

Dec. 7, 1937.

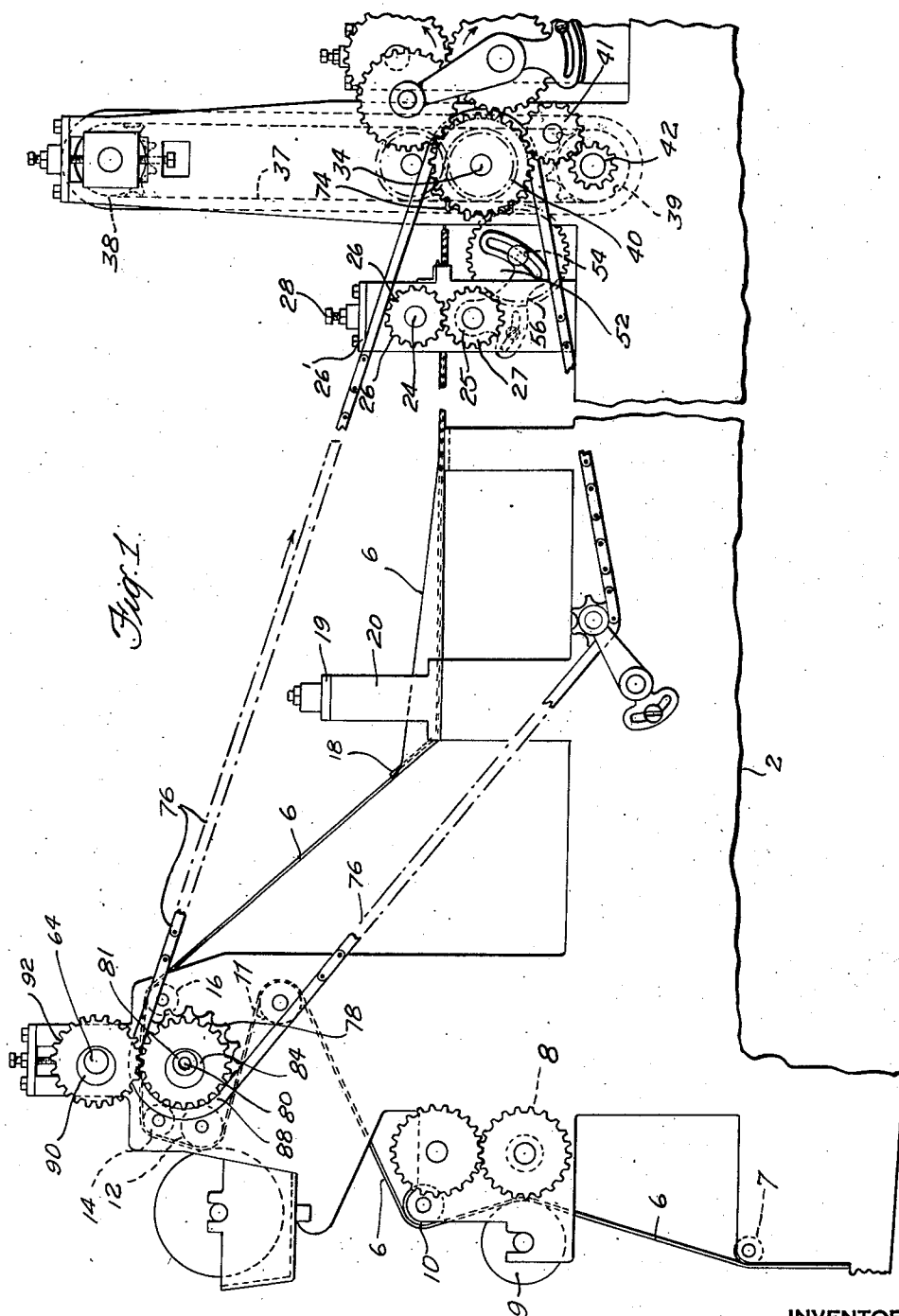
G. W. POPPE

2,101,191

WEB CUTTING MECHANISM FOR BAG MACHINES

Filed Dec. 1, 1936

4 Sheets-Sheet 1



INVENTOR
GEORGE W. POPPE

BY
Geo. M. Dowe
ATTORNEY

Dec. 7, 1937.

