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HIGH SPEED MEANS FOR FEEDING A STRIP WITH CONSTANT
SPEED INPUT BUT WITH INTERMITTENT MOTION
AT THE WORK LOCATION

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2 Sheets-Sheet 1

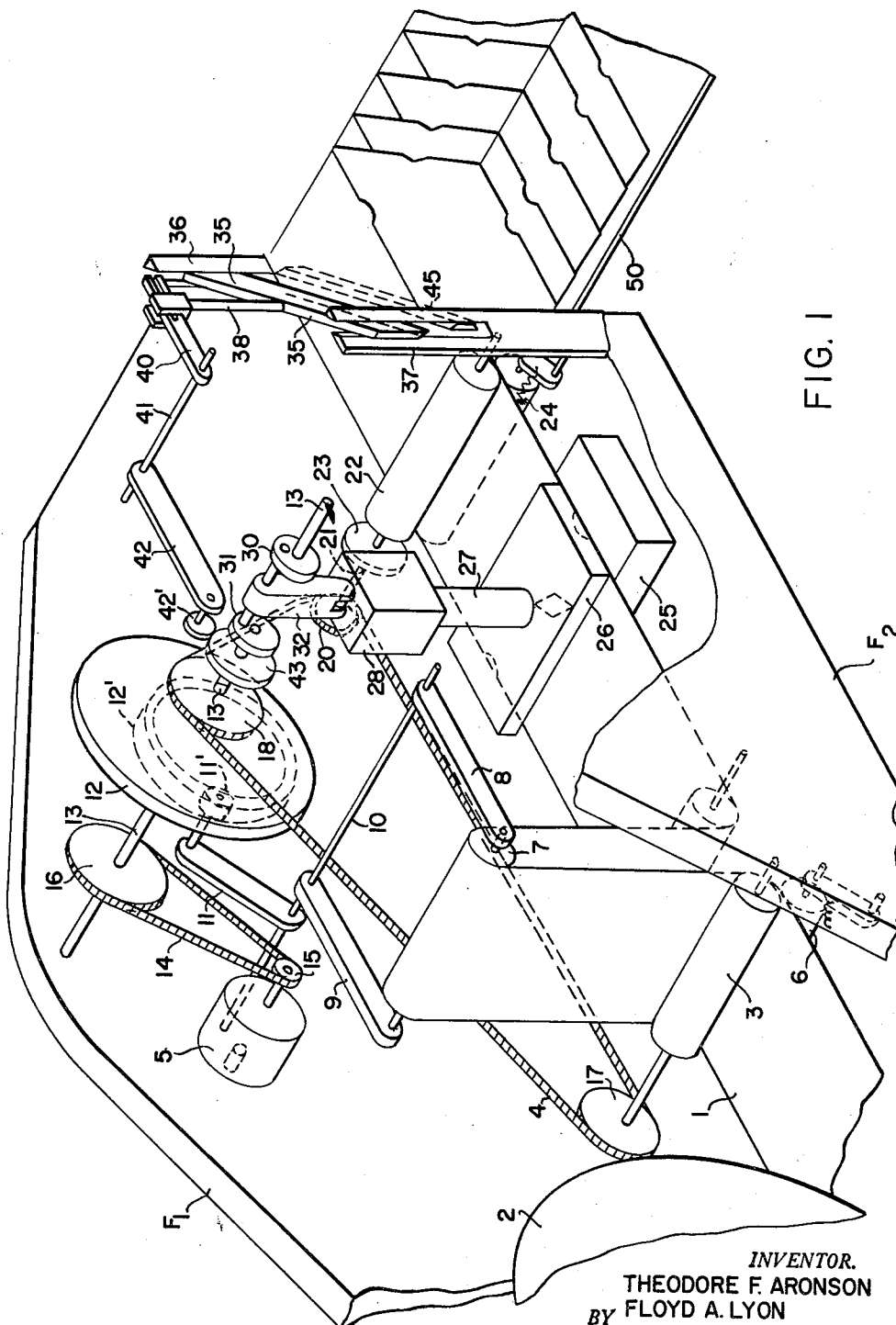


FIG. 1

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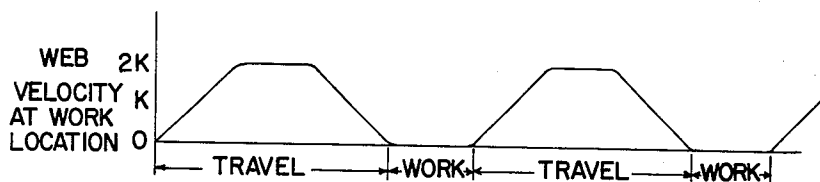


FIG. 2

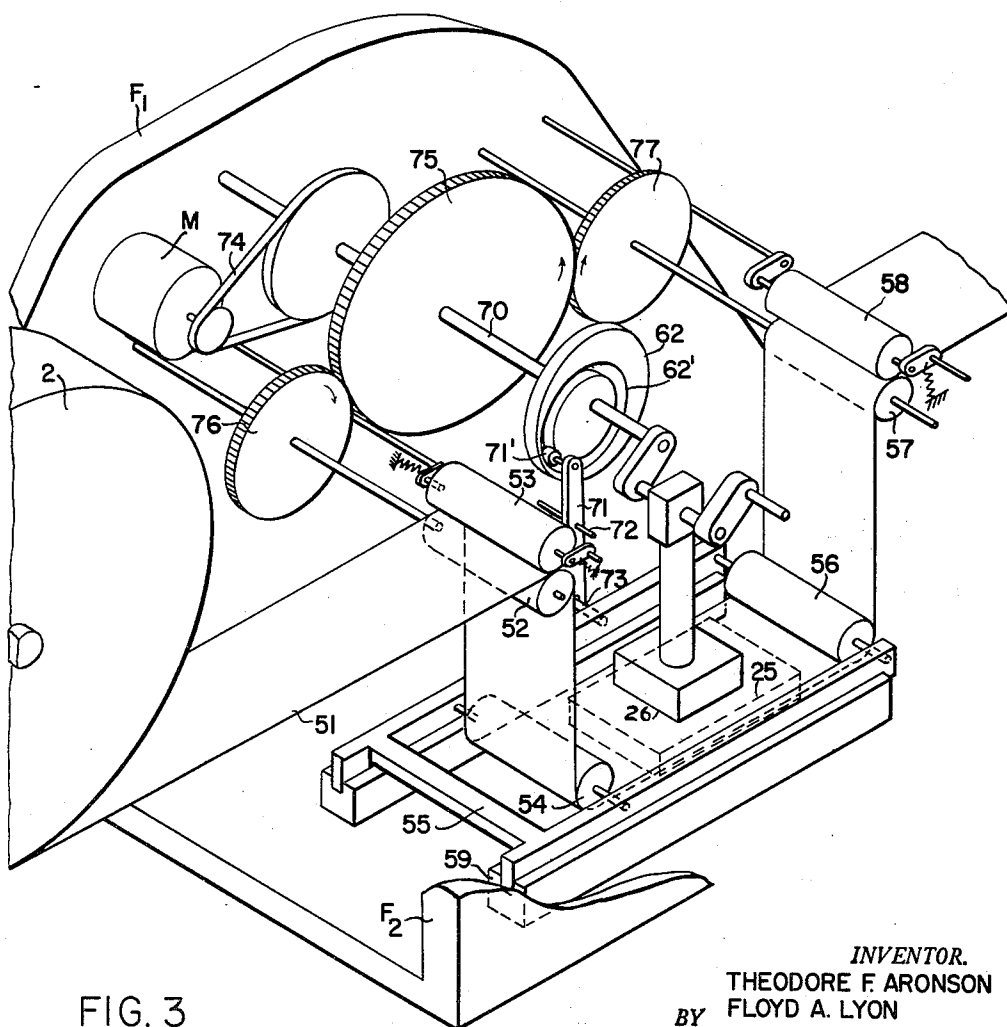


FIG. 3

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HIGH SPEED MEANS FOR FEEDING A STRIP WITH CONSTANT SPEED INPUT BUT WITH INTERMITTENT MOTION AT THE WORK LOCATION**Theodore F. Aronson, Glen Cove, and Floyd A. Lyon, Brookville, N.Y., assignors to Commercial Envelope Manufacturing Co., Inc., New York, N.Y.**

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3 Claims. (Cl. 83-236)

This invention relates to high speed means for feeding a strip of material past a work place with constant speed input but with intermittent motion at the work location.

