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CUTTING MECHANISM SPECIALLY APPLICABLE TO PAPER AND OTHER TUBE MACHINES.

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1,325,173. Patented Dec. 16, 1919.

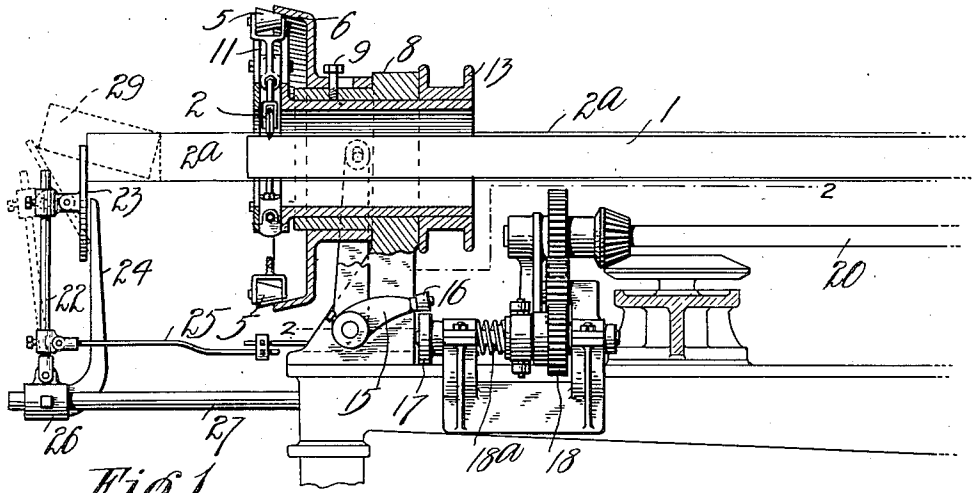


Fig. 1.

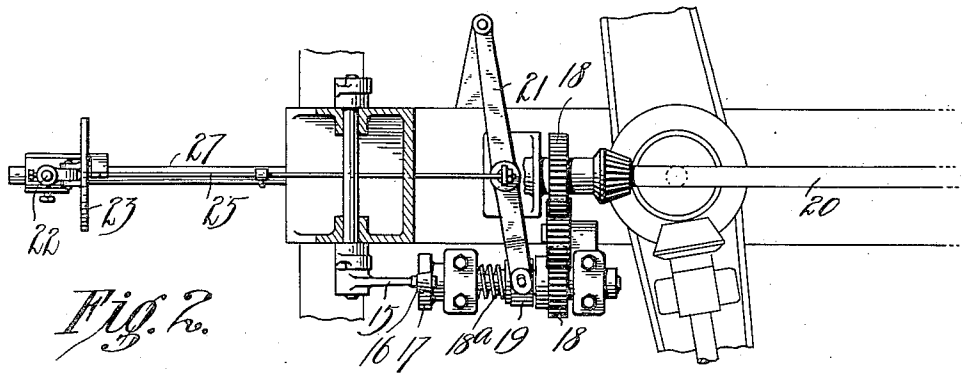


Fig. 2.

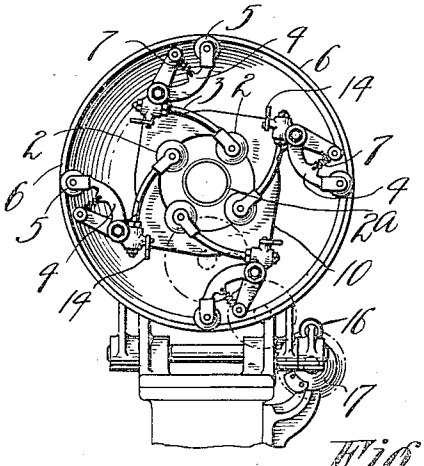


Fig. 3.

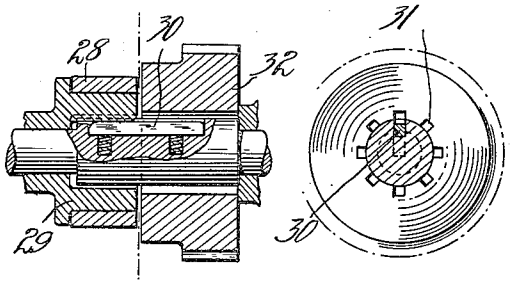


Fig. 4.

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UNITED STATES PATENT OFFICE.

ALBERT EDWARD SHIRLOW, OF GLEN HUNTLY, NEAR MELBOURNE, AND HENRY WILLIAM HOARSE, OF GARDEN VALE, NEAR MELBOURNE, VICTORIA, AUSTRALIA, ASSIGNORS TO JAMES CLASON GATES, OF MELBOURNE, VICTORIA, AUSTRALIA.

CUTTING MECHANISM SPECIALLY APPLICABLE TO PAPER AND OTHER TUBE MACHINES.

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To all whom it may concern:

Be it known that we, ALBERT EDWARD SHIRLOW and HENRY WILLIAM HOARSE, both subjects of the King of Great Britain, and residents of Glen Huntly, near Melbourne, in the State of Victoria and Commonwealth of Australia, and Olinda, 72 Murphy street, Garden Vale, near Melbourne, Victoria, and Commonwealth of Australia, respectively, have invented certain new and useful Improved Cutting Mechanism Specially Applicable to Paper and other Tube Machines, of which the following is a specification.