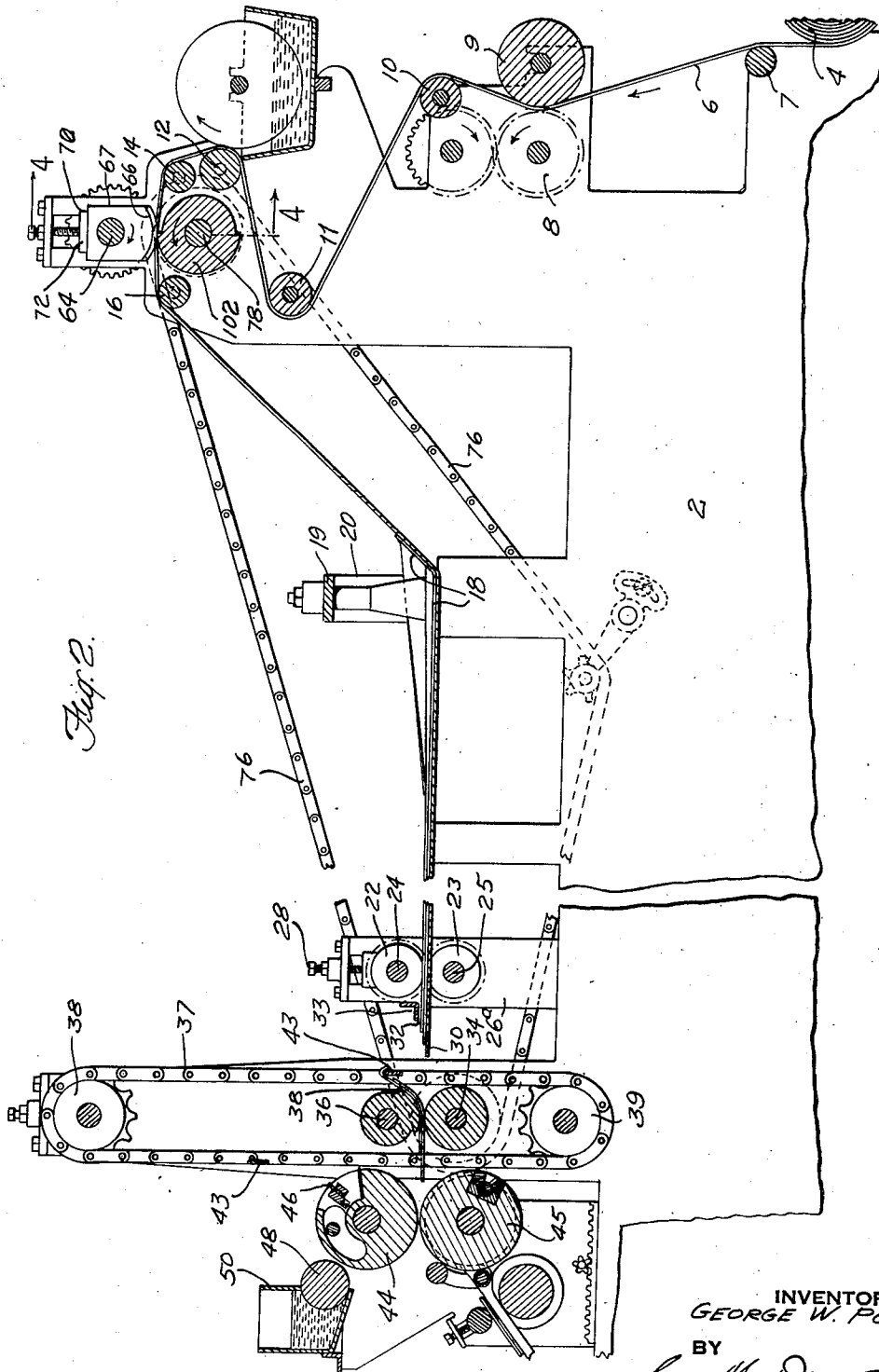
G. W. POPPE

2,101,191

WEB CUTTING MECHANISM FOR BAG MACHINES

Filed Dec. 1, 1936

4 Sheets-Sheet 2



INVENTOR
GEORGE W. POPPE.

BY
Geo. M. Dawe.
ATTORNEY

Dec. 7, 1937.

