Nov. 19, 1935. E. T. JAEGER 2,021,310

CONTINUOUS STRIP MATERIAL PROCESS

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Fig. 2

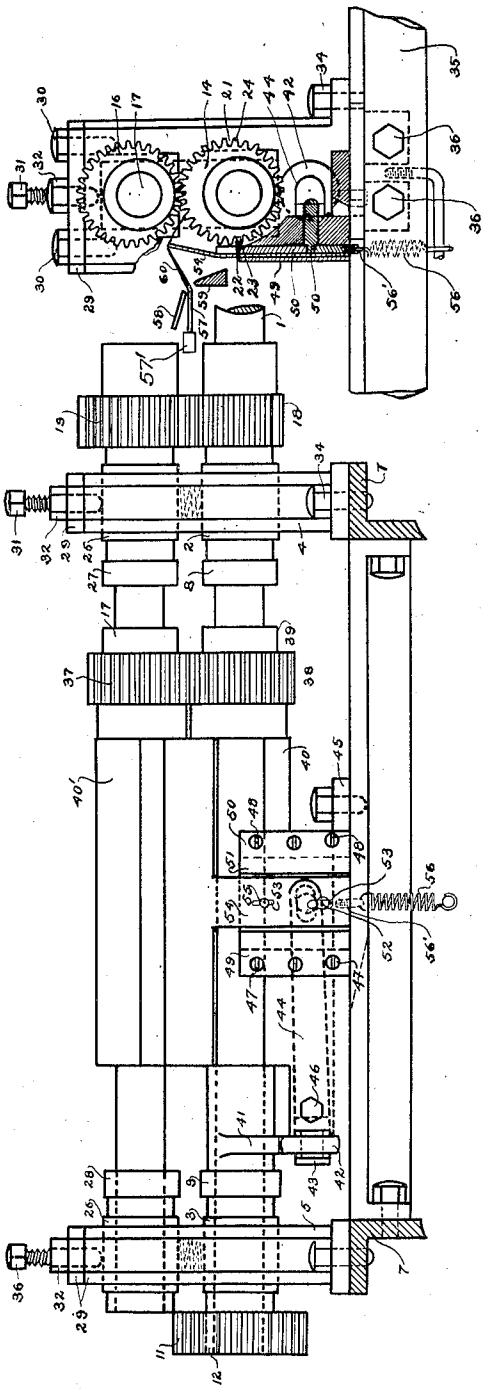


Fig. 1

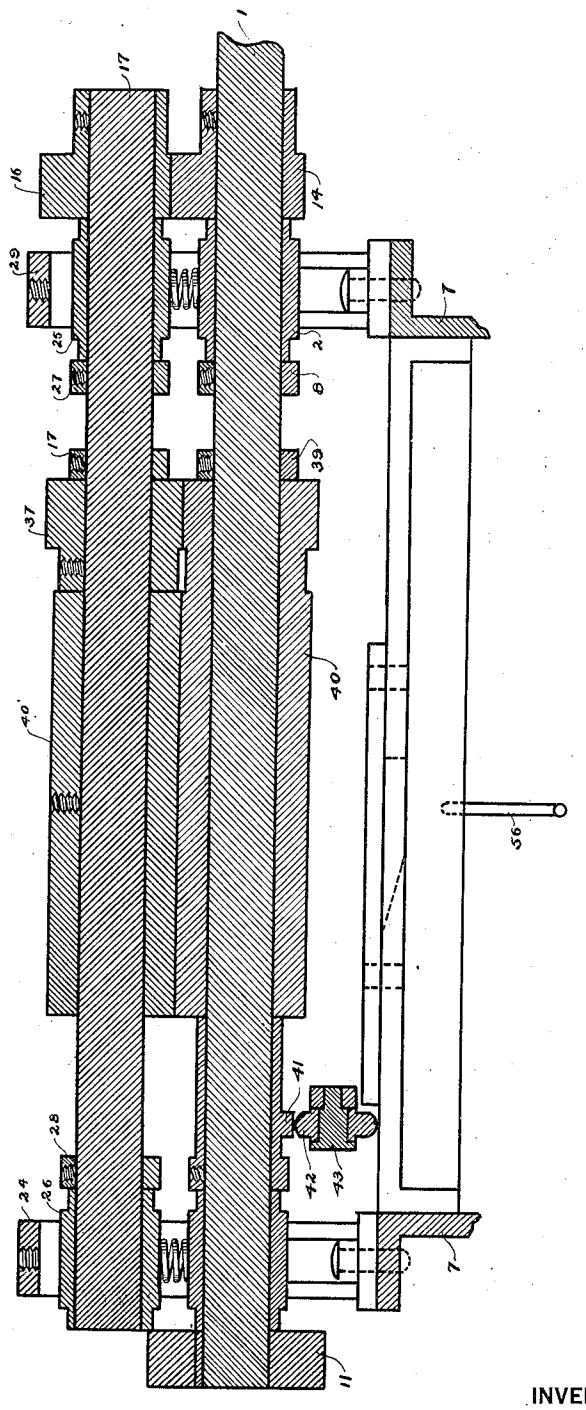
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Fig. 3



