Nov. 30, 1965 F. B. ROBERTS 3,220,160

UNDERLAP FORMING MEANS FOR WRAPPING MACHINES

Filed May 16, 1962 5 Sheets-Sheet 1

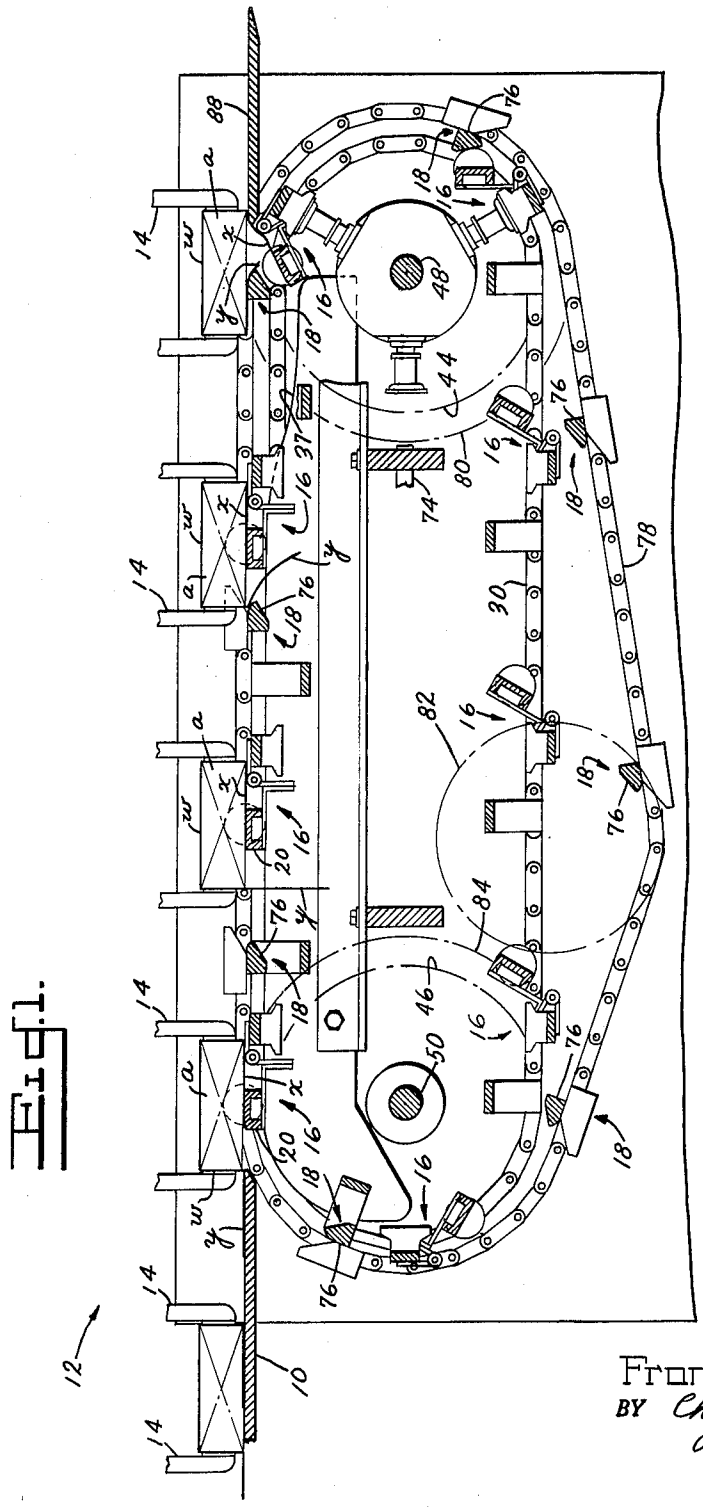


Fig. 1.