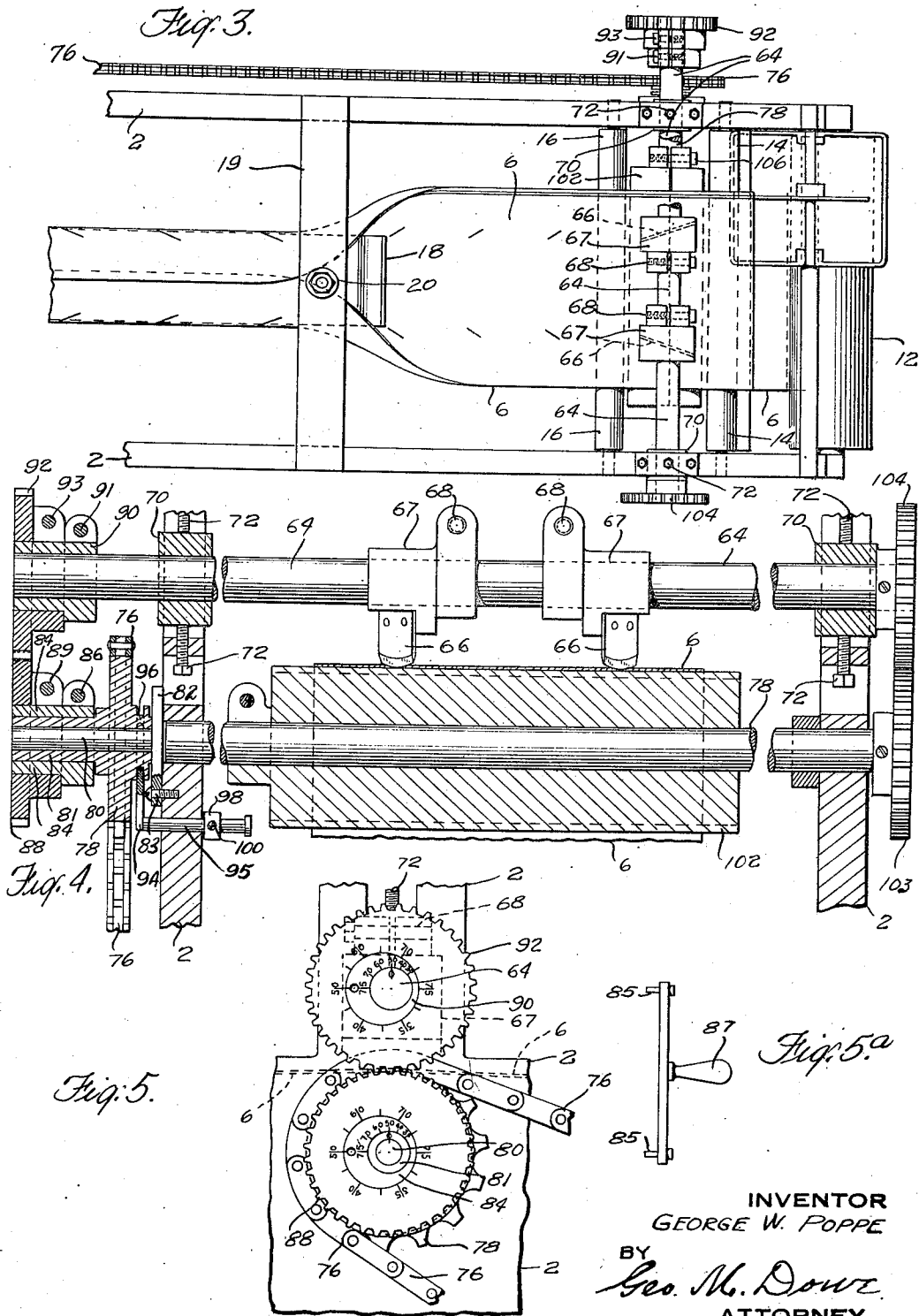
G. W. POPPE

2,101,191

WEB CUTTING MECHANISM FOR BAG MACHINES

Filed Dec. 1, 1936

4 Sheets-Sheet 3



Dec. 7, 1937.

G. W. POPPE

2,101,191

WEB CUTTING MECHANISM FOR BAG MACHINES

Filed Dec. 1, 1936

4 Sheets-Sheet 4

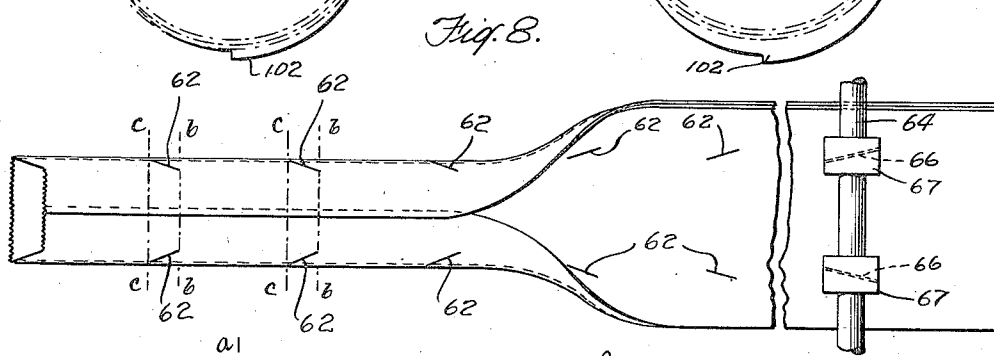
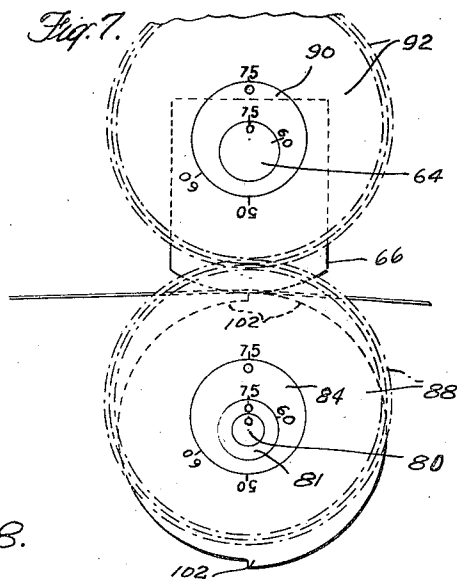
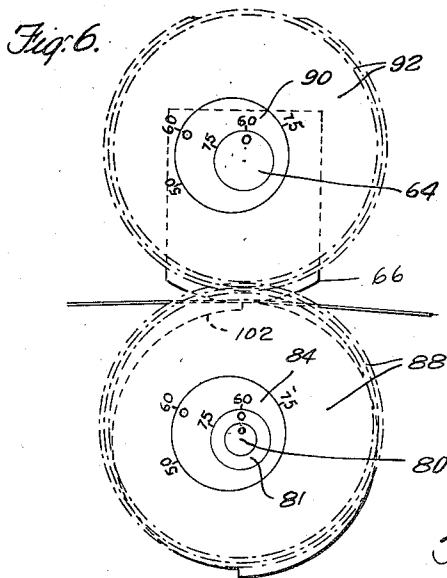


