April 10, 1928. 1,665,834

W. T. AYER

MECHANISM FOR CUTTING PAPER SHELL BLANKS FROM CONTINUOUS ROLLS OF PAPER

Original Filed Sept. 18, 1923 2 Sheets-Sheet 1

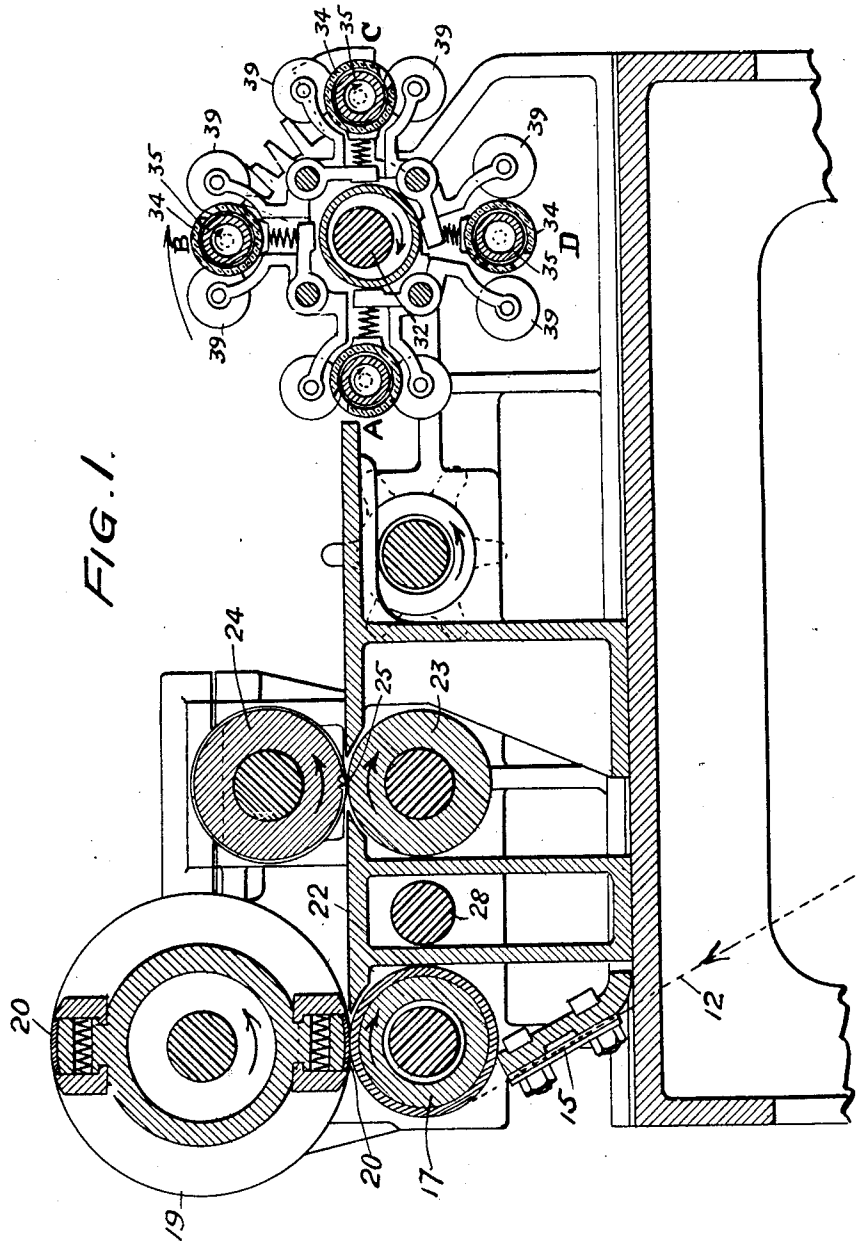


FIG. 1.

