

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) A MACHINE FOR PROCESSING TEA LEAF

(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:—

This invention relates to a machine for processing tea leaf.

Processing of tea leaf is a step in the manufacture of tea after withering and before drying the leaf. In this step tea leaf is squeezed and twisted in its passage through a stationary cylinder or barrel closed at one end and open or partially open at the other end. Tea leaf is fed in the cylinder through an opening at the closed end and is fed by a worm provided on a rotatable shaft within the cylinder. The rotating shaft and the stationary cylinder are provided with means to propel the leaf to the open discharge end, and during its passage to squeeze and twist the leaf.

One such machine according to United Kingdom Patent No. 856568 comprises a stationary cylinder wholly or partially open, or adapted to be wholly or partially opened, at one end and closed at the other end and provided at said closed end with means for feeding leaf into a helical feed worm provided on a rotatable axial drive shaft, said helical feed worm being adapted to feed the leaf into an annular space formed by the cylinder bore and a substantially cylindrical extension of said rotatable axial drive shaft, said cylindrical extension being provided with a plurality of sets of vanes or the like protruding into said annular space and adapted to propel the leaf towards, and to discharge it through, said open end of the cylinder, and said cylinder bore being provided with a plurality of sets of pins or the like also protruding into said annular space, said sets of vanes or the like and said sets of pins or the like being staggered with respect to one another.

The specification of United Kingdom Patent No. 1099758 discloses an attachment for a tea [Price 25p]

processing machine as described above, the attachment comprising a conical or frusto-conical member having its curved surface fluted with the flutes helically disposed, the conical or frusto-conical end thereof being adapted to be mounted at the end of the rotor shaft at the discharge end of the stationary cylinder, for axial drive, said attachment being adapted to be enclosed by the end portion of, or by an extension of, the stationary cylinder i.e. stator of said machine, leaving a clearance for processed tea to discharge from around the base of the attachment. The rotor shaft described therein corresponds to the axial drive shaft described in United Kingdom Patent No. 856568. The curved surface of the attachment is fluted by fixing battens to the surface.

In the specification of United Kingdom Patent No. 1,175,559 there is disclosed an improvement in or modification of a tea processing machine and attachment thereof as described in patent specification No. 1099758, which comprises a sleeve slidably mounted within the stationary barrel of the machine from its discharge end in the space between the inner wall of the barrel and the conical or frusto-conical attachment to the rotor shaft. The said sleeve is cylindrical for a portion of its length at the anterior end of the rotor and has its intermediate portion sloping downwards, the remaining portion extending divergently. The sleeve is provided at least at its intermediate portion with pins projecting within itself; and also the conical or frusto-conical attachment is provided with pins projecting from its inclined surface. The said pins in the sleeve and in the attachment are staggered and do not come in contact.

The pins projecting from the conical attachment and from the corresponding portion of the sleeve as provided in the specification No. 1175559, serve the purpose of processing tea leaf, as do the means for processing provided in the central portion of the shaft in the form of projecting vanes and co-operating pins in the cylinder wall. With the sleeve provided within the cylinder, that portion of the cylinder which surrounds the sleeve serves no purpose

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except to accommodate the sleeve. We have found that such machine can be simplified and the cost of the machine can be much reduced without sacrificing the efficiency or service-

5 ability.
To achieve this we reduce the length of the cylinder to accommodate only the worm; and the length of the shaft is also correspondingly reduced. The conical or frusto-conical attachment is fixed to the shaft next to the worm
10 without any intervening portion of the shaft providing vanes. The attachment is enclosed in a sleeve which is fitted to the cylinder but not enclosed within the cylinder. Owing to
15 the reduction in the length of the cylinder and the shaft, and the omission of the pins in the cylinder and the vanes of the shaft there is a worthwhile saving of the material in the manufacture of the machine and hence there is reduction of cost.

20 According to this invention a machine for processing tea leaf after withering and before drying the leaf comprises a stationary cylinder or barrel closed at one end and open at the
25 other and mounted between two side bars of the machine which support said cylinder, said cylinder enclosing a feed worm or feed screw mounted on a rotatable shaft, and a stationary sleeve adjustably fitted at the open end of the
30 cylinder to enclose a conical or frusto-conical attachment mounted on an extension of the rotatable shaft, the open end of the sleeve being supported at two sides by two support lugs mounted respectively on said side bars and
35 locked in position thereon by locking nuts. The support lugs are provided with eyed ends through which the side bars pass. A hopper is provided in the cylinder at the location of the feed screw.

