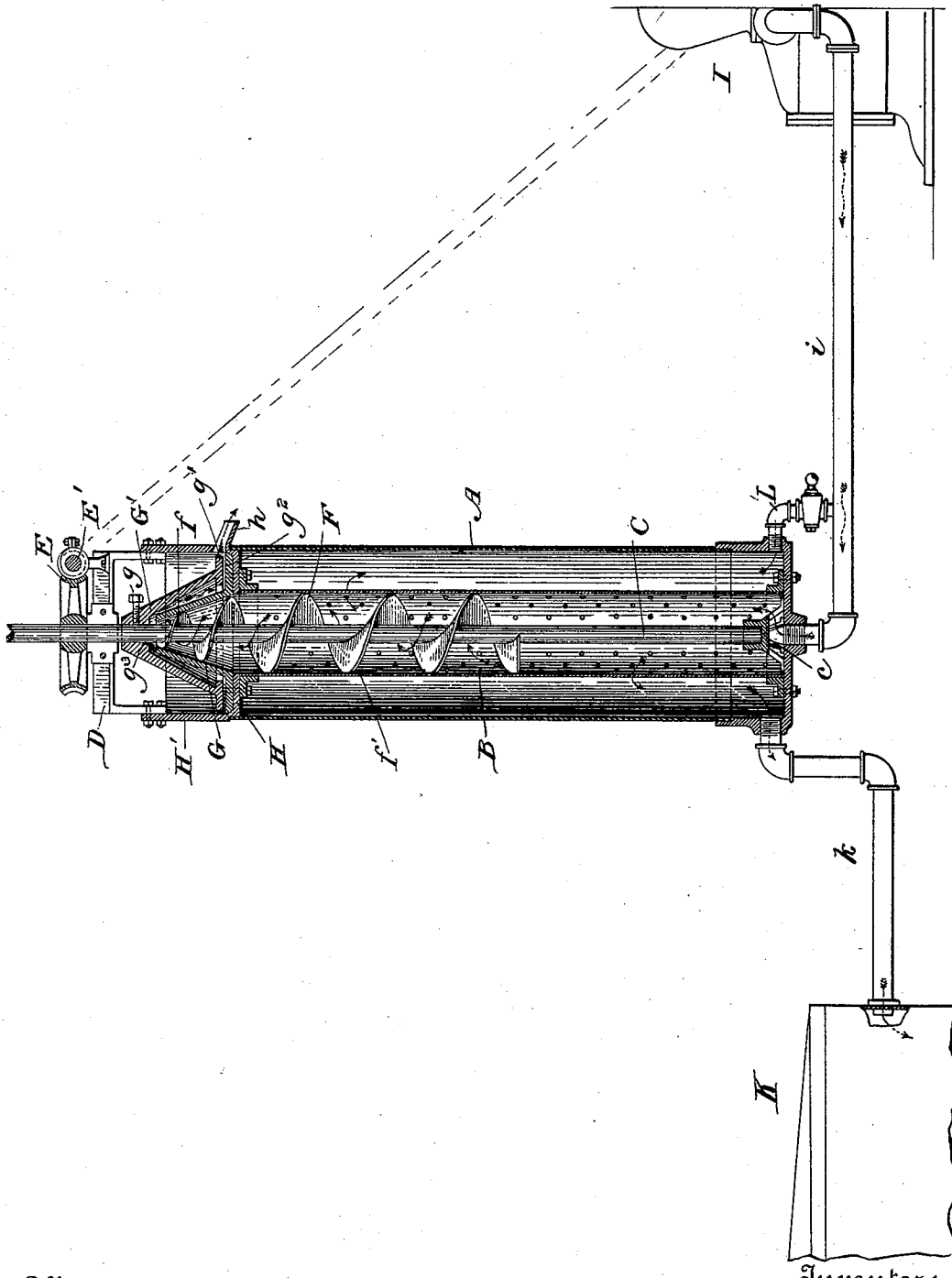
(No Model.)

G. SOBOTKA & W. AHRENS.

APPARATUS FOR SEPARATING SOLID MATTER FROM LIQUIDS.

No. 488,583. Patented Dec. 27, 1892.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SEPARATING SOLID MATTER FROM LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 488,583, dated December 27, 1892.