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CONTINUOUS STRIP MATERIAL PROCESS

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8 Claims. (Cl. 93—19)

My invention relates to novel apparatus for and methods of operating strip material and, more particularly, relates to novel apparatus for and methods of severing strip material in a continuous process.

In the formation of paper bags, strip material from which the bags are formed is conducted between the forming rolls in a high speed continuous process. In cutting the strip material into proper lengths for the bags, it is necessary to materially reduce the speed of that portion of the strip which comes into engagement with the cutting knife to prevent tearing during the cut.

This is accomplished by providing a predetermined amount of slack material at the cutting point, as for example, between the forming and slacker rolls. A lever arm raises the slack material into an arch. The cutting knife engages the strip at its apex where the direction of movement of the paper is changed and a minimum speed obtained. However, in order to maintain the process in operation at a high rate of speed, it is often necessary to use a larger amount of slack material to make a successful cut-off, than the space between the end of the former and the slacker rolls will permit.

This excessive slack material often chokes the process, making it necessary to repeatedly stop the machine at short intervals and clear the choke. Stopping the process, however, results in a loss of material and time. The only alternative available is to slow down the process, but this also entails a loss and is equally undesirable.

I have discovered that the necessary slack can be obtained by intermittently introducing an excess in lag, then taking up the lag and repeating this cycle. This I accomplish by intermittently changing the rate of speed of operation at the slacker rolls. These rolls are first rotated at a speed below that of the process so that the strip is not taken up as fast as it is fed through the former rolls. A slack is thus produced between the former and slacker rolls and the cutting operation completed. Thereupon the speed of rotation of the slacker rolls is increased above that of the continuous process, taking up the slack. This cycle is then repeated. The average value of the faster and slower speed of the slacker rolls is equal to the average speed of the continuous process.

Accordingly, an object of my invention is to provide a novel method for producing a slack.

Still a further object of my invention is to provide means for automatically producing and taking up a large slack.

Still a further object of my invention is to provide excess slack and means for automatically absorbing the excess slack.

Still another object of my invention is to provide the step in a continuous process which comprises intermittently increasing and decreasing the rate of speed of operation, the average speed being equal to the speed of the continuous process.

There are other objects of my invention which, together with the foregoing, will appear in the detailed description which follows in connection with the drawings, in which:

Figure 1 is a plan view of a portion of the process involving my invention with certain parts omitted or broken away to show details of construction and installation.

Figure 2 is a view in part section elevation.

Figure 3 is a cross section view of Figure 1.

Referring to Figure 1, driving power for the mechanism is supplied from a motor (not shown) in any convenient manner to the main driving shaft 1. The shaft 1 is mounted in bearings 2 and 3 which are suitably supported by the housings 4 and 5 respectively, mounted on the base structure 7 of the machine framework. The shaft 1 is held in position between the bearings 2 and 3 by the two collars 8 and 9 suitably fastened in position.

In addition to the motor drive for shaft 1 already described, this shaft may also be driven through the gear 11 rotatably secured by key 12 to one end of the shaft 1. Gear 11 may be connected through a train of gears (not shown) to any suitable driving power, as for example, a manual drive.

Secured near the other end of the shaft 1 for rotation therewith is an eccentric gear 14 shown in more detail in Figure 2. The teeth of gear 14 mesh with the teeth of gear 16 mounted on and for rotation with the shaft 17 to be described in more detail hereinafter. As clearly shown in Figure 2, the geometric center of both gears 14 and 16 are offset with respect to their center of rotation which are the centers of the shafts 1 and 17 respectively. As the shaft 1 rotates, those teeth which, in the figure shown, are at that instant meshing with teeth on the gear 16, being furthest removed from the center of rotation, will be rotating at a much faster rate of speed than the teeth which are shown in the lowermost position and nearer the geometric and rotating center of shaft 1. When these latter teeth engage the teeth of gear 16, their decreased speed will

produce a decrease in speed of rotation of the gear 16.