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Nov. 30, 1965 F. B. ROBERTS 3,220,160

UNDERLAP FORMING MEANS FOR WRAPPING MACHINES

Filed May 16, 1962 5 Sheets-Sheet 2

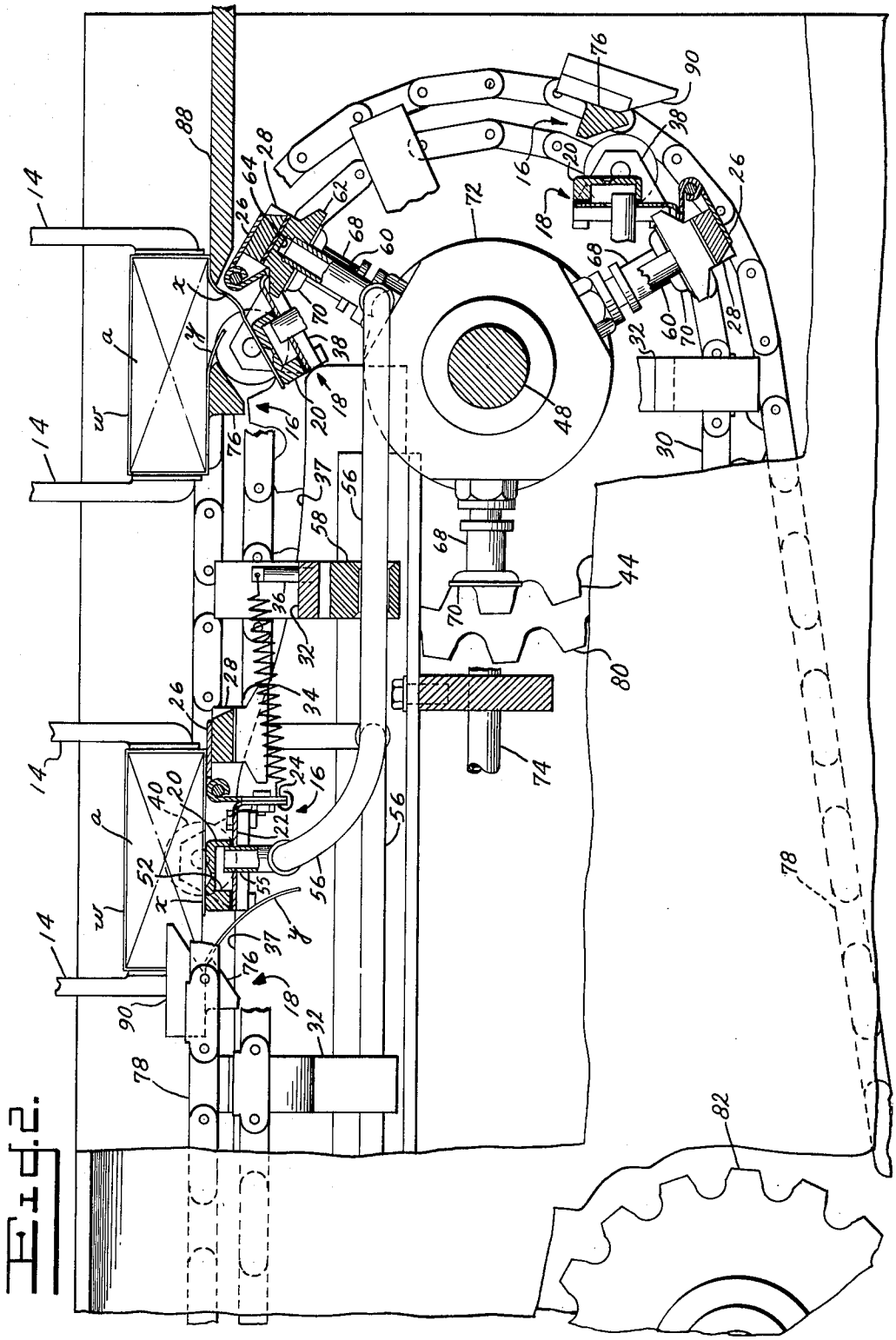


Fig. 2.