Fig. 9.

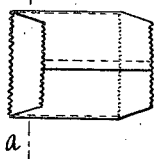


Fig. 10.

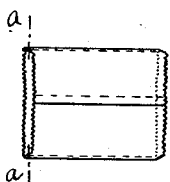
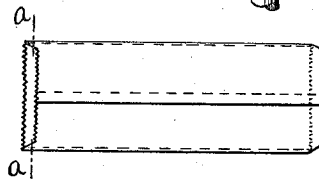
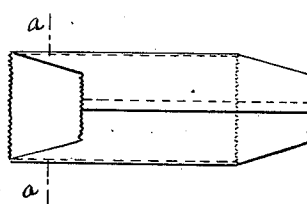


Fig. 11.

Fig. 12.



INVENTOR
GEORGE W. POPPE.

BY
Geo. M. Dwyer
ATTORNEY

UNITED STATES PATENT OFFICE

2,101,191

WEB CUTTING MECHANISM FOR BAG MACHINES

George W. Poppe, Brooklyn, N. Y., assignor to
Equitable Paper Bag Co., Inc., Brooklyn, N. Y.,
a corporation of New York

Application December 1, 1936, Serial No. 113,565

5 Claims. (Cl. 93—19)

The present invention relates to a machine for making paper bags and more particularly to improvements in the devices whereby the preliminary cuts are made in a web of paper prior to folding the same to form a bag tube section which is finally to result in a finished bag.

In my Reissue Patent 19,921 granted April 7, 1936, the flap of the bag is produced by first making cuts in a web of paper, the cuts being spaced from the edge of the web and running generally in a longitudinal direction. In Figures 6 to 8 inclusive of said patent there is shown a pair of dies each of which is set at a slight angle to the line of feed of the web and said dies are mounted to rotate on a shaft as shown in Figure 2 of said patent.

Commercial requirements make it necessary that bags of different lengths may be made at will, and machines of the character described in said patent are provided with change gear mechanism which enable the speed at which the web is fed in relation to the interval between the cutting off of the tube to form a bag length, to be varied. The shaft carrying the dies rotates once for each bag and in order to make a good cut the peripheral speed of the die should be equal to, or substantially equal to, that of the surface speed of the web. In order that this may be accomplished in machines of the prior art, such as illustrated in said patent, it has been the practice to provide a number of dies each with a different radius.

The object of the present invention is to properly slit any length of tube within the capacity of the machine in a more efficient manner than heretofore and also to make different length slits for determining the length of the flap on any tube length within the capacity of the machine with a single set of rotary cutters.

In my Patent 2,054,297, granted September 15, 1936, a single set of dies having a rectilinear movement is provided, said dies being driven by a pair of cams and the speed of the die is made to conform to the surface speed of the web by means of a pair of cams so shaped as to accomplish the desired result. However, in this machine the cams which move the dies must have the proper shape and different sets of cams are required for different lengths of bag tube sections.

In said patent the dies have a rectilinear movement during the cutting action, while for high speed operation to which these machines are subjected, it is preferable that the motions be rotary as far as possible.

The present invention provides a single set of rotary dies with means for coordinating the speed of the dies to correspond substantially with the speed of the paper for any length of bag tube section within the capacity of the machine and also provides means for varying the length of cut of the dies to enable different sized flaps to be made.

A feature of the invention therefore resides in the provision of cutters in the form of rotary dies with driving connections for the cutters including rotary gears and means for varying the eccentric movement of said gears in equal and opposite degree to vary the peripheral speed of the cutters so that such speed during the cutting action will accord substantially with the surface speed of the web as the latter is advanced by the usual feed rollers.

