Nov. 10, 1931. B. C. HOPE 1,831,004

BEATER ROLL ADJUSTER AND INDICATOR

Filed Jan. 27, 1931 2 Sheets-Sheet 1

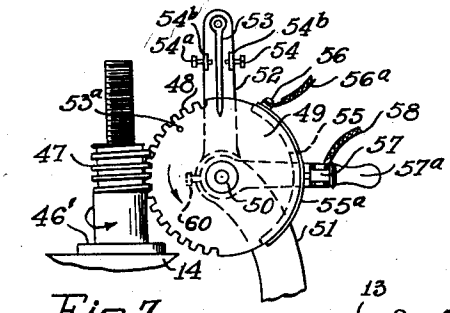

Fig. 7.

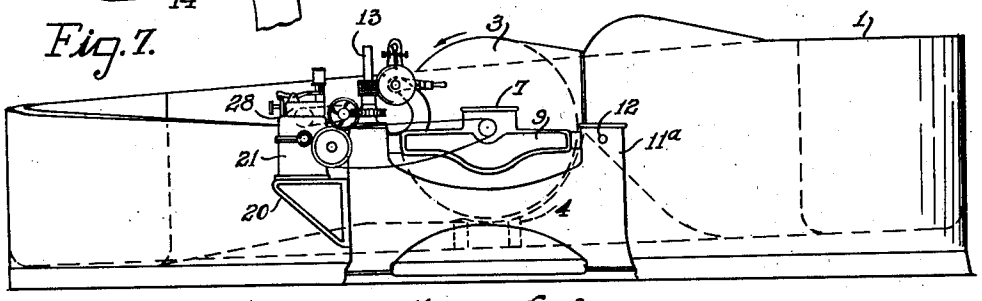

Fig. 1.

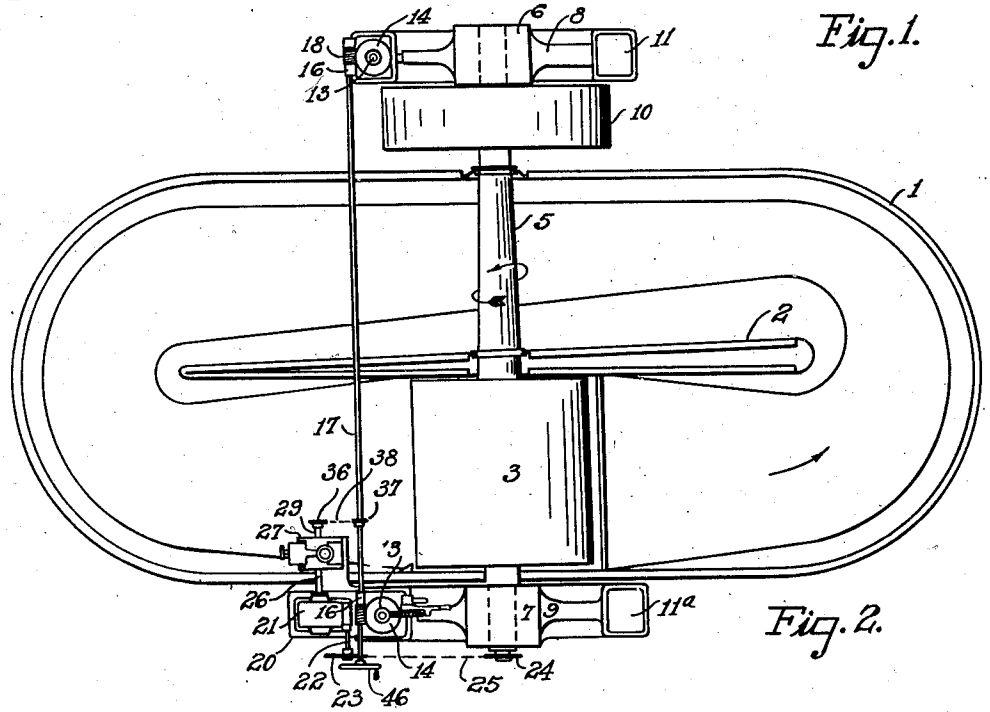

Fig. 2.