This invention relates to improved cutting mechanism specially applicable to paper and other tube machines and has been devised in order to provide mechanism of greater utility and efficiency than that at present in use.

Hitherto paper and other tubes have been automatically cut into the required lengths by a single disk cutter but this device is defective in that the edge of the cut tube is torn or frayed particularly owing to the fact that a single disk must pass through the whole diameter of the tube and exert a cutting pressure in one direction only.

According to this invention a plurality of cutters (preferably a set of four revolving cutters) are arranged around the paper tube so that when the automatic mechanism is operated an even cut and pressure is exerted around and through the tube casing with the result that the edges of the tube are cleanly cut.

An essential feature embodied in the invention consists in mounting a plurality of cutters around a tube feeding mandrel in such a manner that the cutters are automatically closed at predetermined intervals upon and around the paper or other tube, to effect the cutting operation.

A further essential feature consists in utilizing the tube for pressing against trip or lever mechanism to close a clutch operating the gear which controls the cutting operation, such lever mechanism being fitted with means for releasing the cut portion from the tube after each cutting operation.

A further essential feature consists in the particular means employed for closing the cutters upon and around the paper tube at predetermined intervals.

In order that the invention may be more readily understood, one form of carrying the same into practical effect will now be described with reference to the accompanying drawings in which:—

Figure 1 is a view in elevation of portion of an existing paper tube machine with the improved cutting mechanism shown partly in section attached thereto.

Fig. 2 is a view in plan of Fig. 1, a section being taken on line 2—2 Fig. 1, in order to more clearly illustrate the clutch gearing.

Fig. 3 is a view in end elevation, the frame plate being removed for purposes of illustration.

Fig. 4 is a view in detail of the clutch embodied in the invention.

According to this invention the paper or other tubing is formed continuously by spirally winding paper or other tape in a series of layers over a mandrel 1. This is effected by belts which pass from driving pulleys to and around the mandrel and then to idler and tension pulleys. These belts wind the paper on the mandrel and feed it along to rotary cutter gear 2.

The cutters (preferably four in number) are mounted in the forked end of adjustable arms 3 secured in bosses formed on levers 4. The levers 4 are fitted with conical rollers 5 which are kept in contact with a conically flanged disk 6 by the tension of springs 7.

The disk 6 is mounted on the journal portion of the head 8 and has axial reciprocal movement which is limited by the set screw 9. The inner frame plate 10 supporting the cutter levers 4, is formed integral with a sleeve 12 which passes through the head and is fitted with a pulley 13. It will be obvious that other means may be used to rotate the cutters in lieu of pulley 13.

The cutter levers 4 are held in position on the inner frame 10 by the outer clamping frame 11 illustrated more particularly in Fig. 1.

Stop plates 14 may be secured to the bosses of the levers 4 to limit the movement of said levers.

The disk 6 is reciprocated by lever gear 15 on one arm of which is fitted with a roller 16 which engages an adjustable cam 17 rotated by gear 18 on a shaft 18^a which is controlled by the clutch 19.

The gear 18 is preferably driven by the

shaft 20 which is portion of the existing drive of the belt feed previously described.

The clutch 19 is operated by a triple leverage consisting of the rocking lever 21 vertical lever 22 and disk lever 23.

The paper or other tubing 2^a passing from the mandrel 1 (as shown in fine full lines in Fig. 1) a predetermined distance, presses on the upper half of the disk 23 which, using upright 24 as a fulcrum, forces lever 21 over by means of the adjustable connecting rod 25 to clutch the gear. The cam 17 through levers 15 then forces the conical flange of the disk 6 farther over the rollers 5 thereby closing the cutters on the paper or other tubing 2^a. The tubing in feeding slightly farther is finally parted by being forced up the inclined formed by the disk 23 as it assumes the position shown in dotted lines Fig. 1, the severed portion then collapses and allows the clutch gear to return to previous inoperative position, and the disk and cutters are automatically returned to the normal position.

Any size tubing can be made by placing the desired mandrel in the machine and any required length can be cut by adjusting the boss 26 to which the lever 22 is pivoted along the bar 27 and making the required cam adjustment.

As illustrated in Fig. 4, the rocking lever 21 is pivotally connected to the sheaf 28 which reciprocates the cam block 29. This block 29 when in the position shown depresses a spring actuated feather 30 keeping the same out of engagement with any of a series of feather ways 31 formed in the bore of the member 32 of the gear 18.

When the tubing engages the disk 23 as previously described the block 29 moves away from the member 32 and the feather 30 is forced outward and engages one of the feather ways 31, so imparting motion to the cutter gear.