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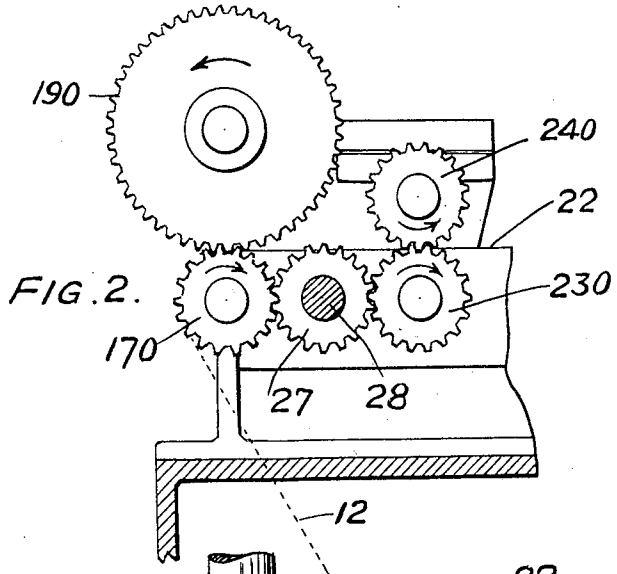


FIG. 2.

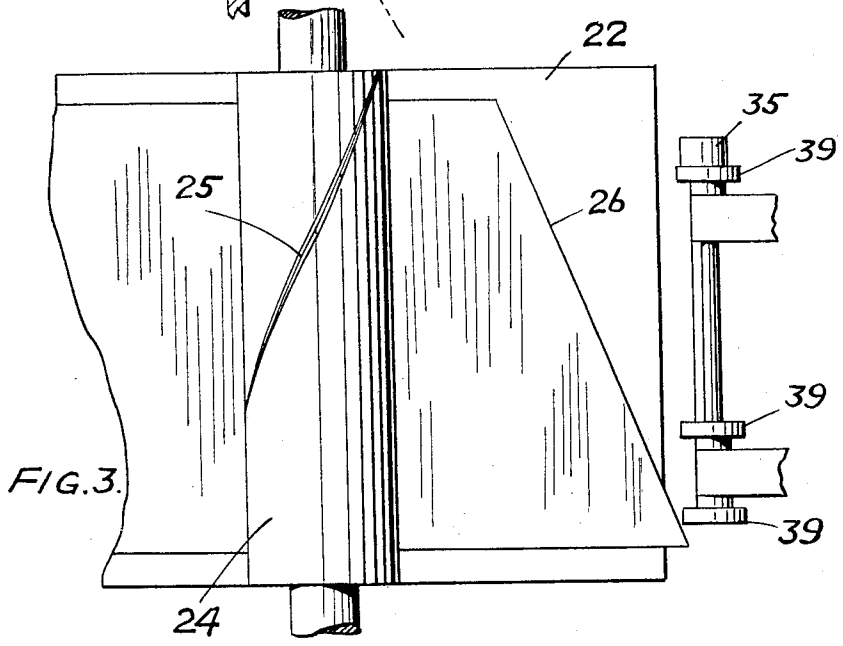


FIG. 3.

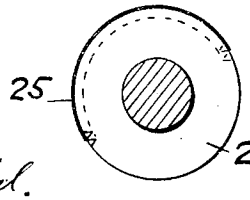


FIG. 4.

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Patented Apr. 10, 1928. 1,665,834

UNITED STATES PATENT OFFICE.

WILLIAM T. AYER, OF WILMINGTON, DELAWARE, ASSIGNOR TO HERCULES POWDER COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

MECHANISM FOR CUTTING PAPER SHELL BLANKS FROM CONTINUOUS ROLLS OF PAPER.

Original application filed September 18, 1923, Serial No. 663,387. Divided and this application filed July 24, 1924. Serial No. 727,886.

In an application filed by me September 18, 1923, Serial No. 663,387, of which this application is a division, I set forth a machine for making, from a continuous roll of paper, shells with a tubular body. The machine comprises various novel features, among which is the means for cutting into separate blanks a moving sheet of paper that is being continuously unrolled. This means forms the subject-matter of the present invention. Besides describing the cutting mechanism per se, I herein include, in order that its mode of operation may be fully understood, such of the mechanism of the entire machine as is immediately associated with, and cooperates with, the cutting mechanism.

In the drawings:

Fig. 1 is a vertical cross-section through the printing rolls, cutting rolls and table.

Fig. 2 is an elevation of the driving mechanism for said rolls.