Further features and advantages will be apparent from the following description and claims when taken in connection with the accompanying drawings in which:

Figure 1 is a side elevation of the left of the machine.

Figure 2 is a longitudinal sectional view.

Figure 3 is a top plan view of the right-hand portion of the machine as viewed in Figure 2.

Figure 4 is an enlarged sectional view on the line 4—4 of Figure 2.

Figure 5 is a detailed elevational view showing the eccentric connections to the cutters in normal or neutral adjustment.

Figure 5^a is a detail of an instrument for adjusting certain eccentrics in unison.

Figure 6 is a diagrammatic view illustrating how a change is made in the adjustment of the eccentrics from the position shown in Figure 5 to a position to make a bag in which a 60 tooth change gear is used.

Figure 7 is a similar diagrammatic view showing the adjustment of the parts to make a bag of a length in which a 75 tooth change gear is used.

Figure 8 is a diagrammatic view showing the development of the bag tube.

Figures 9 to 12 inclusive are details of bag tube sections.

Referring to the drawings and particularly to Figure 2 the reference character 2 indicates one of the side frames of the machine, the other side frame being shown in Figure 1.

A roll of paper 4 is supported in these side frames and a web 6 drawn from said roll passes over a guide roller 7 and between a printing cylinder 8 and an impression roller 9. The web then passes over idlers 10, 11, 12, 14, and 16, thence

downwardly under a former 18, the latter being supported as usual from a cross bar 19 (see also Figure 3) carried by up-standing portions 20 projecting from side frames 2. As the web passes under the former, it is folded over on it in the usual manner to form a bag tube as shown diagrammatically in Figure 8. The tube and web are continuously fed through the machine by means of upper feed rollers 22 and a feed roller 23 carried by shafts 24 and 25 respectively. A gear 26, Figure 1, on shaft 24 meshes with a similar gear 27 on the shaft 25 whereby both upper and lower feed rollers are driven in unison. The upper feed roller shaft is supported from the side frames 2, Figure 1, by means of up-standing frames 26^a one on each side of the machine and the shaft is adjustable for tension by means of screws 28 one of which is shown in Figure 1.

After the tube passes the feed rollers it is severed into bag tube sections and for this purpose any suitable mechanism may be used. In the present embodiment, however, such severing is effected by a serrated edge 30 of the former in conjunction with a serrated edge 32 of a lip knife 33. Prior to the severing operation, the tube is slightly retarded by means of pinch bar mechanism of the usual type. This mechanism includes a lower pinch bar shaft 34 and an upper pinch bar shaft 36. The lower shaft carries a cylindrical roller and the upper shaft carries a roller which is provided with a segmental portion 38 of slightly greater radius than the main portion of the roller and which is so timed that this segmental portion engages the tube for a sufficient length of time to permit the necessary slack to be gathered in the tube. The segmental portion is of less radius than the radius of the feed rollers 22 and 23 and therefore does not feed the tube along as fast as it is advanced by the feed rollers, hence a slack in the tube results. A sprocket chain 37 passes over sprockets 38 and 39 driven from the lower pinch bar shaft 34 through means of gearing 40, 41 and 42, Figure 1, as is usual in machines of this general type. Striker bars 43 are carried by the sprocket chain 37 and the timing is such that when the segmental portion 38 of the upper pinch bar roller retards the tube and produces a slack therein, one of the striker bars 43 gives the tube a sharp blow from beneath, severing one wall of the tube against the edge of the former and the other wall against the lip knife. This matter of severing will be more apparent from a consideration of Figure 8, the upper wall of the tube being severed along the line b-b and the lower wall being severed along the dotted line c-c. This matter of severing is fully set forth in my reissue patent above referred to. The severed tube passes to a tucker blade and paste bar cylinder 44 cooperated with a clamp cylinder 45. A paste bar 46 receives paste from a roller 48 supplied by a paste pot 50, for sealing the bottom of the bag in the usual manner. From the clamp cylinder 45 the finished bag is delivered by any well known mechanism.

The mechanism above described with the exception of some modification in the idlers for guiding the web, is substantially that used in machines of this general type as illustrated in my Reissue Patent 19,921 above referred to.

The various parts of the machine receive their motion through the lower pinch bar shaft 34 and this shaft may be driven in any suitable way although the particular driving means is not shown in the drawings.

