

SPECIFICATION

A device for better processing of tealeaves in a continuous manner from a continuous type of tea processing machine

This invention relates to a device for processing tea leaves at a predetermined pressure in a continuous tea processing machine.

- 10 In the manufacture of black tea, the tea leaves are first withered and then rolled. During rolling the cells of the leaves are broken to bring out the juice which gets uniformly spread on the leaves. The rolled leaves are left to the action of the atmospheric oxygen for a definite period of time during which the chemicals, mainly catechins, present in the leaf cells undergo a series of oxidation and condensation/polymerisation reactions, the said period being dependent on the nature of the leaves and the atmospheric conditions.

- 20 In addition to the orthodox or conventional rollers, tea rolling machines such as the Legg Cutter, the CTC (cutting, tearing and curling) and Rotorvane have been developed which may supersede or complement the orthodox rollers. This invention relates to a fourth type of tea rolling machine which comprises a rotor or roller adapted to rotate or oscillate within a stationary or reciprocating barrel or cylinder. The tea leaves in the annular space between the periphery of the rotor and inner periphery of the cylinder are rolled and curled during which the cells of the leaves are discretely broken to bring out the juice. The rotary or oscillatory motion of the rotor and the abutment presented by the inner periphery of the stationary or reciprocating cylinder, ensure smooth curling, rolling and the passage of tea leaves through the machine, battens or projections may be fitted on the periphery of the rotor and/or the cylinder to make such processing of tea leaves more efficient.

- On the whole the tea rolling machine referred to has worked satisfactorily but has an inherent drawback in that the pressure applied to the tea leaves cannot be varied or controlled as required by the type of tea leaves and the kind of end product required.

The object of this invention is to provide a device for regulating the pressure during rolling in a continuous type of tea rolling machine referred to.

- 50 A device, provided according to this invention for varying and controlling pressure on withered tea leaves processed in a continuous tea rolling machine having a rotatory or oscillatory roller or rotor within a stationary or reciprocating cylinder or barrel comprises an annular or ring shaped pressure cap mounted on the end of the rotor or roller near the discharge end of the machine means for adjusting the position of the cap along the roller or rotor and means for applying variable force on the pressure cap, the pressure cap being adapted to constrict the passage of tea leaves through the said discharge end such constriction being variable by varying the position of the pressure cap on the roller or rotor.

- This invention also includes a continuous tea rolling machine of the type referred to fitted with the

device according to this invention.

- The pressure cap which is annular has a smooth outer peripheral surface curving gradually upwardly towards the discharge end of the machine and then downwardly more sharply. The battens spaced over the outer periphery of the pressure cap has the outer surfaces smoothly flush with the surface of the pressure cap. The position of the pressure cap which is slidable on the rotor is adjusted by a nut. The female screw threads in the nut engage male screw threads on the outer periphery of a pressure retaining plate coaxial with the rotor, the pressure retaining plate is secured to the pressure cap by means of clamps. A spring, the tension of which can be adjusted, exerts necessary pressure on the pressure retaining plate. By the adjustment of the tension of the said spring and the position of the pressure cap on the rotor the pressure to which the tea leaves are subjected to in the rolling machine can be varied and controlled within fine limits.

The device according to this invention is illustrated in the accompanying drawings in which:

- Figure 1* shows in elevation a continuous tea rolling machine fitted with the device;
 90 *Figure 2* shows in elevation a part of the rotor of the said machine with the device partly in section;
Figure 3 is an end view of the rotor shown in *Figure 2* as seen from the left hand side of *Figure 2*;
Figure 4 shows in elevation the device fitted with battens;
 95 *Figure 5* shows an end view of the device as seen from the left hand side of *Figure 4*;
Figure 6 shows the adjusting nut in elevation;
Figure 7 shows an end view of the adjusting nut on a reduced scale;
 100 *Figure 8* shows a sectional elevation of the pressure retaining plate;
Figure 9 shows an end view of the pressure retaining plate as seen from the right hand side of *Figure 8*;
 105 *Figure 10* shows the spring tensioning nut in elevation; and
Figure 11 shows an end view of the spring tensioning nut as seen from the left hand side of *Figure 10*.

- Figure 1* shows schematically a continuous tea rolling machine having a roller R encased within a cylinder or barrel C. An electric motor M or other motive power source is arranged to reciprocate the cylinder or barrel C through a mechanism comprising a crank CR, connecting rod L and block D secured to the cylinder.

