



PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Tea Machinery

We, TEA RESEARCH ASSOCIATION, a registered body under the West Bengal Societies Registration Act, 1961, of Royal Exchange, 6, Natakji Subhas Road, Calcutta 1, West Bengal, India, 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:—

This invention relates to an improved machine for processing tea leaf.

It is known to have roller machines for curling, tearing and cutting tea leaf, a very important series of steps now popularly known as "C.T.C." and the latest machines for doing so as "C.T.C." machines.

The term processing as used herein covers all steps performed by the proposed machine i.e. rolling, shearing and tearing or curling, tearing and cutting.

In commonly known types of tea rolling and processing machines tea leaf in batches is charged into a tea roller and processing is done in batches by the hit and miss method till an adequate overall processing of tea leaf is effected.

In still more modern types of tea processing machines, the so called "C.T.C." machines, leaf is fed in between a gap between two rollers having circumferential cutting edges, running at different speeds.

While the former method suffers basically from discontinuity and the latter from accident hazard, the present invention has for its object to provide a machine in which these basic defects are minimised or altogether eliminated.

Leaf rolling machines are also known in which two co-operating, spaced apart, relatively rotatable discs are employed for the purpose of processing the leaf which is fed centrally into the space between such discs and is discharged from their periphery, one of the discs having an eccentric motion imparted to it so as to rotate eccentrically about the axis of the other disc. In another known type of disc

machine leaf is fed into the gap between two discs at one position in the periphery of the discs, e.g. at the top, while the leaf travels towards the central portion of the rotating discs.

According to this invention there is provided a machine for processing tea leaf comprising two co-operating relatively rotatable coaxial discs spacedly disposed face to face and defining a peripheral discharge opening between their peripheries, at least one of the discs being spring loaded, means for drivably rotating one or each disc on its axis to produce relative rotation of the discs, means for feeding tea leaf into a central zone of the space between the discs, at least one of the opposing faces of the discs having serrations, pins, battens, grooves or like formations which provide friction developing surfaces adapted for processing action on tea leaf in said space and which are orientated in directions adapted to advance tea leaf in said space towards said peripheral discharge opening on relative rotation of the discs.

The discs may be disposed horizontally, in which case leaf is to be fed from above. Alternatively, the discs may be disposed vertically, in which case leaf is to be fed from the side.

In the case of horizontally disposed discs a feed hopper is located axially above the discs over a central inlet opening in the upper one of the discs communicating with the space between the discs. The feed of leaf from the hopper may be controlled by means of a device such as a worm or screw within or at the exit end of the hopper. Such worm or screw may be operable manually or mechanically.

In the case when the discs are vertically disposed a worm feed device may be coupled, at its exit end, to discharge into one of the discs at a central opening in the latter. Such central opening communicates with the space between the two discs.

While the disc to which the worm feed device is coupled may be stationary, though

preferably removably mounted, the other disc is mounted rotatably on a power driven shaft. At the centre of that rotatable disc is formed a cone which protrudes into the central opening in the stationary disc. Such cone may even extend into the exit end portion of the worm feed device where the stationary disc is coupled. In so doing an annular opening between such cone and the central opening in the stationary disc is formed through which the tea leaf is enabled to enter the space between the two discs around the cone in a manner that could be controlled. Battens, grooves, serrations and the like formations may be provided on this cone as well, and disposed counter-hand to formations on the opposing disc.

In order that the axial distance or gap between the two discs may be made adjustable one of the discs at least is axially slidably mounted. Preferably the rotatable disc is so mounted on its shaft.

The relative rotation of the discs enables the tea leaf to be processed. Such relative rotation may be obtained by keeping one of the discs stationary while the other is rotated, or by rotating both the discs in opposite directions. The speeds of the two discs may be the same or different.

The serrations, battens, grooves and the like formations are arranged on the discs at predetermined angles. Such formations on one disc are disposed counter-hand to those on the other. The angle of such disposition will be determined from considerations of the desired product and the requirement of advancing tea leaf from the central zone of the discs to the peripheries thereof.

The shape of the battens, grooves, serrations or the like formations is determined substantially on considerations of processing. A zig-zag formation is found to give satisfactory results in the application of the invention.

We have stated that battens may be used to produce the desired formations on the discs may be grooved or serrated to do so. In another mode of producing such formations pins, preferably conical, protruding from the disc faces may be used to obtain the desired formations.

It is not necessary that such formations should be realised on both opposing faces of the two discs. One alone when so formed is able to serve the purpose. It would perhaps be necessary to simply roughen the surface of the other face.

It would also be possible to have different formations on the two faces but those on one counter-hand to those on the other. This arrangement may, however, not succeed in providing a uniform product.

The invention is described below with reference to the drawings accompanying the provisional and complete specifications. For avoiding confusion serial numbers of figures in the

complete specification are in continuation of those in the provisional specification.

In the drawings:

Fig. 1 shows in longitudinal section one embodiment of machine according to the invention.

Fig. 2 shows section at AA in fig. 1.

Fig. 3 shows section at XX in fig. 1.

Fig. 4 shows section at YY in fig. 1.

Fig. 5 shows formations on a disc face by use of pins.

