

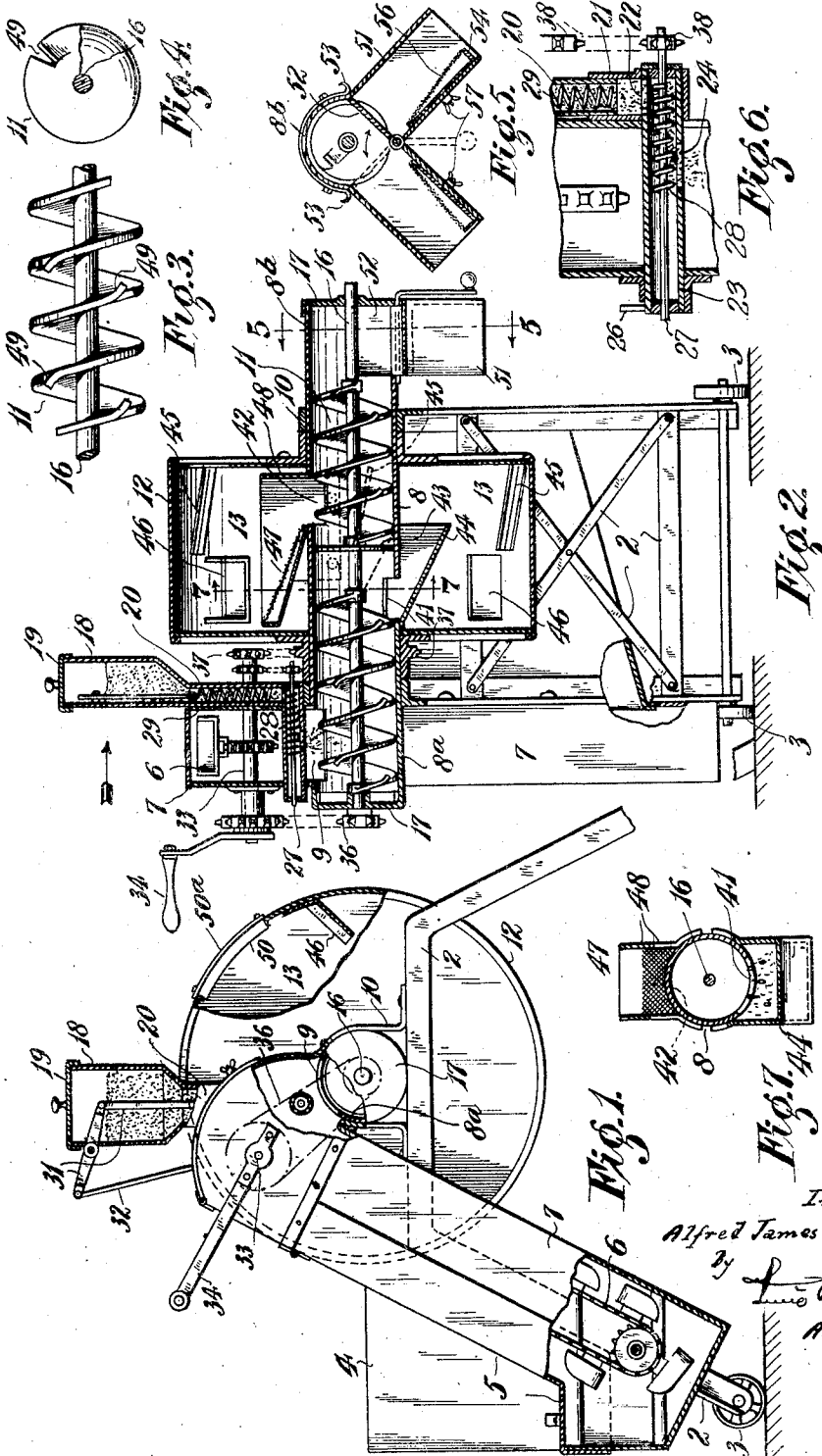
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APPARATUS FOR PICKLING AND/OR MIXING GRAIN AND FOR OTHER ANALOGOUS PURPOSES

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APPARATUS FOR PICKLING AND/OR MIXING GRAIN AND FOR OTHER ANALOGOUS PURPOSES.

