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C. S. ANDREWS

1,737,553

DIE ROLL

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Fig. 1.

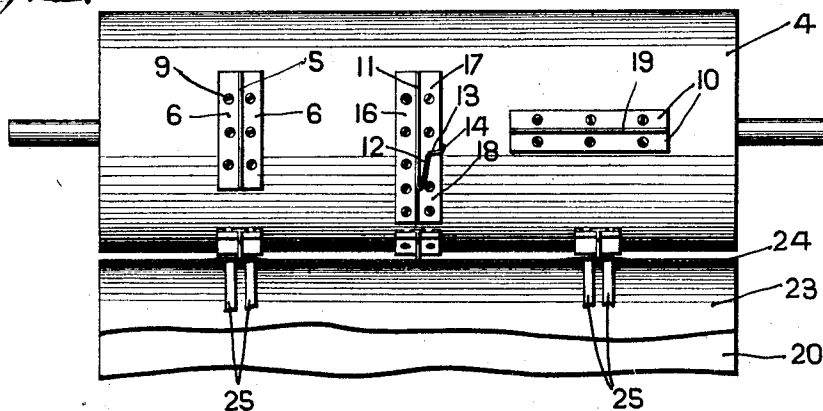


Fig. 3.

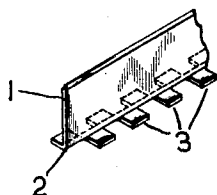


Fig. 2.

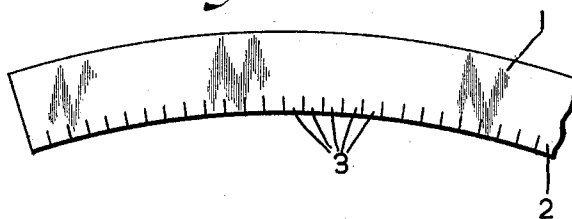


Fig. 4.

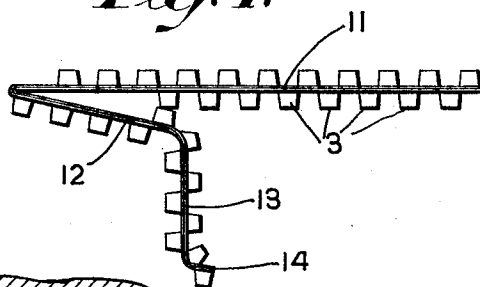
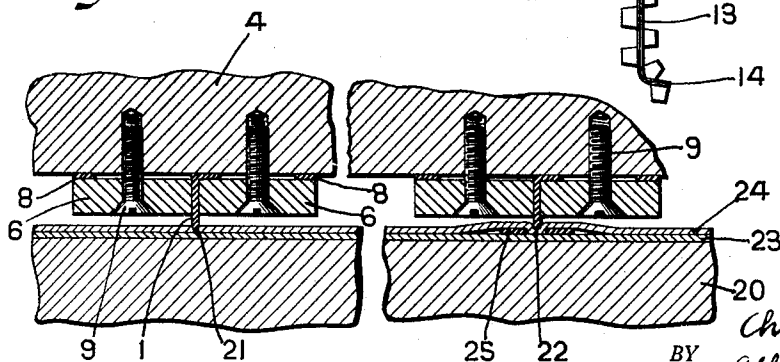


Fig. 5.



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DIE ROLL

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The invention relates, in general, to dies which may be used with paper products making machines for cutting and scoring the paper web, and, more particularly, to a new mode of mounting the cutting and creasing knives or rule upon the supporting surfaces of the dies so that the rule may be easily mounted on the die for a given job and easily removed from the die when the job is completed.

The dies according to the invention may be used anywhere a device for cutting and creasing paper board is desired, but they are particularly adapted for use with a paper box making machine having all its mechanisms for performing the necessary operations to transform the paper web into a finished product, arranged so that they may be changed with facility to meet the exigencies of different jobs. The dies are preferably in the form of rolls, but the invention is applicable also with dies in the form of flat plates.

A feature of the invention is the provision of rule or knives which may be made entirely from flat sheet metal stock, the rule being cut from the sheet metal to such a shape as to fit the surface to which it is to be applied and to make the desired shape impression on the web. Furthermore, means may be provided integrally secured to the rule for securing it to the supporting surface in such manner that it may be easily attached or detached from the supporting surface.

Various other features and advantages of the invention will be apparent from the following particular description and from an inspection of the accompanying drawings.