Application filed January 6, 1892. Serial No. 417,198. (No model.)

To all whom it may concern:

Be it known that we, GUSTAV SOBOTKA, a citizen of Austria-Hungary, residing at New York, in the county of New York, and WILLIAM AHRENS, a citizen of the United States, residing at Long Island City, Queens county, State of New York, have invented certain new and useful Improvements in Apparatus for Separating Solid Matter from Liquids; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in apparatus for separating solid matter from liquids and the principal object is to provide means whereby the waste material or "slops" from distilleries which results from the usual process of manufacturning spirits and yeast and which is ordinarily cast aside or thrown away as useless, may be reclaimed and utilized for cattle food or for other purposes.

A further object is to provide a simple, efficient, inexpensive and reliable apparatus, whereby the solid particles or grain contained in the "slops" may be thoroughly separated from the liquid matter, and collected for subsequent treatment and use.

To this end we have devised the improved apparatus illustrated in the accompanying drawing, which represents a preferred construction of apparatus for practicing our invention, but it will be understood of course that the construction and arrangement of parts of the apparatns may be modified in various ways without departing from the spirit of our invention.

The drawing illustrates a vertical sectional elevation of an apparatus embodying our invention, and like parts therein are denoted by like letters of reference.

A denotes an outer cylinder which may be made of sheet metal or of any suitable material, and within which is placed a second smaller cylinder B. The cylinder B is perforated from top to bottom, as shown the holes or perforations being very small so as to serve as a strainer or sieve to permit the liquid to pass through the same into the space between the cylinders A and B while the solid matter is retained within the cylinder. The cylinder B is preferably made of brass, though any suitable material may be employed.

C denotes a spindle or vertical shaft which is stepped in a bearing *c*, fixed to the bottom of the casing A, and which may be suitably journaled at its upper end in a bearing supported by a frame piece D.

E denotes a worm wheel which is fixed on the spindle C, and meshes with a worm-shaft E′, which latter shaft receives motion from any suitable source of power.

F denotes a spiral blade or screw secured to the spindle C and which is preferably only about half the length of the cylinder B so as to leave a clear space below the blade and within the cylinder for nearly or about half the length of the latter. The blade or spiral F is made tapering at its upper end as indicated at *f*, while its main portion *f′*, is preferably adapted to fit the interior of the cylinder B, so as to impinge against the inner walls of the cylinder and prevent the solid matter from sinking when it has once entered the spiral way provided for its expulsion from the cylinder by the spiral blade.

G represents a conical cap piece which is fitted over the tapered upper end of the spiral F, and may be secured by bolts or otherwise to the cylinder head H, which latter is preferably formed with an annular flange or extension H′, to which is secured the cross piece D which supports the upper bearings for the shaft C. The cylinder head H is also provided with a central opening fitting over the perforated cylinder B, and with an exit opening and spout *h*, at one side thereof. On the lower truncated cone or cap G, is placed a similar rotating bell-shaped cover or cap G′, which is adjustably secured upon the shaft C, by means of a set screw *g*, and these parts are adapted to provide a very narrow space between the inner tapering or conical surface of the cover G′ and the exterior surface of the part G, for the admission of the solid matter or grains exuding from the opening in the apex of the part G. The tapering portion of the cover G′ is preferably formed with an an-

nular flat-faced rim or flange g' which revolves freely slightly above and out of contact with a similar flange g^2 of the part G, so that the solid particles or grains entering the space between the conical caps and working down between the peripheral rims or flanges g', g^2, will be forced out at the spout h.

The conical form of the cover and the conical cap G serve to prevent too free an egress of the solid matter, and also tend to squeeze the material at the apex of the cap G to expel the water contained therein, and allow the solid material to drop into the space between the cones to the discharge spout.

The cover G′ may be adjusted up and down for the purpose of varying the distance between the apex of the conical cap G, and the inner face g^3, of the rotating cover G′, so as to adapt the device to permit grains or particles to escape without grinding them to powder or impeding the operation of the apparatus.

I represents a force pump connecting with the lower end or inlet to the cylinder B, by means of a pipe, i, and K represents a receptacle or reservoir for the liquid matter which connects with the interior of the space between the cylinders A and B, by means of a discharge pipe k.

