

PATENT SPECIFICATION (11)

1 436 195



- (21) Application No. 46916/73 (22) Filed 8 Oct. 1973 (19)
 (31) Convention Application No. 1660/72 (32) Filed 13 Oct. 1972 in
 (33) India (IN)
 (44) Complete Specification published 19 May 1976
 (51) INT. CL.³ A23F 3/04
 (52) Index at acceptance
 A2B A3A

(54) CONTINUOUS TEA ROLLING MACHINE

(71) We, TEA RESEARCH ASSOCIATION, of Royal Exchange, 6, Netaji Subhas Road, Calcutta 1, West Bengal, India, a registered body under the West Bengal Societies Registration Act, 1961, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a continuous tea rolling machine for rolling withered tea leaf.

It is an object of this invention to provide a machine for rolling withered leaf which is economical for its purpose and is easy to service.

According to this invention there is provided a continuous tea rolling machine comprising a frame supporting a horizontally extending hollow cylinder mounted on rails for a reciprocating motion along the rails by a driving means, the cylinder having open ends and carrying a feed hopper fitted over a feed opening in the top of one end portion of the cylinder, a cylindrical block fixed to the frame and extending concentrically within said end portion of the cylinder so as to keep the adjacent end of the cylinder closed at all times during reciprocation, and a rotor disposed concentrically inside said cylinder with an annular space therebetween and being supported slidably and rotatably on a shaft passing through the said fixed block, whereby said rotor may be rotated or oscillated on said shaft, the inside surface of the cylinder and the outside surface of the rotor each being provided with serrations and/or battens and/or projections which may be short or long.

With this machine the cylinder merely has to be disengaged from its driving means and pulled out over the rails for cleaning. Similarly, the rotor can be slid over the said shaft and pulled out for cleaning.

The end of the cylinder where the feed hopper is provided is the feed end of the machine, the open other end of the cylinder being the discharge end. The forward and backward reciprocating motion may be imparted to the cylinder by a simple crank or

a quick return mechanism, and the stroke length of the cylinder may be adjustable in either case. The rotor, which may either be of constant or variable diameter along its length, is preferably provided with a hollow shaft, which is seated over the shaft passing through the fixed block (the latter shaft being solid) and may be supported on bearings so that the rotor can be slid over the solid shaft. When in position, the rotor can either be rotated or oscillated—the oscillations being angular—around its own axis. Arrangements for both kinds of drives may be provided and any one type may be engaged at a time.

The annular space between the rotor and the cylinder constitutes the processing zone of the machine and holds the leaf while at the same time the leaf is being rolled. The inside surface of the cylinder and the outside surface of the rotor constitute the leaf rolling surfaces.

The fixed block is cylindrical in shape with at least one of its ends closed. The block is fitted at the feed end (hopper end) of the cylinder concentrically so that the (or a) closed end faces towards the inside of the cylinder. The inside surface of the cylinder can freely slide over the block, the block being rigidly fixed to the frame and it keeps the feed end of the cylinder closed all the time when the cylinder reciprocates its forward and backward motion.

In the accompanying drawings:—

Figure 1 is the elevation of one form of the cylinder partly in section;

Figure 2 is the end view taken along A—A of Figure 1;

Figure 3 is the elevation of one form of the rotor;

Figure 4 is the end view taken along B—B of Figure 3;

Figure 5 is the elevation of one form of the block;

Figure 6 is the end view of Figure 5;

Figure 7 is the elevation of the assembly of the cylinder partly in section, the rotor and the block;

Figure 8 is the end view of Figure 7;

Figure 9 is the elevation of another form of the cylinder partly in section;

Figure 10 is the end view taken along C—C of Figure 9;

Figure 11 is the elevation of another form of the rotor;

Figure 12 is the end view of Figure 11;

Figure 13 is the elevation of another form of the block;

Figure 14 is the end view of Figure 13;

Figure 15 is the elevation of the assembly of the cylinder partly in section, the rotor and the block shown in Figures 9—14;

Figure 16 is an end view taken along D—D of Figure 15;

Figure 17 is the elevation of the tea rolling machine showing the assembly of the frame, cylinder, rotor, fixed block and driving gears; and

Figure 18 is the end view of Figure 17.

The cylinder (1) has an opening cut out at the top at one end over which a feed hopper (4) is fitted. This end of the cylinder is therefore the feed end, the other end being the discharge end. The cylinder (1) is mounted on two rails (8) fitted to the frame (9) over which it can slide forward and backward, the motion being imparted by the driving gear (10).