40 According to other features of the invention the sleeve is screw threaded externally at the end fitting in the cylinder to which it is screwed and adjustably secured by a ring nut. A groove is provided at this end of the sleeve
45 to accommodate a packing ring between the cylinder and the sleeve. The support lugs are attached to an externally cylindrical end portion of the sleeve adjacent its free end. From the cylinder end of the sleeve its internal cross-section gradually decreases for a portion of
50 its length, forming a convergent portion, and then gradually increases for the rest of its length, forming a divergent portion extending to its open end, and pins or battens are provided projecting from the sloping surfaces
55 of these convergent and divergent portions.

The conical or frusto-conical attachment is fitted to the rotatable shaft with its base portion adjacent to the open end of the sleeve providing a narrow annular passage at its
60 edge to discharge the processed tea leaf. The said attachment has a bore throughout its length through which an extension of the rotatable shaft passes and is
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the base of the attachment. The said extension shaft is supported in a bearing provided in a yoke fixed to the ends of the side bars.

Further, according to this invention the conical or frusto-conical attachment is provided on its exterior surface with helically disposed battens thicker at one end and thinner at the other. The thicker ends of the battens are at the end of the attachment near the feed screw, i.e. at the apex end of the cone, and the thinner ends are at the free end, i.e. at the base end of the cone. The battens are triangular or semi-circular in cross-section. Four to eight such battens are provided on the attachment.

In operation, tea leaf fed into the machine through the hopper will be moved forward by the worm to the conical attachment by the rotation of the shaft. The battens on the surface of the cone in co-operation with the projecting pins or battens of the sleeve will provide friction to squeeze and twist the leaf to process it to produce the desired end product, which is discharged through the annular passage at the edge of the cone base and the sleeve end. The shaft is rotated by motor drive or any other drive as is usual in these machines.

The invention will now be described with reference to the accompanying drawings, in which

Fig. 1 shows in elevation the tea processing machine, omitting the driving arrangement,

Fig. 2 is a sectional plan of the machine shown in Fig. 1,

Fig. 3 is a cross-section of the sleeve,

Fig. 4 is a cross-section of the ring nut,

Fig. 5 is an elevation of the frusto-conical attachment, and

Fig. 6 is section at A—A of Fig. 5.

In the drawings, 1 shows a stationary cylinder or barrel closed at one end 2 and open at the other end 3, and being supported between two side bars 9 of the machine. A feed worm or feed screw 4 is enclosed with the cylinder and mounted on a rotatable shaft 5. A stationary sleeve 6 is adjustably fitted at the open end 3 of the cylinder 1. A conical or frusto-conical attachment 7 is enclosed within the sleeve 6 and is mounted on an extension of the shaft 5. The open end 15 of the sleeve 6 is supported at two sides by two support lugs 8 which are mounted on the side bars 9 respectively and are locked in position thereon by locking nuts 10. The support lugs 8 are provided with eyed ends through which the bars 9 pass. A hopper 11 is provided in the cylinder 1 at the location of feed screw 4.

The sleeve 6 is screw-threaded externally at 12 at the end fitting in the cylinder 1 to which it is screwed and adjustably secured by a ring nut 13. An external groove 14 is provided at this end of the sleeve to accommodate a packing ring between the cylinder 1 and sleeve 6. The sleeve carries the two support lugs 8 bolted to an externally cylindrical portion of

the sleeve adjacent its open end 15. From the cylinder end of the sleeve its internal cross-section gradually decreases for a portion of its length, forming a convergent portion 16, and then gradually increases for the rest of its length, forming a divergent portion 17 extending to its open end 15. Pins or battens 18 are provided projecting from the sloping surfaces of the portions 16 and 17.

10 The conical or frusto-conical attachment 7 is fitted to the rotatable shaft 5 with its base portion 19 adjacent to the open free end 15 of the sleeve providing a narrow annular passage 20 at its edge to discharge the processed tea leaf. The said attachment 7 has a bore 21 throughout its length through which an extension of the rotatable shaft 5 passes and is screwed to an extension shaft 22 extending from the base of the attachment.

