July 18, 1950 B. J. DAVIDSON 2,515,863

ROTARY CUTTING AND CREASING PRESS

Filed Sept. 18, 1946

Fig. 3.

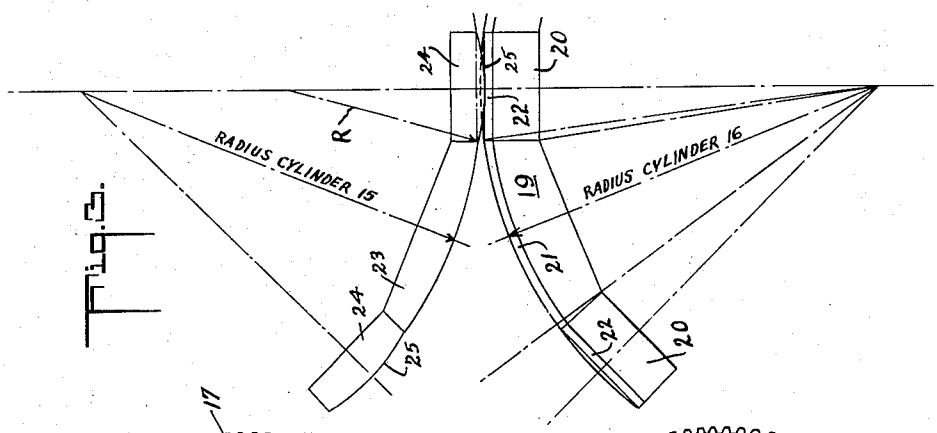


Fig. 2.

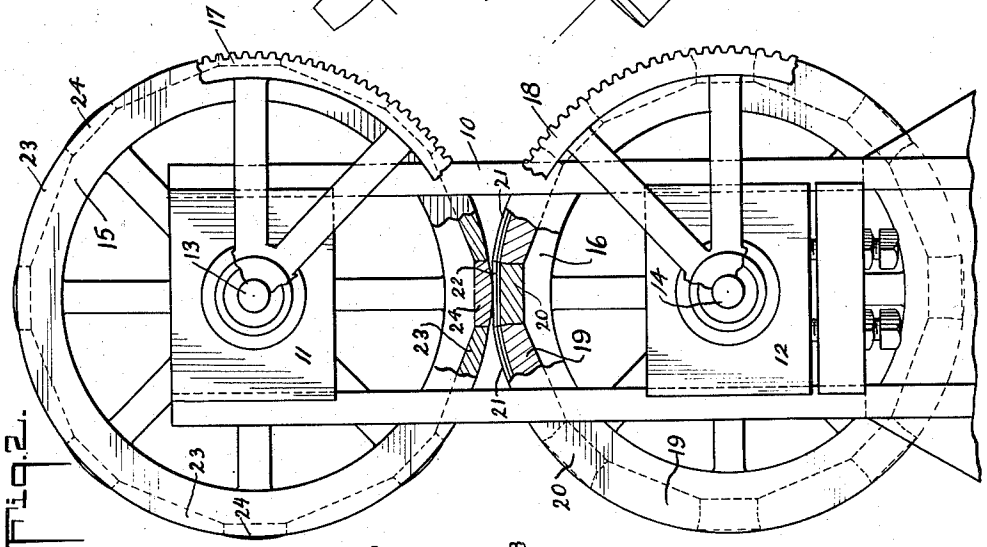
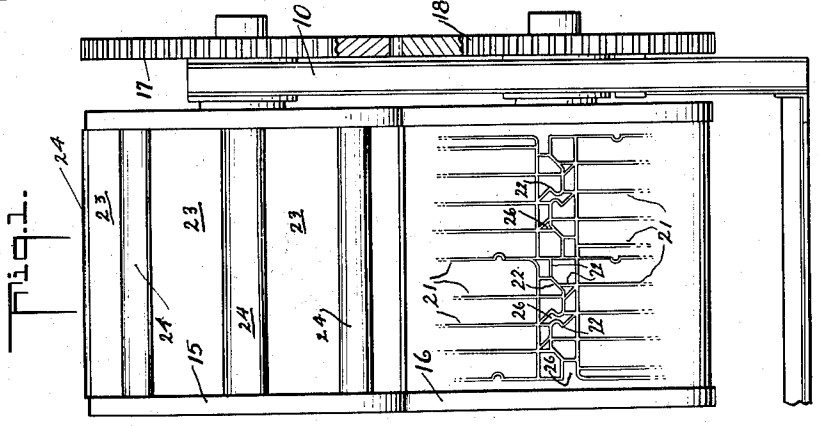


Fig. 1.