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Betram C. Hope,
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BEATER ROLL ADJUSTER AND INDICATOR

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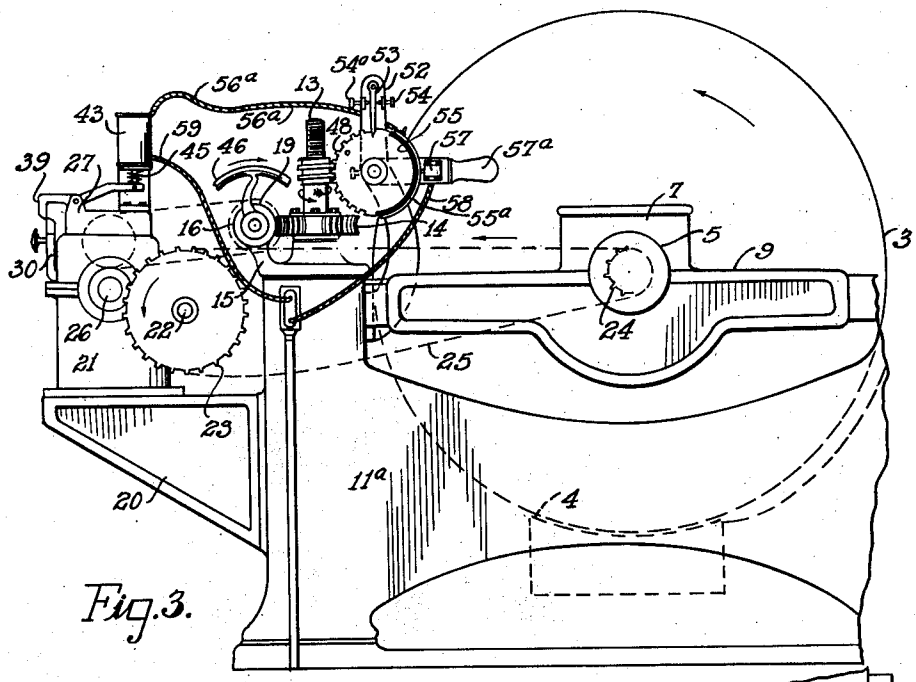

Fig. 3.

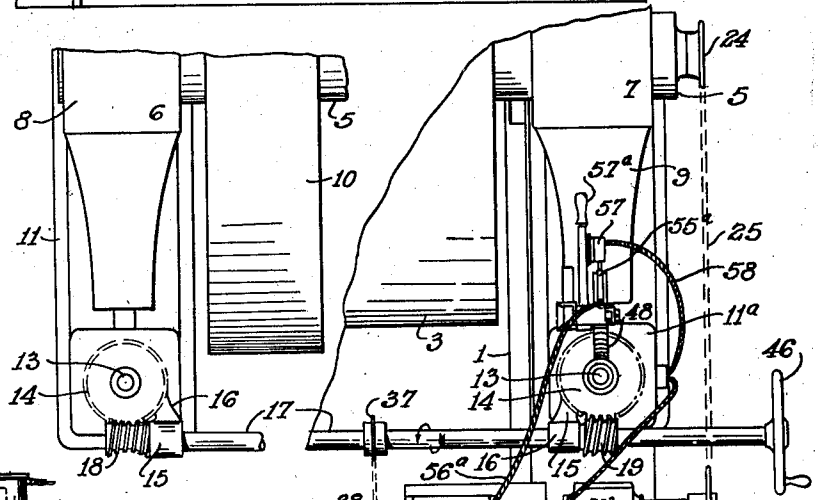

Fig. 4.

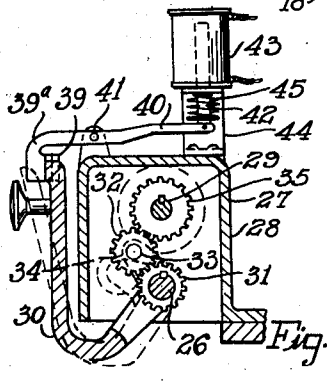

Fig. 5.

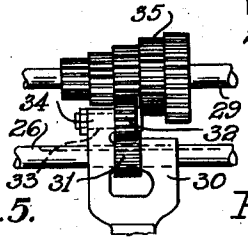

Fig. 6.