The present invention is concerned with the

proper control of the cutters for making the diagonal cuts in the web prior to folding the same into a bag tube, as illustrated diagrammatically in Figure 7. Variations in the length of a bag tube which may be produced on the same machine are brought about through the medium of change gear mechanism between the lower pinch bar shaft 34 and the lower feed roller shaft 25. The shaft 34, which may be considered as the driver or prime mover, makes one rotation for each bag tube section cut off from the main tube. By using change gears 40 of different numbers of teeth, the ratio of drive between the pinch bar mechanism and feed rollers is varied. If the ratio transmission between the pinch bar mechanism and the feed rollers is as one to one a bag tube section of a definite length depending upon the length of the circumference of the feed rollers will be cut off by the severing mechanism. If the ratio of transmission is less than one to one, a bag tube section of shorter length will be cut off. Similarly if the ratio is greater than one to one a bag tube section of greater length will be cut off because during one rotation of the pinch bar mechanism the feed rollers would feed a greater length of the tube to the severing mechanism. A number of change gears such as 40, each having a different number of teeth are mounted on the shaft 34. An intermediate idler gear 52 is supported on the lower feed roller shaft 25 in a carrier 56. While a number of gears such as 40 having different numbers of teeth may be mounted on the shaft 34, the usual practice is to use one change gear at a time.

From a consideration of Figure 8 it will be understood that the cuts 62 are made in the web prior to folding the same into the tube and these cuts by their length and their distance apart transversely of the web determine the width and length of the closing flap in the finished bag. After a bag tube section has been cut off from the main tube, a section similar to that shown in Figure 9 is the result. The present invention contemplates making bag tube sections of any length between that shown in Figures 9 and 11 and that shown in Figures 10 and 12. By varying the length of the cuts 62 flaps of different lengths may be produced, the shortest flap being shown in Figure 11 and the longest in Figure 12 although these are merely illustrative of a practical range of which the machine is capable.

In the type of machine shown in my Reissue Patent 19,921, the shaft carrying cutters was driven directly from the lower pinch bar shaft, hence in machines of the type illustrated in said patent, it is necessary to provide cutters or dies of different radius for different lengths of bag tube sections because in order to make a proper cut the peripheral speed of the cutters or dies must be substantially the same as the surface speed of the web during the cutting action. Therefore, when using machines of the character shown in said reissue patent it has heretofore been necessary to have a great many dies and die holders in order to provide for bags of different lengths. This difficulty has been overcome in the machine of my Patent No. 2,054,297 previously referred to and the present invention is an improvement of said machine. I am also aware of the application of Walter Bochow, Serial No. 101,565, filed September 19, 1936, in which the speed of the cutters is varied so that during the cutting action thereof their peripheral speed accords with that of the surface speed of the web, and I make no claim in the present application

broad enough to read on said Bochow application.

In the present instance, I seek to provide for rotating the cutter shaft at proper speeds so that the peripheral speed of the cutters will accord substantially with the surface speed of the web during the cutting action, by interposing an eccentric drive between the prime mover or driver, which in this particular embodiment is the lower pinch bar shaft 34, and a cutter shaft 64, and I provide means for varying the eccentricity of the driving connections to accord with the particular change gear in use at any particular time.

The cutters 66 are suitably supported in cutter blocks 67 which blocks are clamped to the shaft 64 by means of clamps 68. In this way the cutters may be adjusted longitudinally of the shaft to provide for the proper distance between the cuts 62 as is necessary for different widths of bags to be produced (see Figures 3 and 4), the cutting edge of which die is of a length equal to or slightly greater than the longest cut 62 which the die will be called upon to make.

The shaft 64 is supported in the side frames 2 and to provide for vertical adjustment of the shaft, said shaft is provided with a bearing box 70 at each end thereof and set screws 72, Figure 4, provide for accurate vertical adjustment of the shaft.

In the present embodiment the shaft 64 is rotated once for each bag tube section but during approximately one-half of the rotation of this shaft it moves at a speed which is different from that during the other one-half of its rotation. In other words during the cutting action the peripheral speed of the die is substantially equal to the surface speed of the paper. This peripheral speed during the cutting action may be slower or faster than the speed during the remaining portion of this rotation depending upon the adjustment of certain eccentrics which will now be described.

Referring to Figure 2 the lower pinch bar shaft 34 carries a sprocket 74 about which passes a sprocket chain 76 which chain at the upper portion of the machine passes over a sprocket 78 carried by a stud shaft 80, Figure 4. The stud shaft 80 is supported from the machine frame 2 on the left side of the machine by a plate 82 secured to the side frame by screws 83 one of which is shown in Figure 4. The sprocket 78 is provided with an extended sleeve 81 which sleeve is loosely mounted on the shaft 80 and is capable of slight longitudinal movement thereon for a purpose to be later referred to. A sleeve 84 is mounted eccentrically on the sleeve 81 and a clamp 86 enables the sleeve 84 to be clamped to the sleeve 81 at will. A gear 88 is eccentrically mounted on the sleeve 84 and may be clamped thereto by means of a clamp 89 similar to the clamp 86.

With the structure just described, if both clamps 86 and 89 are tightened, the gear 88 will be driven with the sprocket 78 which in turn is driven from the lower pinch bar shaft 34 and the ratio of transmission is such that when the lower pinch bar shaft makes one rotation, the gear 88 will also make one rotation.

