

Oct. 9, 1928.

1,686,916

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MECHANICALLY OPERATED SPEED CONTROLLING DEVICE

Original Filed Aug. 23, 1922

FIG. 1.

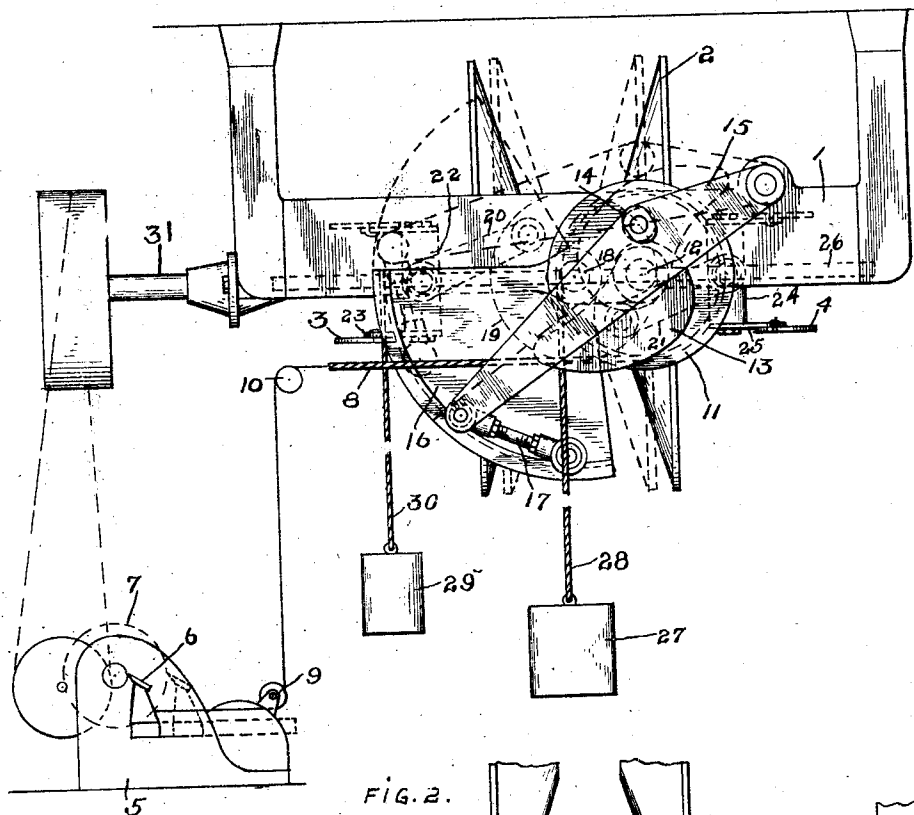


FIG. 2.

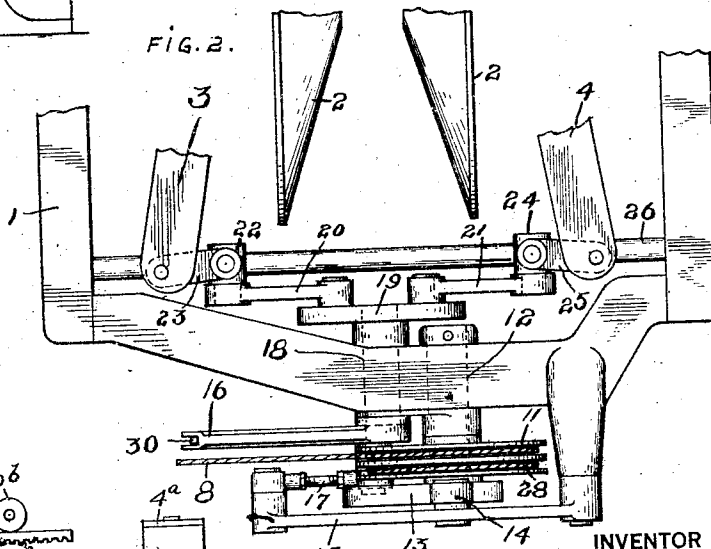
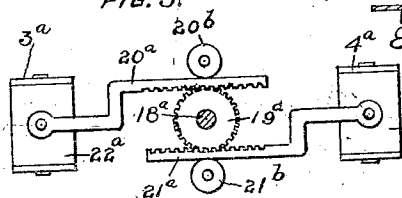


FIG. 3.



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Patented Oct. 9, 1928.

1,686,916

UNITED STATES PATENT OFFICE.

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MECHANICALLY-OPERATED SPEED-CONTROLLING DEVICE.

Application filed August 23, 1922, Serial No. 583,897. Renewed March 1, 1928.