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To all whom it may concern:

Be it known that I, ALFRED JAMES BISHOP, a subject of the King of Great Britain and Ireland, and a resident of Melbourne, county of Bourke, State of Victoria, Commonwealth of Australia, have invented a certain new and useful Improved Apparatus for Pickling and/or Mixing Grain and for Other Analogous Purposes, of which the following is a specification.

This invention relates to apparatus for use in the pickling and mixing or similar treatment of grain and other like materials and refers more particularly to grain pickling or dusting apparatus according to which a dry powdered medium such as copper carbonate or copper sulphate or other suitable substance is mixed with the grain to thereby counteract injurious influences such as ball smut or bunt and promote the germination of the grain.

The primary object of the present invention is to provide an improved machine of the general class mentioned which is of compact and reliable construction and will ensure the grain and powder being intimately and thoroughly mixed so that the germinating properties of the grain are preserved and enhanced to the fullest extent.

Other objects and advantages will be apparent from the following description and accompanying drawings which refer particularly to an improved machine for pickling or dusting grain. It will also be evident that apparatus embodying the same essential features may be utilized for mixing grain, chaff, flour and other like materials, and that various modifications, alterations, and additions may be incorporated in the particular construction and arrangement of parts employed without departing from the spirit and scope of the invention as defined by the appended claims.

Referring to the drawings which form part of this specification:—

Figure 1 is a front elevation of a grain pickling machine in accordance with the invention. Various parts are shown in section and others are broken away for convenience of illustration.

Figure 2 is a sectional elevation taken in a plane at right angles to Figure 1.

Figures 3 and 4 are detail views of a conveyor seen in Figure 2.

Figure 5 is a vertical section on the line 5—5 of Figure 2.

Figure 6 is a fragmentary sectional view of powder feeding mechanism embodied in the machine.

Figure 7 is a fragmentary sectional view taken on the line 7—7 of Figure 2.

In the drawings the reference numeral 2 designates a stand or framework capable of supporting the machine. The legs at one side of this framework may be equipped with wheels or castors as at 3 whereby the machine may be readily wheeled from place to place when so desired.

The numeral 4 indicates a grain hopper and 6 an elevator preferably of the bucket type which operates within an elevator housing 7 and delivers the grain into a preferably cylindrical conveyor casing 8 by way of an inlet orifice 9 formed in the casing 8 adjacent one end thereof. The elevator housing may be provided with an inspection cover as at 5. An Archimedian screw conveyor 11 is housed within the casing 8 which also provides an axle for a rotary drum 12 the interior of which forms a mixing chamber 13 hereinafter referred to. The conveyor casing 8 may be held stationary by means of brackets or clamps 10 which also retain the rotary drum in proper longitudinal position on the said casing.

The rotary drum 12 is mounted upon the casing 8 approximately midway of its length so that the latter has two end portions or what may be termed feed and delivery portions 8^a and 8^b which project axially from each side of the rotary drum, the aforesaid inlet orifice 9 being formed in the feed or inlet portion 8^a.

The conveyor spindle 16 passes at its ends through bearing apertures formed in caps or closures 17 fitted to the ends of the conveyor casing 8.

It is considered preferable to employ copper carbonate in finely powdered form as the pickling medium and a supply thereof may be placed within an elevated hopper or receptacle 18 which may be fitted with a removable closure 19. The powder receptacle 18 may have a reduced neck portion whereby it may be detachably fitted within a socket piece 21 carried by or attached to the adjacent face of the elevator housing 7 as shown in Figure 6. The open bottom

of the reduced neck portion 20 is vertically aligned above a port or slot 22 formed in a rotatable sleeve or tube 23 which extends transversely through the socket piece 21 and the elevator housing 7. A second port or slot 24 is formed in the lower part of the rotatable sleeve 23 in vertical alignment with the aforesaid inlet orifice 9 of the conveyor casing 8. The sleeve 23 may be turned or adjusted by means of a hand or finger piece 26 to thereby bring more or less of the port or slot 22 into communication with the reduced neck of the powder receptacle and thus regulate the rate of the powder feed.