The rotor (2) may either be of constant or variable diameter along its length. The rotor (2) is fitted concentrically inside the cylinder (1) with its hollow shaft (5) seated over the solid shaft (7) passing through a bushing in the fixed block (3). The left-hand end of shaft (7) and the right-hand end of shaft (5) as viewed in the drawings are supported on bearings and the rotor is driven by the driving gear (11) for oscillatory motion. The driving gear (11) may be replaced by ordinary chain and sprockets for rotary motion of the rotor. There is an annular space (6) between the rotor and the cylinder.

This annular space (6) constitutes the processing zone of the machine and holds the leaf while at the same time the leaf is being rolled.

The fixed block (3) is cylindrical in shape with at least one of its ends closed. The block (3) is fitted at the feed end (hopper end) of the cylinder (1) concentrically so that the (or a) closed end faces towards the inside of the cylinder (1), and the inside surface of the cylinder (1) can freely slide over the block (3). The block (3) is rigidly fixed to the frame and it keeps the feed end of the cylinder closed all the time when the cylinder reciprocates its forward and backward motion.

WORKING

The cylinder makes a forward and backward motion while the rotor either rotates or oscillates around its own axis. At the end of a backward stroke of the cylinder the opening of the cylinder below the hopper is closed by the fixed block and during the

forward stroke it gradually opens out while the bottom of the hopper sweeps over the top of the fixed block. Leaf fed through the hopper is pushed by this sweeping action of the bottom of the hopper over the top of the fixed block and thus being carried along with the opening of the cylinder over the fixed block, falls through the opening to the annular space between the cylinder and the rotor during the forward stroke. The leaf which has gone inside the cylinder in this manner is pushed forward in relation to the cylinder by the fixed block during the backward stroke of the cylinder when the inside surface of the cylinder sweeps over the fixed block. Leaf thus fed and pushed forward inside the cylinder gets rolled in the processing zone mentioned above by the combined action of the reciprocating motion of the cylinder and the rotary or oscillatory motion of the rotor.

During the forward stroke, while taking in newly fed leaf, the inside surface of the cylinder provided with serrations and/or battens and/or projections carries with it the leaf which is already in the processing zone and causes the leaf to roll over the surface of the rotor which, due to its rotary or oscillatory motion and its serrations and/or battens and/or projections, carries the leaf around the inside surface of the cylinder in one or either direction depending upon whether the rotor rotates or oscillates, and causes the leaf to roll further over the inside surface of the cylinder at the same moment.

Thus there are two different rolling actions on each leaf particle in two different and mutually perpendicular planes caused by the motions of the two leaf rolling surfaces. Further, there is some leaf rolling action also in the leaf mass inside the processing zone.

During the backward motion of the cylinder as the leaf gets pushed forward in relation to the cylinder by the fixed block, some pressure is generated in the leaf mass inside the processing zone and the leaf slips and/or rolls over the inside surface of the cylinder and some leaf gets discharged at the discharge end while the rotor does the same function as it does during the forward stroke of the cylinder.

Thus the resultant rolling action of the two leaf rolling surfaces are not the same during the two strokes of the cylinder; also, as the sliding velocity of the cylinder varies from zero at the end of a stroke to a maximum at the middle of a stroke in two different directions during the two strokes, the intensity and direction of the resultant rolling action on a leaf particle are different at different moments of the cycle between the times when the reciprocating cylinder and the oscillating or rotating rotor have the same relative positions and motions. The reciprocation frequency of the cylinder and

the oscillation or rotation frequency of the rotor may be chosen and related as desired.

Due to the generation of pressure during the backward motion of the cylinder and to the relieving of the pressure during the forward motion of the cylinder, the leaf mass is subjected to a cyclic pressure variation completed in one oscillation of the cylinder. This cyclic variation of pressure in the leaf mass further adds to the effectiveness of the machine in causing damage to the leaf cells without breaking the leaves themselves during rolling. By adjusting the stroke length of the cylinder, the pressure generated in the leaf mass inside the processing zone of the machine can be regulated to deal with different leaves having different degrees of wither requiring different intensity of pressure during rolling.

Although specific embodiments of the invention have been described, many modifications and changes may be made therein without departing from the scope of the invention as defined by the appended claims.

WHAT WE CLAIM IS:—

1. A continuous tea rolling machine comprising a frame supporting a horizontally extending hollow cylinder mounted on rails for a reciprocating motion along the rails by a driving means, the cylinder having open ends and carrying a feed hopper fitted over a feed opening in the top of one end portion of the cylinder, a cylindrical block fixed to the frame and extending concentrically within said end portion of the cylinder so as to keep the adjacent end of the cylinder closed at all times during reciprocation, and a rotor disposed concentrically inside said cylinder with an annular space therebetween and being supported slidably and rotatably on a shaft passing through the said fixed block, whereby said rotor may be rotated or oscillated on said shaft, the inside surface of the cylinder and the outside surface of the rotor each being provided with serrations and/or battens and/or projections.