This application is a continuation in part of our prior application of the same title, Serial No. 740,669, filed June 9, 1958.

The invention is useful in connection with the cutting for instance of envelope blanks from a continuous strip or web. In the manufacture of envelopes, the first step is to form individual blanks from a continuous strip of paper. This is generally done by cutting a diamond shaped center aperture together with a pair of side notches for each blank.

There are several problems in getting high speed operation. If the paper strip is punched with a reciprocating type punch, then the strip must be stopped each time the punch operates. This requires intermittent motion of the heavy punch machine and makes the operation essentially one of low speed.

One of the solutions has been to mount the cutting dies on rollers. However, this has been found not practical since the positive and negative portions of the cutting dies wear out rapidly during rotary engagement.

The present invention provides a work station, for instance, a reciprocating punch type die cutter, printer or gluer, and input drive means for the strip which has substantially constant speed. A certain amount of slack in the strip is provided before the cutter, and this slack is manipulated by a roller mounted on a rocking arm in synchronism with the cutter so that the paper at the cutter position is momentarily stopped at the time of cutting or punching or other work. In other words, the input speed of the strip is substantially constant, but the speed in the vicinity of the cutter is varied so that the web motion past the cutter is intermittent while the average speed is constant and equal to the input speed. It is possible to achieve this result since the only thing being intermittently controlled is the paper which has negligible weight. All other parts of the machinery which have appreciable weight run with constant or smoothly varying motion. With the arrangement of the present invention it has been found that very high speed operation on the order of 1,000 cycles per minute can be obtained with up to twelve inches advance motion per cycle or 1,000 feet of web per minute.

A modification is provided which oscillates the strip at the work location with a carriage so that the velocity of the strip at the work location is intermittent without affecting the constant input and output speeds.

Accordingly, a principal object of the invention is to provide new and improved strip or web material feeding means.

Another object of the invention is to provide strip material feeding means having constant input and output speeds but intermittent motion at a work location.

Another object of the invention is to provide strip material feeding means having constant input speed but intermittent motion at a work location.

Another object of the invention is to provide new and improved high speed cutting means for strip material.

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Another object of the invention is to provide new and improved handling means for strip material.

Another object of the invention is to provide new and improved high speed cutting means for making envelopes.

Another object of the invention is to provide new and improved strip handling and processing means.

These and other objects of the invention will become apparent from the following specification and drawings, of which:

FIGURE 1 is a perspective drawing of an embodiment of the invention.

FIGURE 2 is a plot of web velocity at the work location against time.

FIGURE 3 is a front view of another embodiment of the invention.

FIGURE 1 shows a perspective view of an embodiment of the invention. All of the members are mounted in a pair of side frames F_1 and F_2 , the frame F_2 being cut away to show the interior construction. The strip 1 is fed from a roll 2 by means of an input roller 3 which is mounted between and journaled to the frame members and which is driven by the constant speed motor 5, as will be discussed. Spring loaded pressure roller 6 bears against the roller 3.

The strip then passes over an idler roller 7 which is adapted to oscillate up and down. The roller 7 is mounted on arms 8 and 9, the other ends of which are mounted on the shaft 10 which is journaled between and to the frame members F_1 and F_2 . An arm 11 is fixedly connected to the shaft 10 and has a cam follower 11' which rides in an approximately eccentric groove 12' of the flywheel cam 12. The flywheel cam is mounted on a shaft 13 which is journaled to the frame and which is driven at constant speed by the motor 5 by means of the chain 14 and sprockets 15 and 16. The input roller 3 is driven by the chain 4 by means of sprocket 17 connected thereto and sprocket 18 mounted on the shaft 13. The chain 4 also passes over a sprocket 20 mounted on a shaft 21 which is journaled between and to the frame members and which is connected to drive the output roller 22 through a slip clutch 23. A spring loaded pressure roller 24 is pivotally mounted on and between the frames and bears against the output roller 22.