15 The said extension shaft 22 is supported in a bearing 23 provided in a yoke 24 fixed to the ends of the side bars 9.

The conical or frusto-conical attachment 7 is provided on its exterior surface with helically disposed battens 25 thicker at one end and thinner at the other. The thicker ends of the battens 25 are at the end of the attachment near the feed screw 4, i.e. at the apex end of the cone, and the thinner ends are at the free end, i.e. at the base end of the cone. The battens are triangular or semi-circular in cross-section. Four to eight such battens are provided in the attachment. These battens in co-operation with the projecting pins in the sleeve provide friction to squeeze and twist the tea leaf to process it to produce the desired end product, which is discharged through the passage 20 at the edge of the cone base and the sleeve end. Due to the sloping surfaces of the sleeve 6 and its adjustable mounting on the cylinder 1 it is possible to adjust the intensity of processing the leaf.

WHAT WE CLAIM IS:—

1. A machine for processing tea leaf after withering and before drying the leaf, comprising a stationary cylinder or barrel closed at one end and open at the other and mounted between two side bars of the machine which support said cylinder, said cylinder enclosing a feed worm or feed screw mounted on a rotatable shaft, and a stationary sleeve adjustably fitted at the open end of the cylinder to enclose a conical or frusto-conical attachment mounted on an extension of the rotatable shaft, the open end of the sleeve being supported at two sides by two support lugs mounted respectively on said side bars and locked in position thereon by locking nuts.

2. A machine for processing tea leaf as claimed in claim 1 in which the support lugs are provided with eyed ends through which the side bars pass.

3. A machine for processing tea leaf as

claimed in claim 1 or 2 in which a hopper is provided in the cylinder at the location of the feed screw.

4. A machine for processing tea leaf as claimed in any one of the preceding claims in which the sleeve is screw-threaded externally at the end fitting in the cylinder to which it is screwed and adjustably secured by a ring nut.

5. A machine for processing tea leaf as claimed in claim 4 in which a groove is provided at said end of the sleeve to accommodate a packing ring between the cylinder and the sleeve.

6. A machine for processing tea leaf as claimed in claims 4 and 5 in which the support lugs are attached to an externally cylindrical end portion of the sleeve adjacent to its open end.

7. A machine for processing tea leaf as claimed in any one of the preceding claims in which from the cylinder end of the sleeve its internal cross-section gradually decreases for a portion of its length, forming a convergent portion, and then gradually increases for the rest of its length, forming a divergent portion extending to its open end, and pins or battens are provided projecting from the sloping surfaces of said portions.

8. A machine for processing tea leaf as claimed in any one of the preceding claims in which the conical or frusto-conical attachment is fitted to the rotatable shaft with its base portion adjacent to the open end of the sleeve providing a narrow annular passage at its edge to discharge the processed tea leaf.

9. A machine for processing tea leaf as claimed in claim 8 in which the said attachment has a bore throughout its length through which an extension of the rotatable shaft passes and is screwed to an extension shaft extending from the base of the attachment.

10. A machine for processing tea leaf as claimed in claim 9 in which the said extension shaft is supported in a bearing provided in a yoke fixed to the ends of the side bars.

11. A machine for processing tea leaf as claimed in claims 8 to 10 in which the conical or frusto-conical attachment is provided on its exterior surface with helically disposed battens thicker at one end and thinner at the other.

12. A machine for processing tea leaf as claimed in claim 11 in which the thicker ends of the battens are at the end of the attachment near the feed screw, i.e. at the apex end of the cone, and the thinner ends are at the free end, i.e. at the base end of the cone.

13. A machine for processing tea leaf as claimed in claims 11 and 12 in which the battens are triangular or semi-circular in cross-section.

14. A machine for processing tea leaf as claimed in claims 11 to 13 in which four to eight such battens are provided in the attachment.

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the sleeve adjacent its open end 15. From the cylinder end of the sleeve its internal cross-section gradually decreases for a portion of its length, forming a convergent portion 16, and then gradually increases for the rest of its length, forming a divergent portion 17 extending to its open end 15. Pins or battens 18 are provided projecting from the sloping surfaces of the portions 16 and 17.