Fig. 6 shows side elevation of pin in fig. 5.

Fig. 7 is part exploded view of a machine according to a further embodiment of the invention.

Referring to the drawings (Figs. 1 and 2), a disc 4 is shown fixed to the exit end of feeding means which comprises a horizontally disposed cylindrical casing 1 with a feed hopper 2 at one end and a worm feed 3 extending from below the hopper to exit end of casing 1. The worm feed is driven by a motor 9. Appropriately spaced from the disc 4 is located another disc 6 which is mounted on bearings 15 around a shaft 12 driven by a motor 10. The disc 6 is shown spring loaded by a spring 8 in a spring loading device 11. A key-way 13 (with a corresponding key) in shaft 12 enables the disc 6 to be slidably mounted on the shaft.

Protruding from the central portion of disc 6 on the co-operating face thereof is a conical member 7 which enters the central opening in disc 4. The leaf from cylindrical casing 1 of the feed means enters the space or gap 16 between the two discs 4 and 6 through the annular space around the member 7.

By a slidable mounting plate 14, the rotating disc assembly — comprising the disc 6, bearing 15, spring loading device 11 with spring 8, shaft 12 and motor 10 can be, when required or desired, completely slid away from the facing disc 4, with which it is in co-operative rolling engagement for processing the tea.

A chamber C surrounds the two discs to collect processed tea discharging from the peripheries of the discs.

An opening is made in the lower portion of the chamber C and a tray T kept there to allow processed tea to be removed.

In the embodiment shown in figure 7 (where like references refer to like parts) the co-operating discs 4 and 6 are shown horizontally disposed. Their co-operating faces are not flat but conical. Disc 4 is coupled to exit end of feed hopper 2 at central opening of disc 4.

Disc 6 is mounted on a power driven shaft 12 and is loaded by a spring 8 in a spring loading device 11. By a wheel 17 rotating on a worm or threaded bush 18 the gap 16 between the two discs may be adjusted.

Conical member 7 protruding from disc 6

extends into exit end of feed hopper 2 and thereby forms an annular space 21 running along which tea leaf enters the gap 16.

5 A collecting chamber 23 surrounds the discs 4 and 6 at least around the peripheral edges thereof from where the processed leaf discharges. Chamber 23 has a chute 20 along which the collected leaf slides and is removed.

10 To scrape off any tea leaf adhering to the base of chamber 23 a scraper 19 is provided.

A worm 22 may be employed in the feed hopper 2 to control the feed of tea leaf for processing.

15 A preferred shape of formations which provide friction developing surfaces on the disc faces is shown by figures 4 and 5. This is a zig-zag formation. The orientation of formation and angle of their disposition is calculated to advance fed tea leaf from the central zone to the peripheral zone during the course of which due to the shape of formations and co-operative differential movement of the discs the tea becomes processed.

20 Figures 3 and 4 show more clearly the battens 5 and 5A on discs 4 and 6 respectively. These (5, 5A) can also be regarded as resulting from the formation of serrations or grooves in the surfaces of the discs. Battens 5A may likewise be provided on the cone 7 protruding from disc 6, as shown in figure 7.

30 Figures 5 and 6 show that the formations may be made up from conical pins 24 arranged on the surface of a disc in the required manner.

35 WHAT WE CLAIM IS:—

1. A machine for processing tea leaf comprising two co-operating relatively rotatable coaxial discs spacedly disposed face to face and defining a peripheral discharge opening 40 between their peripheries, at least one of the discs being spring loaded, means for drivably rotating one or each disc on its axis to produce relative rotation of the discs, means for feeding tea leaf into a central zone of the space 45 between the discs, at least one of the opposing faces of the discs having serrations, pins, battens, grooves or like formations which provide friction developing surfaces adapted for processing action on tea leaf in said space and which are orientated in directions adapted to 50 advance tea leaf in said space towards said peripheral discharge opening on relative rotation of the discs.

2. A machine as claimed in claim 1 wherein 55 the discs are disposed horizontally and a feed hopper is located axially above the discs over a central inlet opening in the upper one of the discs communicating with the space between the discs.

60 3. A machine as claimed in claim 2 wherein

a device for controlling the feed from the hopper, such as a manually or mechanically operable screw or worm, is located in the hopper or near the exit end thereof.

4. A machine as claimed in claim 2 or 65 3 wherein the discs are conical.

5. A machine as claimed in claim 1 wherein the discs are disposed vertically and a worm feed device is arranged at its exit end to discharge into a central inlet opening in one of 70 the discs communicating with the space between the discs.

6. A machine as claimed in claim 5 wherein the other one of the discs is provided with a central cone which protrudes into said central inlet opening so as to form an annular inlet opening for leaf to enter the space between 75 the discs.

7. A machine as claimed in claim 5 or 80 6 wherein the disc associated with the worm feed device is stationarily mounted and the other disc is mounted rotatably on a power driven shaft.