The work station is illustrated as a punch and die set comprising a lower die 25 and an upper die 26 which is connected to shaft 27 connected to block 28 which slides in gibs (not shown) connected to the frame. The block 28 is pivotally connected to connecting rod 32 and is driven by a pair of crank arms 30 and 31 mounted on the main drive shaft 13 through connecting rod 32. The main drive shaft 13 continues over and is journaled to the frame F_2 .

The apparatus thus far described operates as follows: The roller 3 pulls the strip at constant speed. The roller 7 oscillates up and down and manipulates the slack loop in the strip so that the motion of the strip past the work station is intermittent but has an average speed equal to the input speed as illustrated in the plot diagram of FIGURE 2. This arrangement permits high speed operation since the only thing that is intermittently varied in speed is the strip which has negligible weight. All of the relatively heavy apparatus moves at constant or smoothly varying speed.

The strip is taken away by the driven roller 22 bearing against the pressure roller 24. The strip movement by the roller 22 is intermittent since it operates through the slip clutch 23.

Additional work stations may be added on to or substituted for the work apparatus thus far described. For instance, the strip may then be printed, crimped, cut or glued as desired. FIGURE 1 illustrates a cutting knife 35 which is adapted to slide up and down in the

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guides 36 and 37 connected to the frames. The knife 35 is mounted on a shaft 38 and is drivably connected by means of the connecting member 40 connected to the shaft 41 which is journaled to the frame members at each end and which is rotated by means of the arm 42 and cam followers 42' which rides on the cam 43 mounted on the main shaft 13. The knife, therefore, operates in synchronism to cut the strip into blanks or pieces. The moving knife blade 35 shears off the strip against the stationary blade 45 and the pieces may be stacked or fed onto a moving belt 50 mounted at an angle to the previous strip motion axis. The speed of the belt 50 would preferably be chosen to fan out the cut pieces so that they could be easily fed to other work apparatus, for instance, an envelope folding machine, located at the end of belt 50.

FIGURE 3 shows a perspective view of another embodiment of the invention with one side of the frame cut away, wherein the strip is fed into and out of a work location at constant speeds but where the strip velocity at the work location is made intermittent but having an average speed equal to the input and output speeds.

In this embodiment of the invention the strip 51 is fed between a driven roller 52 and a spring loaded pressure roller 53 mounted between the side frames. The strip is then passed under input idler roller 54 which is mounted on an oscillating carriage 55 which slides on stationary gibs 59. The strip then passes through the work location and under idler roller 56 mounted on the other end of the carriage 55 and is then removed by means of the driven roller 57, the strip passing between the driven roller 57 and the pressure roller 58 mounted on the frames. The work station may comprise a reciprocating punch 25 and die 26.

The carriage is oscillated by means of the driven cam 62 on shaft 70 as follows: The arm 71 is pivotally mounted to the frame on shaft 72 and has a cam follower 71' on one end riding in the groove 62' of cam 62. The other end of arm 72 is connected to oscillate carriage 55 with a slot and pin connection 73.

The movement of the punch and die is therefore synchronized with the movement of the oscillating carriage. The punch 25 and die arrangement may be the same as in FIGURE 1. The motor M on frame F drives shaft 70 through belt 74. Roller 52 is driven from shaft 70 by gears 75 on shaft 70 and gear 76 connected to roller 52. Roller 57 is driven by gear 77 connected to gear 75 on shaft 70.

The motion of the strip at the work location is the same as shown in FIGURE 2, namely, it is intermittent but has an average speed equal to the input and output speeds. The work apparatus is synchronized to work during the part of the cycle when the strip is stationary. A friction clutch takeaway may be used in the embodiment of FIGURE 3 as well as in FIGURE 1.