15 Powdered copper carbonate has a tendency to solidify or pack into a hard mass. In order to counteract this and to ensure that the powder in the sleeve 23 is effectively conveyed along said sleeve so that it may pass through the port 24 into the conveyor casing 8, a spindle 27 may extend longitudinally within said sleeve and a spring 28 coiled around and fixed at one end to the spindle 27 so that upon rotation of the latter the spring 28, in addition to feeding the powder towards the port or slot 24, sets up a vibrating or trembling action whereby the pickling medium is agitated and maintained in its powdered condition.

30 For reasons similar to those stated in the preceding paragraph a spring 29 may be accommodated by the reduced neck portion 20 of the powder receptacle and operatively connected as indicated at 31 (Figure 1) to a reciprocatory rod 32 whereby the powder in the receptacle 18 is subjected to a continual vibration or trembling action of the spring 29.

The shaft 33 at the upper or inner end of the elevator 6 may be power driven or it may be rotated by hand for instance by means of a hand lever such as 34. Rotary motion may be transmitted from shaft 33 to the screw conveyor 11, the rotary drum 12, and the powder feed spindle 27, by suitable gearing, belting or driving chains as indicated at 36, 37 and 38 respectively.

Communication is established between the interior of the conveyor casing 8 and the mixing chamber 13 by orifices 41 and 42, the orifice 41 being formed in the underneath or bottom part of said conveyor casing where it enters the side of the rotary drum nearest the grain and powder-inlet orifice 9. The orifice 42 is formed in the upper part of the conveyor casing 8 near the other side of said drum.

The continuity of the screw conveyor 11 may be broken or interrupted intermediately of the orifices 41 and 42 and a baffle plate or disc 43 mounted on the conveyor spindle 16 between the adjacent ends of the two sections of the conveyor to ensure that the incoming grain and powder fall through the orifice 41 into the mixing

chamber 13. A deflector or chute 44 may be attached to the conveyor casing 8 so as to extend beneath the orifice 41 thereof and direct the grain and powder from said orifice 41 towards the opposite side of the mixing chamber 13.

The grain and powder entering the mixing chamber 13 are therein subjected to a whirling or agitating action produced by the rotation of the drum and are thereby intimately and thoroughly mixed together so that the individual particles of grain are dusted or coated with the powdered pickling medium. A series of baffles or agitators indicated at 45 are preferably disposed around the inner periphery of the rotary drum to ensure a satisfactory whirling or mixing action. These baffles or agitators 45 may be arranged so as to prevent the grain and powder being prematurely gathered by scoops 46 which are also disposed within the mixing chamber 13.

One or more of these scoops may be carried on the inner periphery of the rotary drum 12 and a sieve or screen 47 having perforations of less dimensions than the grain to be treated is stationarily mounted within said drum and inclined downwardly towards the orifice 42. Associated with the sieve or perforated screen 47 is a stationary director comprising upstanding walls 48 which are disposed at either side of said sieve and may be adapted to support same as indicated in Figures 2 and 7. During each rotation of the drum 12 the scoops gather a quantity of the grain and powder and carry it to a position above the sieve 47 onto which it falls by gravity, the grain being directed by the sieve and the upstanding walls 48 through the orifice 42 into the delivery portion 8^b of the conveyor casing whilst the powder, or at least the greater part of it, may fall through the sieve and be again mixed with the grain in the mixing chamber as aforesaid.