8. A machine as claimed in claim 7 wherein the disc associated with the worm feed device 85 is removably mounted.

9. A machine as claimed in any one of claims 1 to 6 wherein both discs are arranged to be driven in opposite directions at the same or different speeds. 90

10. A machine as claimed in any one of the foregoing claims wherein at least one of the discs is axially slidably mounted to permit adjustment of the axial distance between the two discs. 95

11. A machine as claimed in any one of the foregoing claims wherein each disc is provided with said formations arranged on the disc at predetermined angles and disposed counter-hand to those on the other disc. 100

12. A machine as claimed in claim 11 insofar as appendant to claim 6 wherein said cone also is provided with said formations disposed counter-hand to those on the opposing disc.

13. A machine as claimed in any one of the foregoing claims wherein a chamber surrounding at least the peripheries of the discs is provided for collecting tea leaf discharged from the discs. 105

14. A machine as claimed in claim 13 110 wherein the chamber is provided with a chute for discharge of collected tea leaf.

15. A machine as claimed in claim 13 or 14 wherein a driven disc of the machine carries a scraper for removing tea leaf adhering 115 to the collecting chamber.

16. A machine for processing tea leaf substantially as herein described with reference to and as shown in Figs. 1 to 6 or Fig. 7 of the drawings. 120

extends into exit end of feed hopper 2 and thereby forms an annular space 21 running along which tea leaf enters the gap 16.

A collecting chamber 23 surrounds the discs 4 and 6 at least around the peripheral edges thereof from where the processed leaf discharges. Chamber 23 has a chute 20 along which the collected leaf slides and is removed.

To scrape off any tea leaf adhering to the base of chamber 23 a scraper 19 is provided.

A worm 22 may be employed in the feed hopper 2 to control the feed of tea leaf for processing.

A preferred shape of formations which provide friction developing surfaces on the disc faces is shown by figures 4 and 5. This is a zig-zag formation. The orientation of formation and angle of their disposition is calculated to advance fed tea leaf from the central zone to the peripheral zone during the course of which due to the shape of formations and co-operative differential movement of the discs the tea becomes processed.

Figures 3 and 4 show more clearly the battens 5 and 5A on discs 4 and 6 respectively. These (5, 5A) can also be regarded as resulting from the formation of serrations or grooves in the surfaces of the discs. Battens 5A may likewise be provided on the cone 7 protruding from disc 6, as shown in figure 7.

Figures 5 and 6 show that the formations may be made up from conical pins 24 arranged on the surface of a disc in the required manner.

WHAT WE CLAIM IS:—

1. A machine for processing tea leaf comprising two co-operating relatively rotatable coaxial discs spacedly disposed face to face and defining a peripheral discharge opening between their peripheries, at least one of the discs being spring loaded, means for drivably rotating one or each disc on its axis to produce relative rotation of the discs, means for feeding tea leaf into a central zone of the space between the discs, at least one of the opposing faces of the discs having serrations, pins, battens, grooves or like formations which provide friction developing surfaces adapted for processing action on tea leaf in said space and which are orientated in directions adapted to advance tea leaf in said space towards said peripheral discharge opening on relative rotation of the discs.

2. A machine as claimed in claim 1 wherein the discs are disposed horizontally and a feed hopper is located axially above the discs over a central inlet opening in the upper one of the discs communicating with the space between the discs.

3. A machine as claimed in claim 2 wherein

a device for controlling the feed from the hopper, such as a manually or mechanically operable screw or worm, is located in the hopper or near the exit end thereof.

4. A machine as claimed in claim 2 or 3 wherein the discs are conical.

5. A machine as claimed in claim 1 wherein the discs are disposed vertically and a worm feed device is arranged at its exit end to discharge into a central inlet opening in one of the discs communicating with the space between the discs.

6. A machine as claimed in claim 5 wherein the other one of the discs is provided with a central cone which protrudes into said central inlet opening so as to form an annular inlet opening for leaf to enter the space between the discs.

7. A machine as claimed in claim 5 or 6 wherein the disc associated with the worm feed device is stationarily mounted and the other disc is mounted rotatably on a power driven shaft.

8. A machine as claimed in claim 7 wherein the disc associated with the worm feed device is removably mounted.

9. A machine as claimed in any one of claims 1 to 6 wherein both discs are arranged to be driven in opposite directions at the same or different speeds.

10. A machine as claimed in any one of the foregoing claims wherein at least one of the discs is axially slidably mounted to permit adjustment of the axial distance between the two discs.

11. A machine as claimed in any one of the foregoing claims wherein each disc is provided with said formations arranged on the disc at predetermined angles and disposed counter-hand to those on the other disc.

12. A machine as claimed in claim 11 insofar as appendant to claim 6 wherein said cone also is provided with said formations disposed counter-hand to those on the opposing disc.

13. A machine as claimed in any one of the foregoing claims wherein a chamber surrounding at least the peripheries of the discs is provided for collecting tea leaf discharged from the discs.

14. A machine as claimed in claim 13 wherein the chamber is provided with a chute for discharge of collected tea leaf.

15. A machine as claimed in claim 13 or 14 wherein a driven disc of the machine carries a scraper for removing tea leaf adhering to the collecting chamber.

16. A machine for processing tea leaf substantially as herein described with reference to and as shown in Figs. 1 to 6 or Fig. 7 of the drawings.



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