Fig. 3 is a plan view of the cutter roll and part of the sheet of paper that has just been cut thereby.

Fig. 4 is an end view of the cutter roll.

From a stock shaft (not shown), which carries the roll of paper, the paper 12 passes through a paper guide 15 (which corrects the position of the sheet if the roll of paper is not perfectly wound) onto a blanket roll 17 and between this roll and a roll 19. Roll 19 carries electrotypes 20, which print a label on the paper as it moves forward.

The paper thence passes along the top of the table 22 and between rolls 23 and 24. Roll 23 is a hardened anvil roll. Roll 24 is of hardened steel and is provided with a knife 25 (see Figs. 3 and 4) whose lengthwise extension is spiral relative to the roll, as best shown in Fig. 3. The knife projects to a height above the surface of the roll about equal to twice the thickness of a sheet of paper, as shown in Fig. 4. The knife 25 may be formed on the roll by machining the solid metal, or it may be an inserted knife. In passing between rolls 23 and 24, the paper is cut across obliquely, as shown at 26 in Fig. 3.

The shafts of rolls 17 and 23 carry gear wheels 170 and 230 (see Fig. 2), which are driven from a pinion 27 on the driving shaft 28 (see Fig. 1). The gear wheel 170 drives a gear wheel 190 on the shaft of roll 19. The gear wheel 230 engages a gear wheel 240 on the shaft of roll 24.

Beyond the table 22 is a drum shaft 32, which is intermittently given quarter turns, always in the same direction. Drum shaft 32 carries mandrels 35 and slotted mandrel shields 34, both of which turn bodily with the drum shaft. The mandrels also continuously turn on their own axes at a surface speed corresponding to the speed of travel of the sheet between rolls 17 and 19 and rolls 23 and 24. The mandrel shields are slotted to allow tension rolls 39 to extend through them and contact with the mandrels 35. The mechanism for periodically turning the drum and for rotating the mandrels on their own axes need not be described, as it forms no part of the invention.

While the paper is being severed by the cutter roll 24, the most advanced end of the edge formed by the immediately preceding cut of the paper extends into the slot of that one of the four mandrel shields 34 which, at this time, is held stationary, at position A, just beyond the end of the table 22. It is immediately engaged by the mandrel 35 and one of the pressure rolls 39 on one of the two sets of such rolls. By reason of the mandrel being rotated at the same surface speed at which the sheet is moving between rolls 17 and 19 and rolls 23 and 24, the paper is wound on the mandrel at the same speed at which it travels toward it. While winding on the mandrel, the cutter roll completes the severance of the paper.

It is necessary to have at least two pressure rolls 39 on each shaft, and it is desirable to have three, so that the same mandrel can handle wide or narrow sheets. Thus, by reference to Fig. 3, where a wide sheet is shown as about to pass toward the mandrel, the advance edge of the paper will be engaged first by the left-hand pressure roll, then by the mediate pressure roll and then by the right-hand pressure roll. If the sheet is substantially narrower, the left-hand pressure roll will be inoperative and the edge of the sheet will be engaged successively by the mediate pressure roll and the right-hand pressure roll.

At the moment when the sheet is completely severed, the drum shaft starts to

turn, carrying the mandrel that has just received the sheet from position A through an arc of ninety degrees to position B, where it is again brought to rest so far as bodily movement is concerned. Simultaneously the mandrel that was in position D is brought into position A to receive the severed end of the next blank.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

A mechanism for cutting blanks from a continuous sheet of paper comprising a pair of rolls between which the paper travels, one of the rolls being an anvil roll with a smooth cylindrical surface and the other a cutting roll carrying a knife extending spirally about and having a cutting edge projecting slightly beyond its cylindrical surface, the forward face of the knife extending from the cutting edge inwardly of the surface of the cutting roll, and the surface of the cutting roll being recessed adjacent the forward face of the knife to form a wall diverging from the inner portion of the forward face of the knife to its junction with the surface of the roll, which junction is spaced a substantial distance from the forward face of the knife, whereby a groove of tapering cross section is formed between the said wall and the forward face of the knife.

In testimony of which invention, I have hereunto set my hand, at Wilmington, Del., on this 14th day of July, 1924.

WILLIAM T. AYER.