The shaft 64 is similarly provided with a sleeve 90 eccentrically mounted on the shaft 64 and provided with a clamp 91. A gear 92 is provided with a clamp 93 by which it may be clamped to the sleeve 90 and said gear is eccentrically mounted on said sleeve 90. Gears 88 and 92 are of the same diameter and have the same number of teeth and gear 88 drives gear 92. The eccentric-

ity of the sleeve 90 and the sleeve 81 are the same. The eccentricity of the gears 88 and 92 are likewise the same.

In the position of the parts shown in Figure 4, the eccentricities are not apparent because the parts are shown in what will be later designated as the neutral position in which the parts are so positioned that the eccentricities balance each other and under such condition the gears 88 and 92 rotate as though they were concentrically mounted on their respective shafts. This neutral condition is also illustrated in Figure 5 which is an elevation of the ends of the shafts 64 and 80. Under this adjustment it will be observed that the greatest eccentricity so to speak, of the gears 88 and 92 is opposite the smallest eccentricity of the sleeves 84 and 90. In this position the cutters are vertical and a central line through the cutters passes through the center of the shaft 64.

If the radius of each cutter is for instance $2\frac{1}{2}$ inches and the diameter of the gears 88 and 92 is each 5 inches and each gear is provided with 50 teeth, then it will be apparent that during each rotation of the gear 88, the gear 92 will make one rotation as will likewise the cutters 66 but since in the adjustment assumed the gears 88 and 92 rotate concentrically in respect to their shafts, the cutters will rotate uniformly during a cycle of the machine or during one rotation of the shaft 64. It is also assumed that the change gear 40, Figure 1, on the pinch bar shaft 34 also carries 50 teeth. Such is the normal or neutral adjustment depicted in Figures 4 and 5.

The eccentric mountings above described serve to cause variations in the speed of rotation of the shaft 64 and thereby cause the cutters to be driven at substantially the surface speed of the paper during the cutting action.

Adjustment of the eccentrically mounted sleeves 84 and 90 and the eccentrically mounted gears 88 and 92 are facilitated by graduations on the face of the gears and on the face of the sleeves. These graduations are shown in Figure 5. The shaft 64 and the shaft 80 are each provided with an index which in the embodiment shown is a zero although an arrow would serve the same purpose. Since the shaft 80 does not rotate its zero point serves as a fixed point for adjustment. The zero point on the shaft 64 is opposite the mid-point of the cutters and serves to indicate their position.

The graduations on the face of the sleeves 84 and 90 are shown in Figures 5, 6 and 7 and correspond to the number of teeth in different change gears which may be used. The zero point on each sleeve is indicated by a hole into which the projections 85 on a tool 87 may be placed for moving these sleeves together as will be later described.

With the parts in neutral position, shown in Figures 4 and 5, it will be assumed that it is desired to make a bag tube section of such length as to require a 60 tooth change gear between the pinch bar mechanism and the feed rollers. During the cutting action of the cutters, therefore, it is necessary that they be speeded up to accord substantially with the surface speed of the paper during the time the cuts are being made. To adjust the eccentric connections to accomplish this result, the clamps 86, 89, 91 and 93 are loosened. The eccentric sleeve 90 is rotated on the shaft 64 until the index 69 on the end of the sleeve is opposite the zero on the shaft 64. The sleeve 84 on the stud shaft 80 is rotated until the index 60 is opposite the zero

on the shaft 80. While these sleeves may be rotated independently the tool 87 serves to rotate them together, if desired.

After this adjustment has been made on the eccentric sleeves, the clamps 86 and 91 are tightened. The gear 92 is thus positioned so that the index 60 thereon coincides with the hole on the eccentrically mounted sleeve 90 and the clamp 93 tightened. The gear 88 is then moved out of mesh with the gear 92 and while out of adjustment said gear 88 is turned to such a position that its index point 60 coincides with the hole marking the zero position on the sleeve 84 and the gear put back into mesh with the gear 92. The clamp 89 is then tightened and the machine is ready for operation under the new adjustment.

In order that the gear 88 may be thus unmeshed and remeshed, the sleeve 81 together with the sprocket 78 are slidable longitudinally on the shaft 80 but normally are held in position with the gears 88 and 92 meshing by reason of an arm 94 carried by a rod 95 slidable in the side frame 2, the arm 94 engages a circumferential groove 96 in the hub of the sprocket 78. A collar 98 secures the rod 95 in position, said collar being secured to the rod 95 by a screw 100 when the parts are in the operative position shown in Figure 1.

The relation of the parts, after the adjustment above described has been made, is shown in Figure 6 and it will be understood that during one-half of the rotation of the sleeve 81 due to the eccentric path of the gear 88 more teeth of said gear will engage teeth of the gear 92 than during its remaining one-half of rotation. Consequently during such one-half of rotation the gear 92 will be driven at a greater speed than during its remaining one-half of rotation. The position of the cutters is such that the cutting action occurs during that half of the rotation of the shaft 64 wherein its motion is accelerated.