The conical or frusto-conical attachment 7 is fitted to the rotatable shaft 5 with its base portion 19 adjacent to the open free end 15 of the sleeve providing a narrow annular passage 20 at its edge to discharge the processed tea leaf. The said attachment 7 has a bore 21 throughout its length through which an extension of the rotatable shaft 5 passes and is screwed to an extension shaft 22 extending from the base of the attachment. The said extension shaft 22 is supported in a bearing 23 provided in a yoke 24 fixed to the ends of the side bars 9.

The conical or frusto-conical attachment 7 is provided on its exterior surface with helically disposed battens 25 thicker at one end and thinner at the other. The thicker ends of the battens 25 are at the end of the attachment near the feed screw 4, i.e. at the apex end of the cone, and the thinner ends are at the free end, i.e. at the base end of the cone. The battens are triangular or semi-circular in cross-section. Four to eight such battens are provided in the attachment. These battens in co-operation with the projecting pins in the sleeve provide friction to squeeze and twist the tea leaf to process it to produce the desired end product, which is discharged through the passage 20 at the edge of the cone base and the sleeve end. Due to the sloping surfaces of the sleeve 6 and its adjustable mounting on the cylinder 1 it is possible to adjust the intensity of processing the leaf.

WHAT WE CLAIM IS:—

1. A machine for processing tea leaf after withering and before drying the leaf, comprising a stationary cylinder or barrel closed at one end and open at the other and mounted between two side bars of the machine which support said cylinder, said cylinder enclosing a feed worm or feed screw mounted on a rotatable shaft, and a stationary sleeve adjustably fitted at the open end of the cylinder to enclose a conical or frusto-conical attachment mounted on an extension of the rotatable shaft, the open end of the sleeve being supported at two sides by two support lugs mounted respectively on said side bars and locked in position thereon by locking nuts.

2. A machine for processing tea leaf as claimed in claim 1 in which the support lugs are provided with eyed ends through which the side bars pass.

3. A machine for processing tea leaf as

claimed in claim 1 or 2 in which a hopper is provided in the cylinder at the location of the feed screw.

4. A machine for processing tea leaf as claimed in any one of the preceding claims in which the sleeve is screw-threaded externally at the end fitting in the cylinder to which it is screwed and adjustably secured by a ring nut.

5. A machine for processing tea leaf as claimed in claim 4 in which a groove is provided at said end of the sleeve to accommodate a packing ring between the cylinder and the sleeve.

6. A machine for processing tea leaf as claimed in claims 4 and 5 in which the support lugs are attached to an externally cylindrical end portion of the sleeve adjacent to its open end.

7. A machine for processing tea leaf as claimed in any one of the preceding claims in which from the cylinder end of the sleeve its internal cross-section gradually decreases for a portion of its length, forming a convergent portion, and then gradually increases for the rest of its length, forming a divergent portion extending to its open end, and pins or battens are provided projecting from the sloping surfaces of said portions.

8. A machine for processing tea leaf as claimed in any one of the preceding claims in which the conical or frusto-conical attachment is fitted to the rotatable shaft with its base portion adjacent to the open end of the sleeve providing a narrow annular passage at its edge to discharge the processed tea leaf.

9. A machine for processing tea leaf as claimed in claim 8 in which the said attachment has a bore throughout its length through which an extension of the rotatable shaft passes and is screwed to an extension shaft extending from the base of the attachment.

10. A machine for processing tea leaf as claimed in claim 9 in which the said extension shaft is supported in a bearing provided in a yoke fixed to the ends of the side bars.

11. A machine for processing tea leaf as claimed in claims 8 to 10 in which the conical or frusto-conical attachment is provided on its exterior surface with helically disposed battens thicker at one end and thinner at the other.

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13. A machine for processing tea leaf as claimed in claims 11 and 12 in which the battens are triangular or semi-circular in cross-section.

14. A machine for processing tea leaf as claimed in claims 11 to 13 in which four to eight such battens are provided in the attachment.

15. A machine for processing tea leaf as



claimed in the preceding claims in which the shaft is rotated by motor drive or any other drive as is usual in these machines.

5 16. A machine for processing tea leaf as claimed in claim 1 substantially as described.

17. A machine for processing tea leaf substantially as described with reference to the accompanying drawings.

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