2. A machine as claimed in claim 1,

wherein the reciprocating motion is imparted by a simple crank or a quick return mechanism.

3. A machine as claimed in claim 1 or 2, wherein the stroke length of the cylinder is adjustable.

4. A machine as claimed in any of the preceding claims, wherein the cylinder is so adapted and designed that the cylinder can be disengaged from the drive means and pulled out over the rails for cleaning.

5. A machine as claimed in any of the preceding claims, wherein the rotor is of constant diameter along its length.

6. A machine as claimed in any of the preceding claims 1 to 4, wherein the rotor is of variable diameter along its length.

7. A machine as claimed in any of the preceding claims, wherein said shaft is supported on bearings.

8. A machine as claimed in any of the preceding claims, wherein the rotor is so adapted and designed that the rotor can be slid over the shaft and pulled out for cleaning.

9. A machine as claimed in any of the preceding claims, wherein drive means are provided for either rotation or oscillation of the rotor.

10. A machine as claimed in any of the preceding claims, wherein the fixed block has at least one of its ends closed.

11. A machine as claimed in claim 10, wherein the fixed block is so fitted at the feed end of the cylinder that the closed end faces the inside of the cylinder which freely slides over the fixed block.

12. A continuous tea rolling machine, substantially as herein described.

13. A continuous tea rolling machine, substantially as herein described with reference to the accompanying drawings.

For the Applicants:
BERNIER & BURRINGTON,
The Forge, Bowood, Bridport,
Dorset, DT6 5JG.

the oscillation or rotation frequency of the rotor may be chosen and related as desired.

Due to the generation of pressure during the backward motion of the cylinder and to the relieving of the pressure during the forward motion of the cylinder, the leaf mass is subjected to a cyclic pressure variation completed in one oscillation of the cylinder. This cyclic variation of pressure in the leaf mass further adds to the effectiveness of the machine in causing damage to the leaf cells without breaking the leaves themselves during rolling. By adjusting the stroke length of the cylinder, the pressure generated in the leaf mass inside the processing zone of the machine can be regulated to deal with different leaves having different degrees of wither requiring different intensity of pressure during rolling.

Although specific embodiments of the invention have been described, many modifications and changes may be made therein without departing from the scope of the invention as defined by the appended claims.

WHAT WE CLAIM IS:—

1. A continuous tea rolling machine comprising a frame supporting a horizontally extending hollow cylinder mounted on rails for a reciprocating motion along the rails by a driving means, the cylinder having open ends and carrying a feed hopper fitted over a feed opening in the top of one end portion of the cylinder, a cylindrical block fixed to the frame and extending concentrically within said end portion of the cylinder so as to keep the adjacent end of the cylinder closed at all times during reciprocation, and a rotor disposed concentrically inside said cylinder with an annular space therebetween and being supported slidably and rotatably on a shaft passing through the said fixed block, whereby said rotor may be rotated or oscillated on said shaft, the inside surface of the cylinder and the outside surface of the rotor each being provided with serrations and/or battens and/or projections.

2. A machine as claimed in claim 1,

wherein the reciprocating motion is imparted by a simple crank or a quick return mechanism.

3. A machine as claimed in claim 1 or 2, wherein the stroke length of the cylinder is adjustable.

4. A machine as claimed in any of the preceding claims, wherein the cylinder is so adapted and designed that the cylinder can be disengaged from the drive means and pulled out over the rails for cleaning.

5. A machine as claimed in any of the preceding claims, wherein the rotor is of constant diameter along its length.

6. A machine as claimed in any of the preceding claims 1 to 4, wherein the rotor is of variable diameter along its length.

7. A machine as claimed in any of the preceding claims, wherein said shaft is supported on bearings.

8. A machine as claimed in any of the preceding claims, wherein the rotor is so adapted and designed that the rotor can be slid over the shaft and pulled out for cleaning.

9. A machine as claimed in any of the preceding claims, wherein drive means are provided for either rotation or oscillation of the rotor.

10. A machine as claimed in any of the preceding claims, wherein the fixed block has at least one of its ends closed.

11. A machine as claimed in claim 10, wherein the fixed block is so fitted at the feed end of the cylinder that the closed end faces the inside of the cylinder which freely slides over the fixed block.

12. A continuous tea rolling machine, substantially as herein described.

13. A continuous tea rolling machine, substantially as herein described with reference to the accompanying drawings.

For the Applicants:
BERNIER & BURRINGTON,
The Forge, Bowood, Bridport,
Dorset, DT6 5JG.