This invention relates to mechanically operated speed controlling devices designed primarily for use in connection with variable speed transmission mechanisms, and the prime feature of the invention is the provision of means in connection with a movable part of the machine which the variable speed transmission mechanism is driving for regulating the speed of the transmission mechanism as a variance occurs in the element being treated by the machine.

A further feature of the invention is in so constructing and arranging the parts of the speed regulating mechanism that they will be free to move in the event the transmission mechanism is idle without injury to the parts of the transmission mechanism.

A further feature of the invention is in so constructing the cam portion of the device and the members associated therewith that a greater degree of movement will be imparted to the controlling device at one time than another.

Other objects and advantages will be hereinafter more fully set forth and pointed out in the accompanying specification.

In the accompanying drawings,

Figure 1 is an elevation of a variable speed transmission mechanism with the controlling means attached thereto, and a veneer cutting machine shown in miniature,

Figure 2 is a fragmentary top plan view of a portion of the transmission mechanism showing the controlling means mounted thereon, and

Figure 3 is a detail elevation of a different form of lever actuating mechanism.

Referring to the drawings, 1 indicates the frame of a variable speed transmission mechanism which in this instance is suspended from a ceiling, although the same may be mounted in any suitable manner, and co-operating with said frame are the usual form of disks 2 which are adapted to co-operate with a belt (not shown) for changing the speed of the shaft driven thereby, levers 3 and 4 being provided for shifting the disks 2.

In the present instance the variable speed transmission mechanism is shown driving a veneer cutting machine 5, which is shown in miniature in Figure 1, said machine having a movable cutter-head 6 which is gradually fed inwardly towards the axis of the section of log being cut into veneer, the log being shown by dotted lines at 7. The movement of

the cutter-head 6 is employed solely for regulating the speed of the transmission whereby the speed of the driven shaft thereof will be gradually increased as the diameter of the log is reduced, incident to the movement of the cutter-head towards the axis of the log.

To automatically control the mechanism, one end of a cable 8 is connected to the cutter-head 6, said cable being extended around sheaves 9 and 10 and has its opposite end connected with a drum 11, which drum is rotatably mounted upon a shaft 12 extending outwardly from one face of the frame 1 so that when the drum is rotated in one direction, incident to the movement of the cutter-head to its position for initial engagement with the log, the cable will be wound onto the drum while the movement of the cutter-head inwardly towards the axis of the log will cause the drum to be rotated reversely. The rotation of the drum 11 in one direction is employed for shifting the levers 3 and 4 for adjusting the disks 2 by fixing a cam 13 to the drum, so that it will rotate therewith, said cam co-operating with a trunnion 14 carried by a beam 15, one end of the beam being pivoted to the frame 1, while the opposite end thereof is connected with a sector 16 through the medium of an adjustable pitman 17. The sector 16 is fixed to a shaft 18 which projects through the frame 1 and has a crank disk 19 fixed to the inner end thereof so that as the sector is swung in the arc of a circle the crank disk 19 will be rotated.

Eccentrically connected with the crank disk 19 are pitmen 20 and 21, the pitman 20 being connected with the lever 3 through a sliding block 22 and a link 23, while the pitman 21 is connected with the lever 4 through a sliding block 24 and a link 25 and by arranging the pitmen 20 and 21 eccentrically of the axis of the crank disk 19, rotation of said crank disk will cause the levers 3 and 4 to swing laterally and adjust the transmission disks 2. The sliding blocks 22 and 24 are held in proper alignment with the levers 3 and 4 by slidably mounting said blocks upon a rod 26, the ends of which are secured to parts of the frame 1.

As the cutter-head 6 is moved outwardly to position the same for engagement with the outer surface of the log at the beginning of the operation of cutting the log into veneer, the cable 8 will pay out over the sheaves 9 and 10 and relieve the pull of the cable against the drum 11, and in order to cause the drum to

rotate incident to the release of the pull thereon by the cable 8, a weight 27 is suspended from the drum 11 through the medium of a cable 28, said cable and weight being so arranged that the drum will be given reverse rotation from that imparted by a pull on the cable 8. The rotation of the drum 11, incident to the operation thereof by the weight 27, will move the cam 13 in such manner as to swing the free end of the beam 15 upwardly which, through the medium of the pitman 17 and sector 16, will rotate the crank disk 19 which will operate the levers 3 and 4 for decreasing the speed of the driven shaft of the transmission mechanism. As the diameter of the log 7 decreases, incident to converting the same into veneer, the cutter-head 6 will gradually move inwardly towards the axis of the log thereby directing a pull on the cable 8 and gradually reversing the rotation of the drum 11. This operation so positions the cam 13 that the beam 15 will be free to descend and to hold the trunnion 14 in constant contact with the edge face of the cam 13, a weight 29 is connected to the sector 16 by a cable 30, and as the beam 15 descends, the sector 16 will be swung downwardly in the arc of a circle thereby rotating the crank disk 19 and shifting the levers 3 and 4 so as to gradually increase the speed of the driven shaft of the transmission mechanism.