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Patented Nov. 10, 1931

1,831,004

UNITED STATES PATENT OFFICE

BERTRAM C. HOPE, OF PORT HURON, MICHIGAN

BEATER ROLL ADJUSTER AND INDICATOR

Application filed January 27, 1931. Serial No. 511,478.

My invention relates to new and useful improvements in beater roll adjusters and indicators.

My invention relates particularly to beaters employed in papermaking to reduce wood pulp or other papermaking fibres to a pulp of the proper fineness in a liquid mass.

As usually employed the beater comprises a tub equipped with a stationary bed plate over which the beater roll is positioned transversely of the tub.

The beater roll is adjustable vertically to vary the clearance between the roll and the bed plate, and after the tub is charged with the stock and liquid the beater roll is gradually lowered toward the bed plate as the stock becomes comminuted to thus reduce the stock to a desired hydration and freeness. This lowering of the beater roll has been accomplished manually and mechanically, but at a fixed rate with respect to the speed of the beater roll.

This manual or the fixed mechanical lowering of the beater roll leaves much to be desired in the proper and economical preparation of paper stock, for with the manual operation there is uncertainity of the skill of the operator, while with the mechanical operation it is known that stocks require different beating periods, and where a fixed mechanical lowering is employed it is impossible to vary the beating time allowed.

One of the important objects of my invention is to provide a gradual automatic mechanical lowering of the beater roll at various speeds to thus alter the beating time to suit the stock.

It is another object of my invention to permit the continued operation of the beater roll after it has been lowered to the "down" position to permit the making of a hydration and freeness test without interrupting the beater operation.

Another important object of my invention is to provide electrical means for disengaging the lowering mechanism at any predetermined point.

A still further object of my invention is to provide an adjustable gage and indicator that will permit the preparation of a uniform stock and indicate the position of the beater roll relative to the bed plate.

Other important and incidental objects of my invention will be brought out in the annexed specification and subjoined claims.

In the accompanying drawings Figure 1 is a side view of a conventional beater equipped with my beater roll adjuster and indicator.

Figure 2 is a plan view of a conventional beater equipped with my beater roll adjuster and indicator.

Figure 3 is an enlarged side view of my beater roll adjuster and indicator.

Figure 4 is an enlarged plan view showing a portion of a beater tub equipped with my beater roll adjuster and indicator.

Figure 5 is a sectional view through my electrically controlled gear shift.

Figure 6 is another sectional view of my electrically controlled gear shift showing the change gears.

And Figure 7 is a detail view of my contactor and indicator mechanism.

Referring now to Figures 1 and 2, I have shown a conventional beater construction, employing a tub 1 having a mid-feather 2 to provide for the circulation of the pulp around its ends and under a beater roll 3 positioned between the mid-feather and one side of the tub 1.

The beater roll 3 may be of any suitable construction equipped with fly bars or knives that co-act with the top concave surface of a bed plate 4. The bed plate is fixedly secured in the bottom of the tub and substantially below the beater roll to provide a grinding action on the pulp as it passes between the two.

The beater roll is provided with a shaft 5 extending transversely of the tub and mid-feather, and has its ends journalled in bearings 6 and 7 in lighter bars 8 and 9, positioned at each side of the beater tub.

The lighter bar 8 is positioned at a greater distance from the tub than the lighter bar 9, to receive on the shaft, between it and the tub, a drive pulley 10. (See Figure 2.) The lighter bars 8 and 9 are mounted within frames 11 and 11*a* to which one end of each bar is secured by a pivot 12, in the frames.

The opposite free ends of each of the lighter bars are pivotally connected to worm screws 13 that extend vertically through the top of the frames 11 and receive on their projecting ends worm gears 14.

Secured to each of the side frames below the gears 14 is a bracket support 15 for a bearing 16. The bearings 16 receive therethrough a shaft 17, that has secured thereto worm gears 18 and 19 that mesh with the gears 14.

Extending forwardly from and attached to the frames 11 below the bracket support 15 is a bracket 20 to which is attached a double reduction worm gear unit 21, and having a laterally extending driven shaft 22 to which there is secured a sprocket 23. (See Figures 3 and 4).