Nov. 30, 1965 F. B. ROBERTS 3,220,160

UNDERLAP FORMING MEANS FOR WRAPPING MACHINES

Filed May 16, 1962 5 Sheets-Sheet 3

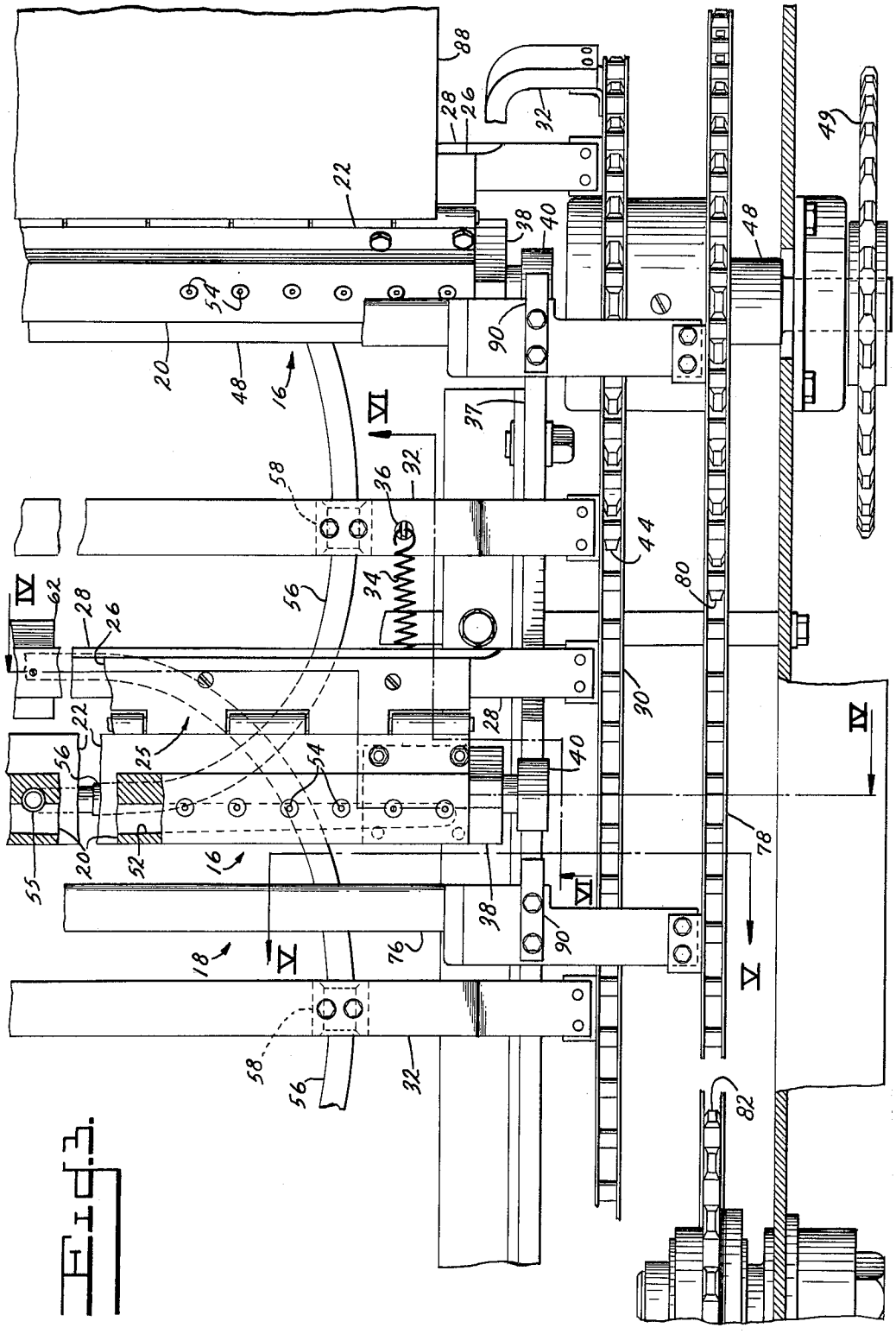


FIG. 3

Nov. 30, 1965 F. B. ROBERTS 3,220,160

UNDERLAP FORMING MEANS FOR WRAPPING MACHINES

Filed May 16, 1962 5 Sheets-Sheet 4

Fig. 4.