The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be pointed out with particularity in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by re-

ferring to the following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 represents a pair of die cylinders illustrating different ways in which the rule may be mounted on the male cylinder;

Fig. 2 illustrates a section of a piece of circular rule in one stage of the process of making it from a flat sheet of metal;

Fig. 3 is a perspective showing a piece of straight rule in condition to be applied to the cylinder;

Fig. 4 is a further detail showing a piece of rule in condition for being applied to a cylinder, and illustrating the ease with which it may be bent to make both longitudinal and transverse impressions and also impressions which are neither truly transverse or truly longitudinal; and,

Fig. 5 is a longitudinal section taken through the center of Fig. 1 showing the manner in which the rule is secured to the cylinder by strips of furniture, and also the manner in which the female roll may be made up.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Like reference characters denote like parts in the several figures of the drawings.

For the purpose of illustrating the invention the rule is shown as applied to a cylinder, and in but a few particular ways. It will be understood, however, that this particular disclosure is solely for the purpose of illustration, and according to the invention the rule may be so shaped that it can be secured to any shape of surface and to make any shape impression on the paper board.

In this description the longitudinal impressions are those caused by the rule which extends around the cylinder in a circle, and that the transverse impressions are those which are caused by the rule which extends across the cylinder or parallel to the axis thereof. The impressions made on the paper board web will be either cuts or scores according to the character of the knife and the

device on the female cylinder with which the knife cooperates, as will be explained more in detail hereinafter.

The mode of making a rule for the longitudinal impressions and applying it to the cylinder will first be described. A strip of the shape shown in Fig. 2 is first cut from the flat sheet material, the strip having an outer or upstanding knife portion 1 and an inner base portion 2, the inner base portion being provided with a plurality of slits forming tongues 3. The tongues are adapted to be bent alternately in opposite directions to form a base, as shown in Fig. 3. The curvature of the rule is such that the base will fit the size cylinder for which the rule was cut and the upstanding knife portion will be of the proper height to make the desired impression.

The upper or male cylinder 4 is first marked or laid out to the shape of the product it is desired to make. The curved rule is fitted to the surface as shown at 5 in Fig. 1 and blocks or furniture of strip material 6 having a rectangular cross-section are provided, which are also curved to fit the surface. The furniture strips engage on either side of the upstanding knife 1 and over the transverse tongues 3. These furniture strips are made of suitable material such as bronze and are bent to fit the particular size cylinder. Spacing members 8 of cardboard or other material may be applied between the furniture strips 6 and the cylinder opposite the projecting tongues 3 (Fig. 5) so that the furniture strips will be uniformly spaced from the cylinder 1. Suitable attaching screws 9 may be threaded into holes drilled through the furniture strips and the cylinder to securely and fixedly clamp and hold the rule in position.

The rule for making the transverse impressions is made in a manner very similar to the rule for making the longitudinal impressions. This rule, instead of being cut on a circle, is cut on a straight line, as illustrated in Fig. 3. The rule is provided with slits forming tongues 3, which are bent transversely alternately in opposite directions to form a base 2. The rule is applied to the surface of the cylinder as shown at 19 and is held in position by strips of furniture 10 in a manner similar to that shown in Fig. 5. The furniture strips 10 are, of course, straight in length, but may be curved or hollowed slightly transversely to fit the curvature of the cylinder, if desired. Generally, it is not necessary to curve the furniture strips 10 transversely on account of their relatively small width as compared to the diameter of the cylinder.

For making oblique impressions, that is those which are neither truly longitudinal or truly transverse, the rule and furniture may be made either circular or straight according to whether the desired impression is nearer

the longitudinal or nearer the transverse direction. In this case, it is necessary to distort the rule and furniture when applying it to the cylinder. It so happens that most oblique impressions are close to either true longitudinal or true transverse directions and are generally quite short. For this reason, by shaping the rule and furniture to an approximate fit, it is an easy matter to distort them the slight amount necessary to secure a close and accurate fit on the cylinder.

If desired, the rule and furniture for oblique impressions may be cut truly to the required shape. It will be understood that the exact shape in each case may be figured out either mathematically or graphically or by first making a suitable pattern from paper or some other suitable material which may be bent and cut easily.

In some cases it may be necessary to make an impression of a more involved nature. The rule is of such nature that a single piece of rule may be cut, in part according to one kind of a line, and in another part according to another kind of line. In Figs. 1 and 4, the rule has a longitudinal portion 11, which is cut on the arc of a circle to fit the curved surface of the cylinder. It has a return-bent oblique portion 12, which may also be cut on the arc of a circle, since this oblique portion is closer to the longitudinal direction. It has a third portion 13, which is bent transversely, and this portion is cut on a straight line. The end 14 of the straight line portion 13 may be bent as shown. It will be seen that the furniture strips 16, 17 and 18 are suitably modified to fit the rule as clearly shown in Fig. 1. The rule in this case will be held at one side by a single furniture strip 16, and on the other side by sections 17 and 18 of furniture strips, each section being cut specially to fit the particular curve of the rule. It will be understood, of course, that all the furniture strips 16, 17 and 18 are curved circularly to extend around the cylinder 1. As shown in Fig. 4, some of the tongues 3 may be broken off to allow the sheet material to be bent to the form desired.