Secured to the beater roll shaft 5 adjacent the frame 11*a*, is a sprocket 24, to receive a sprocket chain 25 for a driving connection with the sprocket 23, to thus impart motion to the latter when the beater roll is operated.

The reduction unit 21, which is of conventional form, has projecting from its side opposite the shaft 22, a drive shaft 26, to which is attached a gear shift and magnetic release 27, likewise mounted on the bracket 20. (See Figures 3 and 4.)

The gear shift and magnetic release 27 comprises a housing 28 in the sides of which are journalled the shaft 26 and a change gear shaft 29. (See Figure 5.)

Freely mounted on the shaft 26 is a forked L shaped arm 30, between whose forked ends and slidably keyed to the shaft 26, is a gear 31 adapted to engage an idler gear 32, rotatably mounted on a stud 33 secured in an angular extension 34 of the arm 30. (See Figure 5.)

Keyed on the shaft 29 within the housing 28 is a series of stepped gears 35, and keyed to the outer end of the shaft 29 is a sprocket 36, arranged to co-act with a similar sprocket 37 on the shaft 17 to impart motion to the latter through a chain 38. Now, when the beater roll 3 is rotated through the means previously described, motion will be imparted to the drive shaft 26 at a reduced speed through the reduction unit 21.

When the desired speed for the shaft 17 is selected, the arm 30 is shifted laterally to bring the gear 31 into alinement with the desired one of the stepped gears 35. Then the free end of the arm 30 is raised to rotate the idler gear 32 into engagement with the latter; and the shaft 29 will be rotated.

When the arm 30 is raised, its free end is engaged by one of a series of notches 39 on the inside face of the latch 39*a*, integral with a latch bar 40, pivoted at 41. The opposite free end of the bar 40 is pivotally connected to the lower end of a solenoid plunger 42. The plunger 42 is supported within the solenoid magnet 43, that is mounted on a bracket 44 from the top of the housing 28.

Now, as long as the magnet is energized, the plunger 42 will be drawn into it and the latch 39*a* will hold the gears 31, 32 and 35 in driving engagement, and the shaft 29 will rotate the worm gear 14 through the worms 18 and 19. When the worm gears 14 revolve on the worm screws 13, the beater roll 3 will be gradually lowered at a uniform speed until the electrical circuit through the solenoid and indicator is broken.

When the circuit is broken, a compression spring 45, surrounding the plunger 42, will force the plunger downwardly and release the latch 39*a* from engagement with the bar 30.

This causes a disengagement of the gears 31, 32 and 35 and the descent of the beater roll 3 will stop. However this does not necessitate stopping the beater roll.

In order to raise the beater roll to any desired "up" position, I have provided on one end of the shaft 17 a hand wheel 46, by which means the shaft 17 may be revolved. (See Figure 4.)

My contactor and indicator mechanism will now be described:

Secured to the gear 14 on the frame 11*a* is a flanged sleeve 46′ having integral with its upper end, a worm 47 that engages a worm gear segment 48. The segment 48 is cut in the periphery of a contactor disc 49, that is rotatably mounted on a stud 50, secured to a bracket 51. The bracket 51 is bolted to the frame 11*a* and projects upwardly therefrom.

Extending upwardly from the bracket 51 and integral therewith is an arm 52 that has pivoted thereto a depending indicator 53 that is adjustably positioned between oppositely disposed set screws 54—54*a* that pass through lugs 54*b* on the arm 52. The lower end of the pointer is intended to register with a gage mark 53*a* on the segment 48, when the beater roll is in the desired "up" position.

To compensate for the wearing away of the bed plate, the set screws 54—54*a* may be adjusted to bring the indicator 53 into registry with the gage mark.

Mounted in the face of the contactor disc 49, and opposite the segment 48, is an arcuate insulating strip or band 55 to whose outer face is secured a contact strip 55*a* that does not have electrical connection with the disc.

One end of the strip 55*a* is provided with a terminal 56 to receive a flexible lead 56*a* from the solenoid magnet 43. Positioned to contact the strip 55*a* is a spring tensioned brush 57, mounted on the horizontally extending gage arm 57*a* and insulated therefrom.