L represents a discharge pipe which may connect with a suitable source of water supply, for the purpose of washing out the apparatus after using or when it becomes "fouled" or clogged in use.

The operation of the apparatus is as follows:—The "slops" or liquid matter to be separated is forced into the lower end of the cylinder B, by means of the pump I, and is caused to ascend the cylinder by the pressure of the pump, so that a liquid column will be maintained in the cylinder which will exert a pressure opposed to the pressure of the pump, tending to force the liquid through the perforations in the cylinder B. As the liquid rises in the latter cylinder the rotary action of the spiral blade or screw F, will raise the solid particles of the liquid while the purely liquid matter will pass through the perforations in the cylinder to the annular space between the cylinders A and B, and thence through the pipe k into the receptacle K. The solid matter which is carried upward by the spiral blade will be forced out between the apex of the cap G and the hub g^3, of the rotating cover or cap G′, and working down between the contiguous conical surfaces of the cap pieces will be delivered into the exit pipe or spout h from whence it may be conducted to any suitable receptacle. By thus providing for the separation of the solid matter from the liquid by maintaining a solid column in the pipe B, the liquid is between two forces, to wit, the pressure of the pump and the weight of the column above the lower end of the pipe B and these combined forces act upon the liquid in effecting a separation, so that all the liquid matter will be extracted and the solid matter will pass out at the top of the apparatus.

The outer shell or casing A, is preferably, though not necessarily, cylindrical in form, and instead of a pump, an elevated tank or other means may be employed for forcing the liquid matter or "slops" into the apparatus, and other modifications will readily suggest themselves to a skilled mechanic. We do not therefore desire to be limited to the exact construction and arrangement of parts described and shown.

The pump I may be of any desired construction, but we preferably use a fly-wheel pump with connections for imparting motion therefrom to the revolving shaft C, simultaneously with the pumping of the liquid into the apparatus, so that when the separating mechanism is stopped by throwing the pump out of action, the supply of liquid will also be cut off.

Having thus fully described our invention, what we claim and desire to secure by Letters Patent of the United States, is:—

1. An apparatus for separating solid matter from liquids, comprising the outer casing or shell, the inner perforated cylinder, the revolving spiral blade, the stationary truncated cone or cap, the revolving bell-shaped cover, and means for forcing the liquid matter into the perforated cylinder, substantially as described.

2. In combination with the perforated cylinder, and the revoluble spiral blade working therein, the stationary cap arranged over the upper end of said cylinder, and the revoluble bell-shaped cover fitting over said cap, substantially as described.

3. In combination with the outer casing, the interior perforated cylinder, the revoluble screw working in said cylinder, the cap over the end of the cylinder, the revoluble cover fitting over said cap, independent outlet and inlet openings for the separated liquid and solid matter, the induction pipe and the pump or forcing apparatus connected with said induction pipe, substantially as described.

4. In combination with the vertically disposed outer cylinder or casing, the perforated cylinder fixed concentrically within said casing, the vertical shaft with spiral blade thereon fitting closely within said perforated cylinder; said blade being tapered at its upper end, the truncated cone or cap fitting over the tapered end of said spiral blade, the revoluble bell-shaped cover fitting over said cap, the cylinder head forming a chamber which surrounds said cap and cover, and having an outlet opening therein, the inlet and outlet pipes connecting, respectively, with the inner perforated and outer cylinders, and the pump connected with said inlet pipe, substantially as described.

5. An apparatus for separating solid matter from liquids, comprising a perforated open-ended cylinder or tube, with induction pipe and forcing apparatus connected therewith,

a cylindrical casing surrounding said tube provided with a head or extension having a central opening therein and forming a chamber above the outlet end of the tube, the outlet pipe connected with said casing, the conical cap fitting over the upper end of the tube, the vertical shaft or spindle, the bell-shaped cover adjustably secured to said shaft above said cap, the spiral blade fixed on said shaft below the cap, and means for revolving said shaft, substantially as described.

6. In combination with the perforated cylinder, the vertical rotary shaft, the spiral blade on said shaft, the conical cap and the bell-shaped cover fitting over said cap and adjustably secured to the shaft, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

GUSTAV SOBOTKA.
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