Figure 7 shows the adjustment of the parts for a change gear of 75 teeth. There it will be noted the zero point on the shafts 80 and 64 coincides with the index 75 on the eccentrically mounted sleeves 84 and 90 while the index 75 on the gears 88 and 92 coincides with the holes marking the zero position on the eccentrically mounted sleeves. It will be apparent that the acceleration under the adjustment shown in Figures 6 and 7, of the shaft 64 during the cutting action will be greatest when the cutters are in the position there shown, that is at their central point. The cutters, however, will move somewhat slower at the beginning of their cutting action and somewhat slower, but in the same degree, towards the end of their cutting action. In other words, the peripheral speed of the cutters at their central point will be exactly the same as the surface speed of the paper but the peripheral speed of the cutters at the beginning and end of their cutting action will be slightly less than the surface speed of the web. This difference however, is so slight that it is not material to the making of a proper cut.

It is obvious from what has been said that the eccentrics may be adjusted to positions corresponding to any change gear within the capacity of the machine and indexes may be provided for the various change gears.

The range shown is from a change gear having 35 teeth to a change gear having 75 teeth and these limits correspond approximately to a bag tube section from eleven inches in length to one of twenty-three inches in length.

Since the cutters have edges of sufficient length

to make the longest cut which the machine may be called upon to make, means are also provided that shorter cuts may be made in order that the closing flap of the bag may have different lengths. For instance, the closing flap shown in Figure 9 is considerably longer than that shown in Figure 11. Figures 10 and 12 also show bag tube sections in which the upper or closing flap is of a different length.

In order to vary the length of cut the shaft 78 carries a hardened roller 102. This shaft carries a gear 103 at its right hand end, Figure 4, which meshes with a similar gear 104 on shaft 64 so that the two shafts are driven in a one to one ratio. The roller 102 is rotarily adjustable on the shaft 78 by means of a clamp 106. The roller 102 has its peripheral portion of different radii and during the time that the dies are in cooperation with the portion of longer radius the dies are in position to make the cuts. By reference to Figure 2, it will be noted that the web does not pass in a straight line between the idlers 14 and 16, but is raised slightly by the roller 102 when its larger radius part is in engagement with the web. When, however, the portion of the roller 102 of less radius is opposite the die there is no cutting action because the web then passes between the rollers 14 and 16 in a line which is slightly below the cutting edge of the cutters. The cutters of course are very accurately ground so that they just touch the roller 102 at that portion of its periphery having the greater radius. By adjusting the roller 102 about the shaft 78 the length of cut which the dies will make may be carefully determined so that a cut short enough to make a bag flap of a length shown in Figures 10 and 11 as well as longer cuts to make the length flap shown in Figures 9 and 12 are possible.

What I claim is:

1. A bag machine having a former about which a web of paper is wrapped to form a bag tube, with means for continuously advancing the tube and web; in combination, cutters for making cuts in the web at bag section intervals apart, means for rotating said cutters, said rotating means including two gears each gear being adjustable to move in an eccentric path, the paths of movement of said gears being complements of each other.

2. A bag machine having a former about which a web of paper is wrapped to form a bag tube, with means for continuously advancing the tube and web; in combination, cutters for making cuts in the web at bag section intervals apart, means for rotating said cutters, said rotating means including two gears each gear being so mounted that it may be made to describe an eccentric path during a rotation, and means whereby the degree of eccentricity may be varied.

3. A bag machine having a former about which a web of paper is wrapped to form a bag tube, with means for continuously advancing the tube and web; in combination, cutters for making cuts in the web at bag section intervals apart, means for rotating said cutters, said rotating means including two gears each gear being so mounted that it may be made to describe an eccentric path during a rotation, and means whereby the degree of eccentricity of each gear may vary in equal and opposite degree.

4. A bag machine having a former about which a web of paper is wrapped to form a bag tube, with means for continuously advancing the tube and web; in combination, cutters for making cuts in

the web at bag section intervals apart, means for rotating said cutters, said rotating means including two gears each gear being so mounted that it may be made to describe an eccentric path during a rotation, and means whereby the degree of eccentricity of each gear may be varied in equal and opposite degree, the degree of eccentricity having a definite relation to the surface speed of the web.

10 5. A bag machine having a former about which

a web of paper is wrapped to form a bag tube, with means for continuously advancing the tube and web; in combination, rotary cutters for making cuts in the web at bag section intervals apart, rotating means for such cutters, and means whereby the degree of eccentricity of said rotating means may be varied in equal and opposite degree to vary the speed of the cutters during their rotation.

GEORGE W. POPPE. 10