This should be clear from the following: While the shaft 1 rotates counterclockwise through 180° moving the gear 14 from its present position 21 through 180° until it reaches the position 22, the gear tooth 23 which is approximately opposite this point 21 is likewise moving until it reaches approximately the position now occupied by gear tooth 24.

During this same interval, the gear tooth 24 will have moved from its position around to approximately the position now occupied by the gear tooth 23. The path taken by gear tooth 24 is obviously much greater than that by the gear tooth 23, and accordingly, gear tooth 24 traveled much faster during this period.

This change in speed is transferred to gear 16 as the faster and slower rotating teeth of gear 14 engage the teeth of gear 16. In this manner, shaft 17 to which gear 16 is secured is rotated first faster, then slower than a predetermined speed. By the arrangement of gears 14 and 16 on shafts 1 and 17 respectively, so that the gear teeth on the large portion of the cam on one gear 14 mesh with the teeth on the small portion of the gear 16, the center to center distance of the two shafts 1 and 17 is maintained fixed as the two gears rotate.

Gear 16 is mounted for rotation on the shaft 17 which like gear 1 is properly journaled in bearings 25 and 26 and held in place by the sleeve members 27 and 28.

Bearings 25 and 26 are suitably supported in housings 4 and 5, each provided with a cap such as 29 bolted to the housing by the cap screws 30. Cap 29 is provided wtih an opening through which there extends a pressure screw 31 for shaft 17, having a lock nut 32. The entire housing is secured to the machine's framework 7 by means of the cap screws 34. The framework is in turn provided with braces 35 which are held securely to the frame by the cap screws 36.

Secured to and rotatable with shaft 17 is a gear 37, the teeth of which mesh with the teeth of a gear 38. Gear 38 is secured to and rotatable wtih a shaft 39 loosely mounted for rotation with respect to shaft 1. Gear 37 partakes of the variable rotation of shaft 17 and in turn transmits this form of rotation through gear 38 to shaft 39. Secured for rotation with shaft 39 is a roller 40 which is in operative relation with a roller 40' mounted on and rotatable with shaft 17.

The operation of the apparatus thus far described should now be clear. As shaft 1 is continuously driven at a uniform rate of speed, power is transferred through gears 14 and 16 to shaft 17. By reason of the special construction of gears 14 and 16, the uniform speed of rotation of shaft 1 is translated into an intermittently faster and slower speed in shaft 17 than the uniform speed of shaft 1. The average speed of shaft 17, however, may be measured as a fixed value bearing a definite relation to the speed of shaft 1 and depending on the teeth ratio of gears 14 and 16.

This intermittently faster and slower rotation of shaft 17 is in turn transferred to roller 40' and through gears 37 and 38 to roller 40 cooperating with roller 40' and known as the slacker rolls. As will be explained hereinafter the paper strip of the process is conducted between the slacker rolls 40 and 40'. During the decreased speed, a slack is produced in the strip conducted thereto. Thereafter, the slack is taken up as the speed of rotation of the slacker rolls is increased.

At the end of shaft 1 adjacent the gear 11, I have provided a cam 41 securely fastened by set screws and adjustable with respect to shaft 1 to permit orientation with respect thereto. In operative relation with the cam 41 is a cam follower 42 mounted on a stud 43 which in turn is securely connected to the cam lever 44 held in place in the casting 45 by the stud 46.

The casting 45 is in whole or in part, a housing for numerous parts as will appear hereinafter. Secured to the casting 45 by means of the screws 47 and 48 are plates 49 and 50 which function to hold the slide 51 in place. The slide 51 is operated by a pin 52 securely fastened to the slide 51 and extending through an elongated opening 53 in the cam lever 44.

Securely fastened to the slide plate 51 is a second plate 54 secured thereto by screws 55 which permit proper adjustment thereof. This entire sliding mechanism is normally held in its lowermost position by means of the spring 56, one end of which is secured to the framework and the other end to a screw eye 56' secured to the sliding mechanism.

The strip of material of the process is first fed by feed mechanism of any suitable construction and diagrammatically illustrated at 57' across the strip material former 57 (Figure 2) to shape and paste the material into proper shape. At the edge thereof, there is provided a knife 58 for cutting lips in the material of proper shape.

