleeve **6** for blowing the holes clean from discharged material.

From the partition wall **13** to the opposite end of the press housing extends a collection funnel **15** for pressed-out water and the like. Between the partition walls **13** and **14** is arranged a discharge shaft **16** into which the discharge cylinder empties the discharged material with the help of the aforementioned compressed air jets whereafter the material can be collected on a conveyor belt or the like running below said shaft.

The discharge cylinder is operated with the help of a pressure cylinder **11** disposed at the corresponding end of the press housing, via a piston rod **17**, and the compressed air for blowing clean the holes in the discharge sleeve is supplied through the pipe **18** at the partition wall **14**.

The press concentrator according to this invention operates as follows: The sludge is fed in through the funnel **2** to the drum concentrator **3**, and thereafter the pressure cylinder **11** moves the discharge sleeve **6** to its outermost position. Thereafter the press plunger **4** is pressed against the concentrator cone **5** and thereby compresses the sludge in the drum concentrator **3**. If the sludge quantity supplied proves to be too small for rendering possible effective concentration, the press plunger, of course, can be moved back until additional sludge is supplied whereafter it again presses the sludge against the concentrator cone. The cone is designed with two or more conicities for increasing the effectivity of the concentration operation. During the pressing operation of the press plunger the holes **7** of the discharge sleeve **6** are filled with concentrated sludge. Owing to the stepped design of the concentrator cone, maximum concentration is effected at its central portion.

When the press plunger has assumed its outermost position, the pressure cylinder **11** pulls back the discharge sleeve **6**, the holes **7** of which are filled with concentrated

sludge. During the outward movement of the discharge sleeve the pressure in the sludge is increased, because the discharge sleeve takes along some sludge which is pressed into the sludge located closer to the base of the concentrator cone, thereby effecting a very high concentrating pressure for a certain period of time.

The holes **7** in the discharge sleeve **6**, when they are passing the compressed air passages **9** at the base of the concentrator cone outside the drum concentrator, are cleaned by removal of the discharged sludge which falls into the discharge shaft and is removed.

The press plunger may remain in its outermost position until the discharge cylinder entirely is in its innermost position, or the plunger may be pulled back earlier, depending on the continuity in the supply of new sludge, the dry content of the sludge, its consistency, etc.

In the embodiments of the invention shown in FIGS. 3 and 4, the concentrator press operates vertically, whereby still more space can be saved.

FIG. 3 shows a longitudinal section through a vertical concentrator press. In a vertical press housing **21**, at its upper end, a feed funnel **22** is mounted which is connected with a drum concentrator **23** located below. At the upper end of said concentrator a press plunger is arranged, and at its lower end is provided a concentrator cone **25** about which a discharge sleeve **26** can be reciprocated in the drum concentrator.

In the embodiment shown the press plunger **24** is stationary, while an assembly comprising the feed funnel **22**, drum concentrator **23**, concentrator cone **25** and discharge sleeve **26** moves upwardly and downwardly in relation to the press plunger. The discharge sleeve thereby operates in two steps, i.e. one compressing step, during which it moves together with the remaining parts upwardly, and a filling step when it is being moved into the drum concentrator, during which movement its holes are filled with sludge. The discharge sleeve, of course, may also first be moved to its filling position and thereafter together with the remaining parts move upwards during the compressing step.

Subsequent to the pressing operation the entire movable assembly moves downwards to its lowermost position whereafter the discharge sleeve **26** is pulled out of the drum concentrator and cleaned of sludge by compressed air supplied through passages in the base of the concentrator cone outside the drum concentrator.

According to another embodiment, not shown, of the invention where the pressing also is carried out vertically, the press plunger and the discharge sleeve operate in like manner as in the horizontal press concentrator.

By using a press concentrator according to FIG. 3 one saves the costs for the hydraulic means at the press plunger. Both of the two latter embodiments, however, are extremely well adapted for being assembled to concentrator assemblies of the type shown in FIG. 4 where the feeding and discharge is carried out centrally and where a plurality of press concentrators are placed in a circle about the feed and discharge means. This arrangement results in a compact assembly with high capacity, where, of course, not all of the concentrators must operate at the same time, but one or several may be stand-by units.

Though only two embodiments of the invention have been shown and described, it is obvious, that many different modifications can be imagined within the scope of the inventive idea, for example with respect of the driving, feeding and discharge, the place and movement of the parts relative to one another, etc.

What we claim is:

1. In a press concentrator for sludge and the like, including a press housing with a feed funnel, a perforated drum concentrator, a press plunger, a concentrator cone directed against the plunger, and a discharge member for the concentrated sludge, the improvement wherein the discharge member comprises a discharge sleeve adapted to be moved into and out of the drum concentrator, said sleeve being provided with a plurality of holes to permit discharging the concentrated sludge from the drum concentrator.

2. A press concentrator according to claim **1** wherein the holes in said discharge sleeve are oblong and outwardly tapering, and extend closely adjacent to each other in a radial plane along the circumference thereof.

3. A press concentrator according to claim **1** wherein the edge of said discharge sleeve located in the drum concentrator is chamfered to form a scraping edge closest to the wall of the drum concentrator.

4. A press concentrator according to claim **1** wherein the holes in the discharge sleeve are staggered relative one to another for rendering the discharge more effective.

5. A press concentrator according to claim **1** and further comprising means for supplying compressed air radially against the discharge sleeve through passages at the base of the concentrator cone immediately outside the drum concentrator, whereby the holes in the discharge sleeve are cleared of the discharged sludge.

6. A press concentrator according to claim **1** wherein the press housing is arranged horizontally, and the press plunger and the discharge sleeve are horizontally movable in the drum concentrator and further comprising pressure cylinders for moving said sleeve and press plunger, the sludge being fed in vertically.

7. A press concentrator according to claim **1** wherein the press housing is arranged vertically and the feed funnel, drum concentrator, concentrator cone and discharge sleeve move together toward and away from a stationary press plunger, the discharge sleeve being adapted to also move relative to the remaining movable means for the discharge movement.

8. A press concentrator according to claim **1** wherein the press housing is arranged vertically and the press plunger and discharge sleeve are vertically movable in the drum concentrator and further comprising pressure cylinders for moving said sleeve and press plunger, the sludge being fed in vertically through a feed funnel arranged about the press plunger.

References Cited

UNITED STATES PATENTS

500,490	6/1893	Grimm	100—188 XR
1,135,309	4/1915	Meakin	100—179
1,782,273	11/1930	Riemann	100—188
2,510,764	6/1950	Stadler	100—179 XR
2,798,424	7/1957	Smith et al.	100—174
2,856,846	10/1958	Belk	100—112 XR

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