Various modifications may be made without departing from the scope of the invention. Various different work apparatus may be used with the strip moving means of the invention. For instance, a complete envelope making machine comprising punching, cutting, gluing or crimping may be combined in connected stages, each using the strip moving means of the invention. Also, more than one operation may be done at one work location.

We claim:

1. Envelope blanking means comprising means for feeding strip material past a work location consisting of substantially constant speed driven input pinching roller means, input idler roller means at said work location, a rotatable shaft, a pair of parallel arms fixedly mounted at one end to said rotatable shaft, a roller mounted on said arms between said constant speed and input idler rollers and adjusted to oscillate substantially perpendicular to the center line of said constant speed and input idler rollers substantially equi-distant relative to said constant speed and input idler rollers to provide an input controlled

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loop having substantially parallel sides in said strip, a compensating cam, continuously driven constant speed drive means connected to said cam, a cam follower arm fixedly mounted on said rotatable shaft and extending to the other side of said rotatable shaft from said parallel arms, the pivot point of said parallel arms at said rotatable shaft being intermediate said cam and said oscillatable roller, said cam being arranged to oscillate said oscillatable roller at half the velocity of said strip material for an appreciable part of a cycle to stop said strip at said work location for an appreciable part of a cycle, and driven output roller means slippable with respect to said strip material at the output side of said work location, said input idler and output driven rollers being tangent to the plane of said strip at said work location, whereby said controlled loop is manipulated so that the motion of said strip past said work location is stopped for an appreciable part of a cycle and said input speed is constant.

2. Envelope blanking means comprising means for feeding strip material past a work location consisting of substantially constant speed driven input roller means, input idler roller means at said work location, a rotatable shaft, a pair of parallel arms fixedly mounted at one end to said rotatable shaft, a roller mounted on said arms between said constant speed and input idler rollers and adjusted to oscillate substantially perpendicular to the center line of said constant speed and input idler rollers to provide an input controlled loop having substantially parallel sides in said strip, a first compensating cam, a cam follower arm fixedly mounted on said rotatable shaft and extending to the other side of said rotatable shaft from said parallel arms, the pivot point of said parallel arms at said rotatable shaft being intermediate said first cam and said oscillatable roller, said first cam being arranged to oscillate said oscillatable roller at half the velocity of said strip material for an appreciable part of a cycle to stop said strip at said work location for an appreciable part of a cycle, driven output roller means at the output side of said work location, said input idler and output driven rollers being arranged to maintain the plane of said strip at said work location, whereby said controlled loop is manipulated so that the motion of said strip past said work location is stopped for an appreciable part of a cycle and said input speed is constant, a reciprocatable knife mounted at a predetermined angle to the movement axis of said strip through said work location, a second cam mounted on the cam shaft of said first cam, a cam follower riding in said second cam, and a linkage connecting said cam follower to said knife to reciprocate said knife to cut said strip at a predetermined angle when said strip is stationary.

3. Envelope blanking means comprising means for feeding strip material past a work location consisting of substantially constant speed driven input pinching roller means, input idler roller means at said work location, a rotatable shaft, a pair of parallel arms fixedly mounted at one end to said rotatable shaft, a roller mounted on said arms between said constant speed and input idler rollers and adjusted to oscillate substantially perpendicular to the center line of said constant speed and input idler rollers substantially equi-distant relative to said constant speed and input idler rollers to provide an input controlled loop having substantially parallel sides in said strip, motion control means connected to said arms, continuously driven constant speed drive means connected to said control means, said control means being arranged to oscillate said oscillatable roller at half the velocity of said strip material for an appreciable part of a cycle to stop said strip at said work location for an appreciable part of a cycle, and driven output roller means slippable with respect to said strip material at the output side of said work location, said input idler and output driven rollers being tangent to the plane of said strip at said work location, whereby said controlled loop is manipulated so that the motion of said strip past said work location is stopped for

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an appreciable part of a cycle and said input speed is constant.

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