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Patented July 18, 1950 2,515,863

UNITED STATES PATENT OFFICE

2,515,863

ROTARY CUTTING AND CREASING PRESS

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Application September 18, 1946, Serial No. 697,713

3 Claims. (Cl. 164—28)

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My invention pertains to rotary cutting and creasing presses and has for its principal object to provide a rotary press that will cut carton blanks having curved, angular or irregularly shaped closing and locking flaps and tongues in a continuous operation from a roll of cardboard of indefinite length.

The usual practice is to cut such cartons from single sheets of cardboard on flat bed reciprocating presses. This involves considerable labor in cutting the cardboard into sheets before being fed to the press, in separating the various blanks and in knocking out the scrap pieces that must be left adhering to the blanks to prevent clogging of the cutting rules. Heretofore, rotary cutting and creasing presses were usually used for cutting only carton blanks that have straight line or rectangular flaps because of the extreme cost of fitting curved and angular rules to the curved faces of the cylinders.

According to the present invention, I provide the lower or rule bearing cylinder with flat faces in which the curved and angular rules are mounted and then compensate for these flattened faces by making corresponding raised curved faces on the pressure cylinder that will have a smooth rolling contact over the rules on the flattened faces. The cylinders are of such size as to permit the layout of an exact number of carton blanks on their circumferences. Thus in the case of a usual size of carton blank that requires 12¼ inches of material when interlocked with adjacent blanks, a cylinder or drum that is 98 inches in circumference is required to layout rules to cut and score eight blanks per revolution. The rule carrying cylinder will have eight flat faces fitted with rules to cut the flaps and tongues at the ends of the blanks and the cylindrical sectors between the flats will be fitted with rules to make the straight cuts and scores in the body of the blank. The pressure cylinder will have eight raised curved sections to roll over the rules on the flat faces and the same number of cylindrical sections to roll over the cutting and scoring rules on the intermediate cylindrical sectors. With each revolution of the cylinders eight carton blanks, or a multiple of eight, depending on the length of the cylinders, will be cut out and the operation will be continuous.

With the above general statement of the object and nature of the invention in mind, reference will be had to the accompanying drawings for a full description of one embodiment thereof.

Fig. 1 is a side elevation, partly diagrammatic, of a cylinder press embodying my invention.

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Fig. 2 is an end elevation, with parts broken away to show more clearly the construction of the cylinders.

Fig. 3 is a diagram showing how the flat and bulged cylinder sections cooperate.

I have illustrated my invention as embodied in a machine adapted to cut out eight blanks for each rotation of the cylinders. However, this is not to be considered a limitation in the invention, but is for the purposes of illustration only. The cylinders may be fitted with any number of cutting and scoring rules within practicable limitations.

A frame 10 has bearings 11, 12 on each side in which opposite ends of the shafts 13, 14 are rotatably supported and which carry the upper or pressure cylinder 15 and the lower or rule cylinder 16. One of the bearings, preferably the bearing 12, is adjustable so as to vary the distance between the shafts 13, 14 to compensate for wear on the cylinders and to make adjustments for different thicknesses of material.

The shafts 13, 14 and cylinders 15, 16 are driven by gears 17, 18 which are secured to the shafts and whose pitch lines coincide or substantially coincide with the line of contact of the two cylinders. In operation, the cylinders 15, 16 rotate in fixed relation to one another with their surfaces in contact.

The rule cylinder 16 has eight sections 19 whose outer surfaces lie in the circumference of the cylinder and eight flat sections 20, which are cut below the surface of the cylinder, but whose edges terminate at the circumference.

Rules 21 for cutting and scoring the straight lines on the carton blanks are secured to the cylindrical sections 19 and the curved and angular rules 22 for cutting the irregularly shaped closing flaps and tongues on the ends of the carton blank are secured to the flat faces 20.