The striker or breaker bar 59 is shown about to cut off the formed tube of the strip material 60 which has just been fed over the former 57 and after given the necessary slack, has been raised to the position shown by the slide bar 54. The operation is as follows:

As the shaft 1 is driven at a fixed rate of speed in accordance with the speed of the process, the gear 14 on shaft 1 will, during one interval, transfer a greater speed to the shaft 17 through gear 16. During another interval the gear 14 will transfer a decreased speed through gear 16 to the shaft 17.

The over-all speed will, of course, still be the same as that of the motor driving the shaft 1 since a complete revolution for shaft 1 is made during a fixed interval of time. During this interval for one revolution, the shaft 17 will, however, during one portion thereof, rotate at a greater speed and during another portion at a lesser speed than the speed of shaft 1. During the period while the speed of shaft 17 is less than the shaft 1 speed, the slacker rolls 40 and 40' will draw through less of the strip material 60 than is fed through the former 57'. The amount of slack material between former 57 and rolls 40' will accordingly be increased.

By proper adjustments of the cam 41 during this interval while the slack has been increased, the cam follower 42 will operate over the large portion of the cam 41 to move the lever 44 and the slide 55 to their uppermost position against the action of spring 56. When sufficient slack has been produced the cam follower 43 is riding over the largest portion of cam 41 which acts through lever 44 to raise the slider 55 to its uppermost position shown. At this instant, the cutter 39 which is rotatably operated (not shown) engages and cuts the formed strip material. At this period in the cycle, the speed of shaft 17 becomes greater than the average speed and the slacker rolls 40 and 40' will accordingly conduct

the strip material through faster than it is fed by the former **57**, thus taking up the slack which formed during the preceding period in the cycle. As is well understood in the art, the cut edge of the strip material is fed into the slacker rolls by its own stiffness after the cutter **59** in its rotation has passed above the strip material following the cut and the slide **55** has been carried downward through the action of cam lever **44** and out of the path of the material **60**.

Although I have described my invention in connection with a specific adaptation thereof for operating strip material such as cellophane and the like, it will be clear that it has other adaptations and I do not propose to limit myself except insofar as set forth in the appended claims.

I claim:

1. The steps in a continuous strip material process which comprises continuously feeding and forming strip material at a predetermined rate, intermittently producing a slack in said formed material, cutting the material at the slack and thereupon taking up said slack.

2. The steps in a continuous strip material process which comprises continuously feeding and forming strip material at a predetermined rate, intermittently producing a slack in said formed material, cutting the material at the slack and thereupon automatically taking up said slack.

3. In combination, means for feeding strip material, slacker rolls in operative relation with said feeding means for receiving said strip material between said rolls, means whereby said slacker rolls control the rate of movement of said strip material, and means for intermittently decreasing and increasing the speed of operation of said slacker rolls below and above the speed of operation of said feeding means for correspondingly increasing and decreasing the rate of movement of said strip material below and above the rate of movement produced by said feeding means for alternately producing and taking up slack in said material.

4. In combination, means for feeding strip material, slacker rolls in operative relation with said feeding means for receiving said strip material and means for intermittently decreasing and increasing the speed of operation of said slacker rolls to intermittently produce and take up a slack in said strip material and means for cutting said material in the slack thereof.

5. In combination, means for feeding strip material, slacker rolls in operative relation with said feeding means for receiving said strip material and means for intermittently decreasing and increasing the speed of operation of said slacker rolls and means for cutting the material when the speed of operation has been decreased by the slacker rolls.

6. In combination, means for feeding strip material, slacker rolls in operative relation with said feeding means for receiving said strip material between said rolls, means whereby said slacker rolls control the rate of movement of said strip material, a first gear mounted off center for producing a variable speed of rotation and a second gear meshing therewith for transferring said variable speed of rotation to said slacker rolls for correspondingly increasing and decreasing the rate of movement of said strip material below and above the rate of movement produced by said feeding means for alternately producing and taking up slack in said material.

7. In combination, means for feeding strip material, slacker rolls in operative relation with said feeding means for receiving said strip material and eccentrically mounted gear means for intermittently increasing and decreasing the speed of said slacker rolls to intermittently produce and take up a slack in said material and means for cutting said material in the slack thereof.

8. In combination, means for feeding strip material, slacker rolls in operative relation with said feeding means for receiving said strip material, a source of driving power and eccentrically mounted gears driven by said driving power and slacker rolls driven by said power through said gears whereby the speed of said rolls is intermittently increased and decreased to intermittently produce and take up a slack in said material and means for cutting said material in the slack thereof.

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