The arm is rotatably mounted on the stud 50 and is positioned between the bracket 51 and disc 49. Current is supplied to the magnet 43 and brush 57 by leads 58—59 from a source not shown. When it is desired to change the "down" position of the beater roll, it is only necessary to loosen the screw 60 to permit a desired rotation of the arm 57*a*.

The arrows indicating the direction of rotation of the various parts of the mechanism as shown at Figure 7 refer to the lowering of the beater roll, and as the disc 49 is revolved as indicated, the brush 57 will pass out of contact with the strip 55ª, and cause the magnet 43 to be de-energized. This will cause the gears 31, 32 and 35 to disengage.

It is thus apparent that I have provided a beater roll adjuster and indicator that eliminates the "human element" in the lowering of a beater roll; that I have provided simple, variable, gradual lowering means, and simple control means for automatically stopping the lowering of the rolls without effecting the rotation of the beater roll. I have also provided micrometer accuracy in gaging the "up" position of the roll, and simple means for raising the roll manually likewise without effecting the rotation of the beater roll.

My method of compensating for the wearing away of the bed plate and roll bars is simple and efficient. After setting the roll in the "up" position and observing the position of the brush 57 relative to the strip 55ª, the condition of or time required to complete the pulping operation is evident at any time.

Having described my invention, I claim:

1. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, and variable speed mechanism for gradually lowering the beater roll.

2. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, and variable speed gear mechanism for gradually lowering the beater roll.

3. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, automatic mechanism for gradually lowering the beater roll at a selected speed, and electrical mechanism for disengaging the lowering means at any predetermined point.

4. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, automatic mechanism for gradually lowering the beater roll at a selected speed, and magnetic release mechanism for disengaging the lowering means at any predetermined point.

5. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, means for lowering the beater roll, a stepped gear connected to the lowering means, driving means, and a slidable gear rotated by the driving means for engagement with one of the stepped gears to actuate the lowering means at a selected speed.

6. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, means for lowering the beater roll, a stepped gear connected to the lowering means, driving means, a slidable gear rotated by the driving means for engagement with one of the stepped gears to actuate the lowering means at a selected speed, and electrical release means for disengaging the shiftable gear from the stepped gear at any predetermined point in the descent of the beater roll.

7. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, a stepped gear connected to the lowering means, driving means, a slidable gear rotated by the driving means for engagement with one of the stepped gears to actuate the lowering means at a selected speed, and magnetic release mechanism for disengaging the shiftable gear from the stepped gear at any predetermined point in the descent of the beater roll.

8. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, automatic mechanism for gradually lowering the beater roll, means for disengaging the lowering mechanism at any predetermined point, and manual means for raising the beater roll to its "up" position after it has descended to said predetermined point.

9. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, automatic mechanism for gradually lowering the beater roll, magnetic release means for disengaging the lowering mechanism to stop the descent of the beater roll, and a manual device for setting the magnetic means to predetermine the distance of downward movement of the beater roll.

10. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, automatic mechanism for gradually lowering the beater roll, magnetic release means for disengaging the lowering mechanism, a contact rotated by the lowering mechanism, a contact member adjustable to a set position in engagement with the rotatable contact, and an electrical circuit including the magnetic release means, the rotatable contact and the adjustable contact member, said circuit adapted to be broken to stop the descent of the beater roll when the rotatable contact is moved out of engagement with the adjustable contact member.

11. In a beater, a tub, a bed plate therein, a beater roll adjustably mounted in the tub above the bed plate, automatic mechanism for gradually lowering the beater roll, magnetic release means for disengaging the lowering mechanism, a gear rotated by the automatic lowering mechanism, a second gear in mesh with the first gear, a contact element carried by the second gear, a contact member manually adjustable in engagement with the contact element to a set position thereon, and an electric circuit including the magnetic release means, the contact element carried by the sec-

ond gear and the manually adjustable contact member, said circuit adapted to be broken to stop the descent of the beater roll when the contact element carried by the second gear is drawn out of engagement with the adjustable contact member.

In testimony whereof I have hereunto set my hand this 22nd day of January, 1931.

BERTRAM C. HOPE.