The pressure cylinder 15 has eight cylindrical sections 23 which roll in contact with the edges of the rules in the sections 19. It has an equal number of raised or bulged sections 24 which roll in contact with the rules on the flat sections 20. The contact surface of each section 24 is the arc of a circle having a radius R which is less than the radius of the cylinder 15 as clearly shown in the diagram of Fig. 3. The radius of this section is selected so that the arc at the center will project beyond the surface of the cylinder 15 an amount equal to the distance that the lowest part of the flat faces 20 lies below the normal cylindrical surface of the cylinder 16. The arc meets the cylindrical surface of the cyl-

inder 15 at the edge of the section. It will thus be seen that the length of each outer face of the sections 24 is slightly greater than the width of the flat faces 20 on which the curved rules are mounted. Thus in the case illustrated, if the cylinders 15, 16 have a circumference of 98 inches, and are adapted to cut the usual size of carton previously referred to, the flat faces 20 will measure approximately 4¼ inches. The length of the arc 25 will be about .03 of an inch greater than this. However, this means only that the bulged section will slip slightly over the material while the latter is being pressed down on to the cutting and scoring rules. Any error that may occur in the cutting and scoring of the blank will be very small and well within the allowable plus and minus limits for cutting cartons.

The present invention greatly speeds up the output and reduces the labor cost in cutting carton blanks. The cardboard for making the blanks is fed continuously between the cylinders which are driven at uniform speed and continuously cut out the carton blanks. The cutting rules may be made so as to completely sever the blanks from each other and also completely sever the scrap pieces 26. The complete carton blanks and pieces of scrap will fall out as they reach the lower side of the roll cylinder 16, or if desired means may be provided for separately removing the scrap by suction or other means.

This operation is in contrast to present practice where the cardboard must first be cut into sheets and then the rules must be provided with notches or open spaces so as to hold the carton blanks in a continuous sheet, and to leave the scrap pieces adhering to the blanks from which they must be broken loose after the blanks are separated from each other. Also the cylinders are operative throughout their entire revolution as against 33⅓% maximum operative time with flat bed reciprocating presses.

I have illustrated the cylinders in Fig. 1 as adapted to cut two sets of blanks at one time, but the number to be cut will depend upon the length of the cylinders and sizes of the blanks and may be any number within allowable limits.

The faces 25 of the bulged sections 24 preferably are arcs of circles because of their ease of construction. In order to obtain uniform contact with the rules 22 on the flats 20 over the entire area, I build the usual cut-out paper "make-readys" under the knives.

Having thus described and illustrated what I now believe to be the best form of my invention, I claim all modifications and adaptations thereof that may come within the terms or scope of my claims.

1. In a rotary carton press, the combination of a frame, a rule cylinder and a pressure cylinder mounted therein to rotate in fixed relation to one another with their surfaces in contact, the surface of the rule cylinder having a number of flat faces thereon cut below the circumference and separated by cylindrical sections, curved and angular rules secured to said flat faces with their outer operative edges lying parallel to the plane of the respective flat faces, rules for making straight cuts and scores secured to said cylindrical surfaces, the surface of the pressure cylinder having cylindrical sections opposed to and rolling in contact with the operative edges of said straight rules and having outwardly bulging curved sections opposed to and rolling in contact with the operative edges of the rules on the flat faces of the rule cylinder.

2. In a rotary cutting press, the combination of a frame, a rule cylinder mounted to rotate therein and having alternate cylindrical and flat faces thereon, cutting and scoring rules secured to said cylindrical and flat faces, a pressure cylinder mounted to rotate in said frame and having alternate cylindrical and bulging faces thereon, said cylinders being mounted to rotate in fixed relation to one another with their surfaces in contact, the cylindrical faces being opposed to and rolling on the rules in the cylindrical faces of the rule cylinder and the bulging faces being opposed to and rolling on the rules in the flat faces of the rule cylinder.

3. In a rotary cutting press, the combination of a frame, a rule cylinder mounted to rotate therein and having alternate cylindrical and flat faces thereon, cutting and scoring rules secured to said cylindrical and flat faces, a pressure cylinder mounted to rotate in said frame and having alternate cylindrical and bulging faces thereon, the cylindrical faces being opposed to and rolling on the rules in the cylindrical faces of the rule cylinder and the bulging faces being opposed to and rolling on the rules in the flat faces of the rule cylinder, said bulging faces being curved on a radius less than the radius of the pressure cylinder.

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