The screw conveyor 11 may be provided with projections 49 whereby the grain and powder are mixed together during their passage along the conveyor casing as well as in the mixing chamber. Such projections may be formed by cutting the screw at its periphery and bending or offsetting said cut portions sidewardly as shown in Figures 3 and 4.

Suitable arrangements are made at the outer end of the delivery portion 8^b of the conveyor casing for discharging the treated grain. As shown in Figures 2 and 5 a duplex bagging mechanism, comprising a pair of inclined delivery chutes 51 which are opened and closed alternately by a suitable shutter 52, may be provided. Hooks 53 may be provided for convenience in holding bags or like receptacles in position during filling operations.

Powder collecting boxes 54 having perforated or foraminous tops or sieves 56 may be removably retained on the lower inclined walls of the delivery chutes 51 by wing nuts or the like 57 to thereby trap any excess powder and prevent it from passing with the grain into the bags or other receptacles.

The rotary drum may have an opening 50 affording access to the interior thereof for cleansing and other purposes, said opening being normally closed by a dust proof door 50*.

It will be evident from the foregoing that the grain and powder, throughout their passage along the conveyor housing and while in the rotary mixing drum, are continuously and intimately mixed together so that a most thorough and effective "pickling" of the grain is obtained. The machine is consequently economical in the use of the powdered pickling material, any escape thereof except by way of the delivery chutes 51 being obviated.

If desired adjustable baffles or the like (not shown) may be provided to cover the orifices 41 and 42 in the conveyor casing so that the materials within the mixing chamber 13 may be subjected to an agitating or diffusing action for an extended period. The supply of grain and powder may also be arrested during this period for example by closing the inlet orifice 11 of the conveyor casing.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. Mixing apparatus, comprising a drum, the interior of which constitutes a mixing chamber; a stationary casing passing substantially horizontally through the drum and whereon said drum is rotatably mounted, said casing having orifices to establish communication between its interior and the mixing chamber; and screw conveying means within the casing for conducting the materials to be mixed into and away from said mixing chamber by way of said orifices.

2. Mixing apparatus, comprising a drum, the interior of which constitutes a mixing chamber; a stationary casing passing substantially horizontally through the drum and whereon said drum is rotatably mounted, said casing having an orifice in its lower side to discharge the materials to be mixed from the casing into the lower part of the mixing chamber, and also having an orifice in its upper side to admit the mixed materials into the casing from the upper part of said chamber; and screw conveying means within said casing for conducting the materials therein to the first-named orifice and discharging from the apparatus the materials admitted through the second-named orifice.

3. Mixing apparatus, according to claim

2, wherein the two orifices are spaced longitudinally from each other, and the continuity of the screw-conveying means is interrupted by a gap at a point between said orifices; and wherein a transverse partition is located in such gap between the resultant sections of the conveyor.

4. Mixing apparatus, comprising a drum, the interior of which constitutes a mixing chamber; a stationary casing passing substantially horizontally through the drum and whereon said drum is rotatably mounted; said casing projecting beyond each side of the drum and having one projecting portion provided near its outer end with an inlet aperture for the materials to be mixed, and the other projecting portion provided with means for discharging the materials after having been mixed; the intermediate portion of the casing having orifices to establish communication between the interior of the casing and the mixing chamber; and screw-conveying means within the casing for conducting the materials to be mixed into and away from said mixing chamber by way of said orifices.

5. Mixing apparatus, according to claim 2, in which the conveyor casing projects beyond each side of the drum, one projecting portion having an inlet aperture near its outer end for the materials to be mixed, and the other projecting portion having means for discharging the mixed materials; the orifice in the lower part of the casing being located within the drum and adjacent that side of said drum from which the first-named end portion of the casing projects, and the orifice in the upper part of the casing being likewise located within the drum but adjacent the side from which the second-named end portion of the casing projects.