It will be understood that the upstanding or knife portion 1 of the rule is of the proper height to coact properly with the lower or female roll 20. For cutting the knife 1 will be sharpened as shown at 21, and for scoring it will be left generally blunt as shown at 22 (see Fig. 5). The female cylinder 20 may be suitably covered with a layer 23 of paper which may be pasted thereon. The cutting knife is adapted to cut through the paper web 24 against the paper layer 23. The scoring knife 1 is adapted to clear the paper layer 23, and the paper layer is provided with spaced paper strips 25 placed thereon to coact with the scoring knife to cause the fibers of the web to be broken, there-

by causing a score to be made, as clearly indicated in Fig. 5.

The rule may conveniently be made of sheet steel. It will be understood that, after the rule has been cut and bent to the final shape, before it is applied to the cylinder, the working edge may be hardened so that it will stand up against hard usage. However, if desired, the sheet stock may be made of tempered spring steel so that it will stand up against hard usage without hardening or tempering after it is cut to shape.

It will be understood that any size of die rolls may be used for practicing this invention, and any number or shape of cartons or products may be cut by a single revolution of the die roll. The rule may be mounted in any position and to give any desired cut or score. The construction is such that both the rule and furniture may be inexpensively made and set up in a minimum amount of time and with a minimum amount of labor.

Although certain specific shapes have been illustrated into which the knives may be formed, it will be understood that these shapes are for illustration and to show the possibilities of the invention. The invention, however, is not limited to the exact shapes disclosed, but the knives may be made into any shape to make any desired impression and to fit any shape or character of supporting surface.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. A die roll comprising a cylinder having a smooth cylindrical surface, rule formed of flat sheet material and having an upstanding knife and a base curved to fit said surface, said base being formed by cutting slits on the inner edge of the rule and bending the resultant tongues laterally, alternately in opposite directions, strips of furniture of less thickness than the height of said knives embracing said knives and overlying said base, screws for fastening said furniture to said surface, said strips of furniture being curved to fit said surface.

2. A die comprising a member having a smooth supporting surface, rule formed of flat sheet material and having an upstanding knife and a base adapted to fit said surface, said base being formed by cutting slits on the inner edge of the rule and bending the resultant tongues laterally, alternately in opposite directions, strips of furniture of less thickness than the height of said knives embracing said knives and overlying said

base, fastening devices for fastening said furniture to said surface, said furniture being adapted to fit said surface.

3. A cutting and scoring die comprising a member having a supporting surface, rule formed of flat sheet material and having an upstanding knife and a base adapted to fit said surface, said base being formed by distorting said sheet material, blocks of furniture of less thickness than the height of said knives embracing said knives and overlying said base, means for fastening said furniture to said surface, said furniture being adapted to fit said surface.

4. In a die, a member having a supporting surface, rule comprising a flat strip of sheet material having inner and outer edges, there being slits cut in said inner edge, the tongues formed by said slits being bent laterally, alternately in opposite directions to form a base portion, the outer portion of said strip forming an upstanding knife, said base portion fitting said supporting surface, and means for securing said rule to said surface.

5. In a die cylinder having a curved supporting surface, rule comprising a flat strip of sheet material having its inner and outer edges cut on concentric circumferences, there being slits cut in said inner edge the tongues formed by said slits being bent laterally, alternately in opposite directions to form a base portion, the outer portion of said strip forming an upstanding knife, said base portion fitting said supporting surface, and means for securing said rule to said surface.

6. A die roll comprising a cylinder having a substantially uninterrupted supporting surface, rule having a knife portion and a base portion, separate furniture for clamping said base portion therebetween and said surface, means for securing said furniture to said surface, said rule and furniture fitting said surface, whereby said rule may be held in any position on said surface whatsoever.

7. A die comprising a member having a supporting surface, rule having an upstanding knife portion and a transverse base portion, separate furniture fitting said surface, means for securing said furniture to said surface to hold said base portion between said surface and said furniture, said knife portion projecting up between and above said furniture.

In testimony whereof I have hereunto set my hand.

CHAMPE S. ANDREWS.