In operation the tube 2^a to be cut is fed along the mandrel 1 and when it reaches the plate 23 it forces the same outwardly at an angle. The disk or plate 23 using the arm 24 as a fulcrum forces the rod 22 outwardly so throwing, by means of the rod 25, the clutch 19 into gear, causing the rotation of the gear shaft and cam 17. The cam 17 being in contact with the roller 16 causes the arm 15 to slide the disk 6 into further engagement with the rollers 5 so narrowing the radius of the cutters 6 and causing them to close upon and around the tube 2^a to enable it to be cleanly cut. The angle which the cut end then takes causes it to collapse and the whole of the parts are returned to the normal position ready for the next outward pressure upon the disk 23.

It will be readily understood that without departing from the spirit and scope of the invention, the mechanism can be so arranged that the cutting rollers are laterally carried in the same direction and at the same speed as the tube movement or feed on the mandrel to insure an even and continuous movement of the tube.

What we claim as our invention and desire to secure by Letters Patent, is—

1. In cutting mechanism of the class described, the combination of a tube carrying mandrel, a plurality of cutters spaced thereround, a conically flanged disk frame coaxial with said mandrel, conical rollers, spring controlled arms carrying said cutters and rollers and adapted to hold the latter against the conical flange on said disk, and mechanism for automatically throwing the flange of said disk axially over the surface of the cutting rollers at predetermined intervals to insure an even cut and pressure of the cutters around and through the tube.

2. Cutting mechanism of the class described characterized in that a plurality of cutters are arranged within a conically flanged disk frame around a tube feeding mandrel, each cutter being carried by arms connecting levers carrying conical rollers held in contact with the conically flanged disk by springs, the said disk being capable of axial reciprocal movement, while the levers carrying the cutters connect a plate integral with a sleeve carrying a driving pulley, and mechanism for automatically throwing the conical flange of the disk over the surface of the cutter rollers to close the cutting rollers upon and around the tube at predetermined intervals for the purposes specified.

3. In cutting mechanism of the class described, the combination of a plurality of cutters arranged around a tube feeding mandrel and operated so that they close upon and around the tube at predetermined intervals with means such as an axial reciprocal conically flanged disk arranged to engage conical rollers carried by pivoted spring controlled levers formed with arms carrying the said cutters.

4. In cutting mechanism of the class described, means for adjusting the lengths of tube to be cut and for automatically throwing the cutters into operation consisting of a disk lever arranged forwardly of the machine and in the path of the tubing to be cut, being pivoted to and adjustable along a vertical lever hinged at its lower end and connecting by means of an adjustable connecting rod with a rocking lever adapted to control the clutch operating the driving gear, an arm formed with a roller operating over a cam surface on the driving shaft causing the conically flanged disk to further engage the conical rollers for closing the cutters upon and around the tube which when cut passes to the trip disk which using a stop plate or arm as a lever takes a diagonal po-

sition and separates the cut portion from the tube, so allowing the cutting mechanism to return to inoperative position as and for the purposes specified.

5. In cutting mechanism of the class described, the combination of a tube feeding mandrel, a plurality of cutters arranged therearound, a conically flanged disk mounted for axial movement along said mandrel, means engaged by the flange on said disk and adapted to operate said cutters when the disk is moved in one direction, means including a clutch for reciprocating said disk, means for separating the cut tube portions, said separating means being adapted to control the operation of said clutch, and means for carrying the cutters in the same direction and at the same speed as the tube feed on said mandrel.

6. In cutting mechanism of the class described, a tube feeding mandrel, a plurality of cutters arranged therearound, a conically flanged disk co-axial with said mandrel, conical rollers, spring controlled arms carrying said cutters and rollers, and adapted to hold the latter in engagement with the conical flange on said disk, means including a clutch for reciprocating said disk, and a trip lever adapted to separate the cut lengths of tube and operatively connected with said clutch, the distance between each cutting operation being limited by the distance between the cutters and said trip lever.

7. In cutting mechanism of the class described, a tube feeding mandrel, a plurality of cutters therearound, a conically flanged disk co-axial with said mandrel, conical rollers, spring controlled arms carrying said cutters and rollers and adapted to hold the latter in engagement with the conical flange on said disk, means including a clutch for reciprocating said disk longitudinally of said mandrel, a trip lever in the path of the cut tube portions, means controlled by said lever for operating said clutch, said means including an adjustable connection to allow of varying the position of said trip lever with respect to said cutters, said trip lever being adapted to throw the cut tube portions out of alinement with, and to separate them from, said mandrel.

8. In cutting mechanism of the class described, clutch operating mechanism consisting of a disk lever (as 23) a lever (as 22) a connecting rod (as 25) connecting a rocking lever (as 21) connecting a sheaf (as 28) adapted to reciprocate a cam block (as 29) adapted to depress a spring actuated feather (as 30) featherways (as 31) formed in the bore of one member (as 32) of gearing (as 18), the parts being so arranged that when the tube engages the disk lever 23 the block 29 moves away from the member 32 and the feather 30 is forced outward and engages one of the featherways to allow of motion to be imparted for the purposes specified.

Signed at Melbourne, in the State of Victoria, Australia, this 22nd day of March, A. D. 1918.

ALBERT EDWARD SHIRLOW.
HENRY WILLIAM HOARSE.

Witnesses:

ANNIE B. EDWARDS,
JEAN D. PATON.