Instead of employing the disk 19 and pitmen 20 and 21 for shifting the levers 3 and 4, that form of device shown in Figure 3 of the drawings may be substituted therefor, and in this structure the shaft 18^a has a pinion 19^a fixed thereto with which co-operate rack bars 20^a and 21^a, the outer ends thereof being connected with swivel blocks 22^a and 24^a respectively, and these are in turn pivoted to the levers 3^a and 4^a. The rack bars are held in engagement with the pinion 19^a in any suitable manner as by means of guide rollers 20^b and 21^b. This mechanism is operated in the same manner and from the same source as the disk 19 and parts associated therewith.

Various means may be provided for operating the shifting mechanism, but it is preferable to use a cam, as shown, as a given movement of parts of the variable speed mechanism at one point gives a far greater degree of change in speed than will result from the same given movement at another point, and by properly shaping the cam this variable change of movement will be compensated for.

In addition to the above specified advantages, the cam and beam are so arranged with respect to each other, as to render the same substantially fool proof in that when the transmission mechanism is idle, in which event it is impossible to shift the parts thereof, a pull on the cable 8 will merely result in moving the cam 13 away from the trunnion 14, and in view of the lightness of the weight 29, the downward pull on the sector 16 will

not be sufficient to injure any of the parts of the transmission mechanism.

Various devices may be employed for actuating the levers 3 and 4 without departing from the scope of the invention but the two structures shown and described are the preferred designs.

In operation, when the cutter-head 6 is moved to the position shown by dotted lines in Figure 1, so as to contact with the peripheral face of the log 7, the weight 27, being heavier than the weight 29, will rotate the drum 11 and through the cam 13 and trunnion 14 swing the end of the beam 15 upwards and rotate the sector 16, thereby moving the ends of the levers 3 and 4 towards each other and shifting the disks 2 for decreasing the speed of the driven shaft 31 of the transmission mechanism.

As the strip of veneer is cut, the cutter-head 6 will gradually travel inwardly towards the axis of the log, such movement directing a pull against the cable 8 and rotating the drum 11 so as to lift the weight 27, the cam 13 at the same time operating to swing the beam 15 downwardly, such action rotating the crank disk 19 through the medium of the sector 16, gradually moving the levers 3 and 4 for gradually increasing the speed of the driven shaft 31, thereby increasing the speed of rotation of the log 7.

This provides an entirely automatic speed controlling means for the variable speed transmission mechanism, and while the device is shown as used in connection with a veneer cutting machine, it will be understood that it may be applied to use for driving machinery or the like used for many different purposes.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. The combination with a machine having a movable element and a variable speed transmission mechanism for driving said machine, said transmission mechanism having adjustable parts, of a rotating drum, a cam operable with said drum, a beam operated in one movement by said cam, means operable by the movement of said beam for shifting the adjustable parts of said transmission mechanism, a flexible element extending from said drum to said movable element of the machine for causing said drum to rotate in one direction incident to the movement of said element, and means for operating said drum and beam operable means in reverse movement.

2. A machine comprising driving gearing including opposed tapered disks with a belt between them, speed changing means therefor including an element controlled by the diameter of the work, connections from said element to said disks for moving them toward and from each other, and lost motion connections between parts of the speed chang-

ing means for preventing damage due to unduly rapid movement of said element, substantially as set forth.

3. A machine comprising driving means for rotary work including opposed tapered disks and a wedge-shaped belt between them, speed changing means for moving said disks toward and from each other, an element adapted to engage the periphery of the rotating work, connections from said element to the speed changing means, and means for providing lost motion in said connections to prevent unduly abrupt changes of speed, substantially as set forth.

4. A machine comprising rotary work driving means, speed changing means therefor, an element engaging the periphery of the rotary work, and connections from said work to the speed changing means including a drum, a cable connected at one end to the drum and at the other end to the work engaging element, means for rotating the drum to wind the cable thereon, a cam operated with the drum, and a lever connected at one end to the speed changing means and having a part resting loosely on the cam whereby one of said parts may lag behind the other to prevent unduly abrupt changes of speed, substantially as set forth.