- The shaft SH on which the rotor or roller R is mounted slidably and engaged with a shaft by means of a dog is adapted to be oscillated through a linkage system OM by the electric motor M or other source of motive power. Withered tea leaves are fed into the cylinder or barrel C through a hopper H. The tea leaves are processed, that is, broken, rolled and curled in the annular space between the rotor or roller R and the cylinder C and passed to the discharge end of the cylinder or barrel C at the right. The pressure applied to the tea leaves has to be varied depending on the nature of withered leaves and the kind of end product required so that the

breaking, rolling of the leaves to the desired extent can be ensured. The present invention propose to vary the pressure on leaves by constricting the discharge space between the cylinder C and the rotor R, the degree of such constriction being variable. The object of the invention is achieved by fitting a pressure cap, on the rotor or roller R at its end near the discharge opening of the cylinder C and providing means for applying the desired pressure on the cap as shown in phantom in Figure 1 and in detail in Figure 2.

The pressure cap 1 is generally annular or ring shaped having an outer peripheral surface gradually and smoothly inclined from its outer end upwardly and inwardly as shown at p towards a crest q and then downwardly comparatively sharply as shown at r (figures 2, 4). On its inside the pressure cap is formed with key ways 2 engaging keys 3 on the rotor or roller R. A plurality of battens 14 are spaced around and secured to the curved surface pqr of the pressure cap 1 (Figures 2, 4, 5). Near its outer end the pressure cap 1 is formed with a circumferential groove on the outer periphery; lips formed on the inner ends of a number of clamps 5 are located within the groove 4. The clamps 5 are secured to an adjusting nut 6 which has female threads cut in its inner periphery engaging male threads formed on the outer periphery of a pressure retaining plate 7. The nut 6 can be turned in either clockwise or anticlockwise direction by means of its handles H to advance the pressure cap 1 inwardly or to retract it outwardly for varying the pressure on the tea leaves in the cylinder or barrel C. The pressure retaining plate 7 is prevented from rotation by keys 11 on the shaft SH, engaged in keyways 10 inside hub 9 of the plate. A helical spring 12 surrounding the outer end of the shaft SH exerts a force on the pressure retaining plate 7; the tension or the force of the spring can be adjusted by a nut 13 rotatable by means of its handles h screwed on the threaded end of the shaft SH.

During the operation of the continuous tea rolling machine the pressure cap is adjusted in position on the rotor or roller R by turning the adjusting nut and the force of the spring 12 on the plate 7 also correspondingly adjusted. The desired optimum pressure will be applied on the withered tea leaves passing through the cylinder or barrel.

The working of the reciprocating type of the Continuous Tea Processing Machine to which the device according to the invention may be fitted is as follows.

During the forward motion of the cylinder leaf is fed through the hopper and the feed opening at the feed end and during the backward motion of the cylinder this leaf is pushed forward in relation to the cylinder by a fixed block over which the cylinder is free to slide. Leaf thus fed and pushed forward inside the cylinder gets rolled in the annular space between the cylinder and the rotor due to the combined action of the reciprocating motion of the cylinder and rotary/oscillatory motion of the rotor. While the rolling takes place in this manner fresh leaf is continuously fed and pushed forward all the time. The pressure generated in the leaf mass inside the

cylinder due to this constant pushing action causes some leaf to be discharged at the discharge end.

The opening at the discharge end being of fixed dimension the rate of discharge or the amount of pressure developed in the leaf mass inside the cylinder cannot be regulated, while this kind of regulation is essential for adopting this type of tea leaf processing machine for different types of leaves and for different types of end products. When the proposed device is fitted to this type of tea leaf processing machine this kind of regulation is made possible (as explained in the description of the device), so that any type of withered tea leaf may be rolled at a predetermined pressure to suit the requirements. As this device is fitted to the rotor or the tea leaf processing machine it has the same motion and hence the same kind of action on the leaf as the rotor of the processing machine. Therefore, the proposed device also helps in increasing the leaf rolling action of the tea leaf processing machine by virtue of a greater surface area, effective for rolling, offered by the pressure cap fitted with the battens.

In the foregoing only a preferred embodiment of the invention has been illustrated which shall not be deemed to limit the scope of the invention which resides in a device fitted on the rotor or roller and adjustable thereon in position for applying varying pressure on the tea leaves passing through a continuous tea rolling machine.

CLAIMS

1. A device for varying and controlling pressure on withered tea leaves processed in a continuous tea rolling machine having a rotating or oscillating roller or rotor within a stationary or reciprocating cylinder or barrel comprising an annular or ring shaped pressure cap mounted on the end of the rotor or roller near the discharge end of the machine, means for adjusting the position of the cap along the roller or rotor and means for applying variable force on the pressure cap, the pressure cap being adapted to constrict the passage of tea leaves through the said discharge end such constriction being variable by varying the position of the pressure cap on the roller or rotor.