6. Mixing apparatus, comprising a drum, the interior of which constitutes a mixing chamber; a stationary casing passing substantially horizontally through the drum and whereon said drum is rotatably mounted, said casing having orifices to establish communication between its interior and the mixing chamber; and a screw conveyor within the casing for conducting the materials to be mixed into and away from said mixing chamber by way of said orifices, said conveyor having offset projections to assist in the mixing of the materials as they are conducted along the conveyor casing.

7. Mixing apparatus, comprising a drum, the interior of which constitutes a mixing chamber; a stationary casing passing substantially horizontally through the drum and whereon said drum is rotatably mounted, said drum having orifices to establish communication between its interior and the mixing chamber; means for feeding grain into said casing near one end thereof; means operating in unison with the grain-feeding

means to automatically feed a grain-pickling medium into the casing; means for adjusting the rate of feed of the pickling medium in relation to that of the grain; and a screw conveyor within the casing for conducting the grain and pickling medium into and away from the mixing chamber by way of said orifices.

8. Mixing apparatus, comprising a drum, the interior of which constitutes a mixing chamber; a stationary casing passing substantially horizontally through the drum and whereon said drum is rotatably mounted, said drum having orifices to establish communication between its interior and the mixing chamber; means for feeding grain into said casing near one end thereof; means operating in unison with the grain-feeding means to automatically feed a grain-pickling medium into the casing; and a screw conveyor within the casing for conducting the grain and pickling medium into and away from the mixing chamber by way of said orifices.

9. In apparatus for the purpose indicated, the combination with a mixing chamber and means for conveying the material under treatment into said mixing chamber, of a receptacle adapted to contain a powdered pickling medium having at its bottom an escape opening or passage for the powdered material, a hand adjustable rotary tube having a port or slot adapted to control the escape of the powdered material from said receptacle and a second port at a different longitudinal position to the first named port, and a conveyor element mounted within said tube and adapted to conduct the powdered material along said tube from the first to the second named port, from which latter port it is conveyed into said mixing chamber with the grain under treatment.

10. In apparatus for the purpose indicated, means for feeding powdered pickling material to the grain under treatment within a mixing chamber, comprising a coiled spring arranged and adapted to set up a vibrating or trembling action within said powdered material and to feed the latter towards said mixing chamber.

11. In apparatus of the nature indicated, the combination of a rotary drum, the interior of which forms a mixing chamber, a conveyor casing passing through said drum, agitators disposed within the drum, scoop-

ing means mounted on the inner periphery of said drum to lift the material under treatment from the lower to the upper part of the mixing chamber, said casing having an orifice formed in its lower part within said drum and a second orifice formed in its upper part, and a perforated screen member mounted within the mixing chamber above said conveyor casing, said screen being inclined downwardly towards the last named orifice.

12. In apparatus of the nature indicated, the combination of a rotary drum forming therein a mixing chamber, means for feeding grain and pickling powder into said mixing chamber, means carried by and within said drum for raising said materials from the lower to the upper part of said mixing chamber, and means stationarily mounted within said drum for receiving and directing the materials dropped by gravity from the upper part of the mixing chamber, into a discharge or delivery passage leading from said mixing chamber.

13. Apparatus according to claim 14, characterized in that the said receiving and directing means includes a screen having perforations of less dimensions than the grain, whereby the grain is directed into said discharge or delivery passage while the excess powder falls through said screen and returns to the lower part of the mixing chamber.

14. Apparatus for the purpose indicated, comprising a supporting framework, a rotary mixing drum, a conveyor casing adapted to form an axle for said mixing drum, a conveyor located within said casing, mechanism for feeding grain and powdered material in desired proportionate quantities into one end of said conveyor casing, driving means for simultaneously actuating said grain and powder feeding mechanism, said conveyor and said rotary drum, means whereby the grain and powdered material are transferred from said conveyor casing into the interior of said rotary drum and after the mixing operation are returned from said drum into said conveyor casing, and means located at the discharge end of said conveyor casing for bagging the treated grain and collecting the surplus powdered material.

In testimony whereof I affix my signature.

ALFRED JAMES BISHOP.