5. A machine comprising rotary work driving means, speed changing means therefor, an element engaging the periphery of the rotary work, and connections from said work to the speed changing means including a drum, a cam operated by the drum, a lever resting loosely on the cam and connected to the speed changing means for operating the same, a cable connected at one end to the drum and at the other end to the work engaging means, and automatic means for winding the cable on the drum whereby unduly rapid movement of the work engaging element in one direction slackens the cable without causing unduly rapid movement of the speed changing means, substantially as set forth.

6. The combination of a machine acting on work of progressively varying diameter, change-speed driving means for the machine, an element engaging the work, and connections between said element and elements of the speed changing means including a cam shaped to operate the speed changing mechanism to keep the work at a constant peripheral speed, substantially as set forth.

7. The combination of a machine acting on work of progressively varying diameter, change-speed driving means for the machine, an element adapted to engage the work, and connections between said element and the change-speed means said connections including a drum, a cable connected to the work-engaging element adapted to be wound on the drum, and a cam operated by the movement of the drum said cam being shaped to so control the change speed means as to im-

part uniform peripheral speed to the work at all times, substantially as set forth.

8. A machine comprising a rotary work driving means, speed changing means therefor including an expansible pulley having disks movable toward and from each other, levers movable toward and from each other for adjusting said disks, links connected to said levers, a rockshaft for operating said links, an element adapted to engage the periphery of the work, and connections from said element to said rockshaft whereby the speed of the work driving means is controlled by the size of the work, substantially as set forth.

9. The combination with a machine having an element moving progressively in one direction during an operation of the machine and a variable speed transmission for driving said machine, of means for automatically shifting parts of the transmission mechanism for regulating the speed of the machine, and a cable attached at opposite ends to a part of the shifting mechanism and to said movable element of said machine respectively whereby the position of the movable element will determine the operation of the shifting mechanism, substantially as set forth.

10. The combination with a machine including a movable tool and a variable speed transmission mechanism for driving said machine, of means for automatically imparting movements of translation to one or more parts of the transmission mechanism for regulating the speed of the machine, and flexible means connecting parts of the shifting mechanism to said movable element of said machine whereby the position of the movable element will determine the operation of the shifting mechanism, substantially as set forth.

11. A variable speed transmission mechanism including a controlling element having a movement in one direction, a gradually retreating stop in the path of said element to restrain its movement in that direction, and means tending to move said element in said direction, said last-named means being proportioned to move said element at low speed only, substantially as set forth.

12. A variable speed transmission mechanism including a controlling element, work-controlled means in the path of said element to check its movement in one direction, and means acting on said element with a force but little above the resistance of said element and that of the parts actuated thereby for moving it in said direction, substantially as set forth.

13. A variable speed transmission mechanism including a lever, a cam in the path of the lever, yieldable means for moving the lever in one direction, and automatic means for actuating the cam to permit movement

of the lever in said direction, substantially as set forth.

14. A variable speed transmission mechanism including a lever, a cam in the path
5 of the lever, yieldable means proportioned to move the lever at low speed in one direction, and automatic means for moving the cam to permit movement of the lever in said direction, substantially as set forth.

10 15. The combination with a machine having a movable element and a variable speed transmission mechanism for driving said machine including driving and driven members in frictional engagement said members
15 being relatively adjustable to provide an infinite number of speed changes between fixed limits, of means for automatically shifting parts of the transmission mechanism for regulating the speed of the machine, and flexible actuating means connected with parts of
20 the shifting mechanism and said movable element of said machine whereby the position of the movable element will determine the operation of the shifting mechanism, substantially as set forth.

25 16. In a machine operating on work of progressively varying diameter, a change-speed mechanism, a controlling element for said mechanism, a backing-off stop in the
30 path of said controlling element, and means responsive to changes in the diameter of the work for determining the action of said stop, substantially as set forth.

17. A variable speed drive for giving con-

stant peripheral speed to work, the radius 35 of which continually varies, comprising a belt and two conical disks adjustable to vary the relative axial spacing of the conical disks and the belt, a train of linkage moving in response to changes in the radius of the work 40 to adjust said axial spacing, means to move said train in response to such changes, and a compensation cam in said train shaped so as to enable equal increments of work radius variation to produce equal increments of 45 drive speed variation, substantially as set forth.

18. A variable speed drive for giving constant peripheral speed to work, the radius of which continually varies, comprising a belt 50 and two conical disks adjustable to vary the relative axial spacing of the conical disks and the belt, a train of linkage moving in response to changes in the radius of the work to adjust said axial spacing, means to move 55 said train in response to such changes, and a compensation cam in said train shaped so as to enable equal increments of work radius variation to produce unequal increments in the adjustment of the axial spacing so as to 60 finally result in equal increments of drive speed variation, substantially as set forth.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 21st day of August, A. D. nineteen hundred and 65 twenty-two.

DARCY E. LEWELLEN.