2. A device as claimed in claim 1 in which the said pressure cap is slidable along the roller or rotor but is not rotatable relative to the roller or rotor.

3. A device as claimed in claim 2 in which keyways formed in the pressure cap engage keys provided on the roller or rotor.

4. A device as claimed in claim 1, 2 or 3 in which the means for adjusting the position of the pressure cap comprises an adjusting nut clamped to the pressure cap but rotatable relatively thereto and screwed around a pressure retaining plate which is linearly movable but non-rotatably mounted on shaft of the rotor or roller.

5. A device as claimed in claim 4 in which a plurality of clamps secured to the said nut have lips engaging into a circumferential groove at the end of the pressure cap.



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The pressure cap 1 is generally annular or ring shaped having an outer peripheral surface gradually and smoothly inclined from its outer end upwardly and inwardly as shown at p towards a crest q and then downwardly comparatively sharply as shown at r (figures 2, 4). On its inside the pressure cap is formed with key ways 2 engaging keys 3 on the rotor or roller R. A plurality of battens 14 are spaced around and secured to the curved surface pqr of the pressure cap 1 (Figures 2, 4, 5). Near its outer end the pressure cap 1 is formed with a circumferential groove on the outer periphery; lips formed on the inner ends of a number of clamps 5 are located within the groove 4. The clamps 5 are secured to an adjusting nut 6 which has female threads cut in its inner periphery engaging male threads formed on the outer periphery of a pressure retaining plate 7. The nut 6 can be turned in either clockwise or anticlockwise direction by means of its handles H to advance the pressure cap 1 inwardly or to retract it outwardly for varying the pressure on the tea leaves in the cylinder or barrel C. The pressure retaining plate 7 is prevented from rotation by keys 11 on the shaft SH, engaged in keyways 10 inside hub 9 of the plate. A helical spring 12 surrounding the outer end of the shaft SH exerts a force on the pressure retaining plate 7; the tension or the force of the spring can be adjusted by a nut 13 rotatable by means of its handles h screwed on the threaded end of the shaft SH.

During the operation of the continuous tea rolling machine the pressure cap is adjusted in position on the rotor or roller R by turning the adjusting nut and the force of the spring 12 on the plate 7 also correspondingly adjusted. The desired optimum pressure will be applied on the withered tea leaves passing through the cylinder or barrel.

The working of the reciprocating type of the Continuous Tea Processing Machine to which the device according to the invention may be fitted is as follows.

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CLAIMS

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2. A device as claimed in claim 1 in which the said pressure cap is slidable along the roller or rotor but is not rotatable relative to the roller or rotor.

3. A device as claimed in claim 2 in which keyways formed in the pressure cap engage keys provided on the roller or rotor.

4. A device as claimed in claim 1, 2 or 3 in which the means for adjusting the position of the pressure cap comprises an adjusting nut clamped to the pressure cap but rotatable relatively thereto and screwed around a pressure retaining plate which is linearly movable but non-rotatably mounted on shaft of the rotor or roller.

5. A device as claimed in claim 4 in which a plurality of clamps secured to the said nut have lips engaging into a circumferential groove at the end of the pressure cap.



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6. A device as claimed in claim 4 or 5 in which mutually engaging female and male screw threads are provided in the inner periphery of the adjusting nut and outer periphery of the pressure retaining plate.
7. A device as claimed in claim 5 or 6 in which mutually engaging keyways and keys are formed in the hub of the pressure retaining plate and the said shaft.
- 10 8. A device as claimed in any of claims 1 to 7 in which the means of applying the force on the pressure cap includes a helical spring surrounding the shaft of the rotor or roller and provided with means for adjusting its tension.
- 15 9. A device as claimed in claim 8 in which the said means comprises a nut screwed on thread end of the rotor or roller shaft abutting against the said spring which at its other end abuts against the said pressure plate.
- 20 10. A device as claimed in any of claims 1 to 9 in which the outer periphery of the pressure cap near to the discharge end of the machine is inclined upwardly and inwardly in smooth manner towards a crest and then sharply and downwardly away from the crest.
- 25 11. A device as claimed in claim 10, in which a plurality of battens spaced around the pressure cap on the inclined or curved surfaces thereof is smoothly flush with the periphery of the pressure cap.
12. Device for varying and controlling pressure on tea leaves processed in a continuous tea rolling machine of the type referred to substantially as herein described with reference to the accompanying drawings.
- 30 13. A continuous tea rolling machine including a device as claimed in any preceding claim. rotor within a reciprocating cylinder or barrel fitted with the device claimed in any of claims 1 to 12.

ERRATUM

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