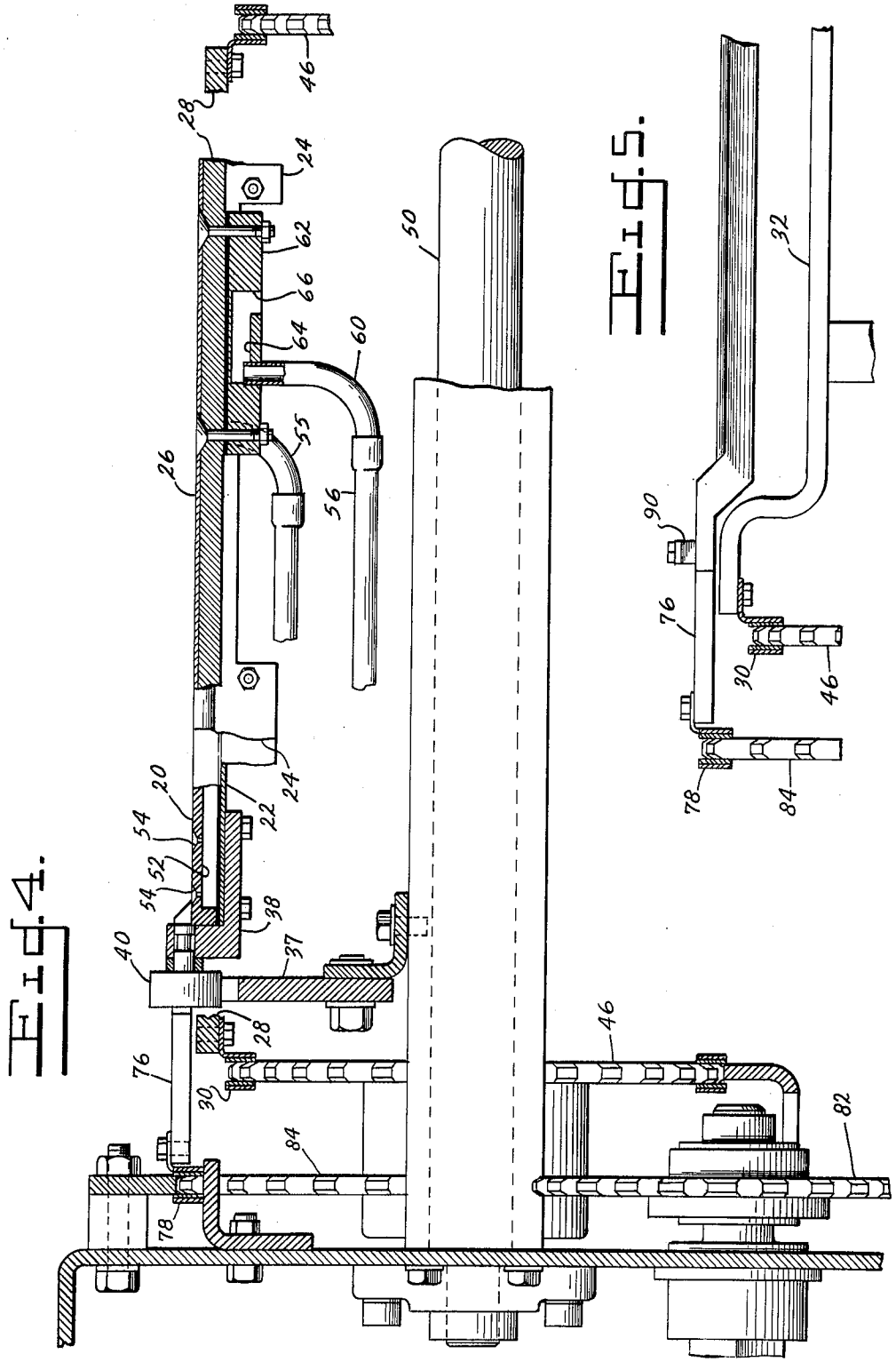


Fig. 5.

Nov. 30, 1965 F. B. ROBERTS 3,220,160

UNDERLAP FORMING MEANS FOR WRAPPING MACHINES

Filed May 16, 1962 5 Sheets-Sheet 5

Fig. 6.

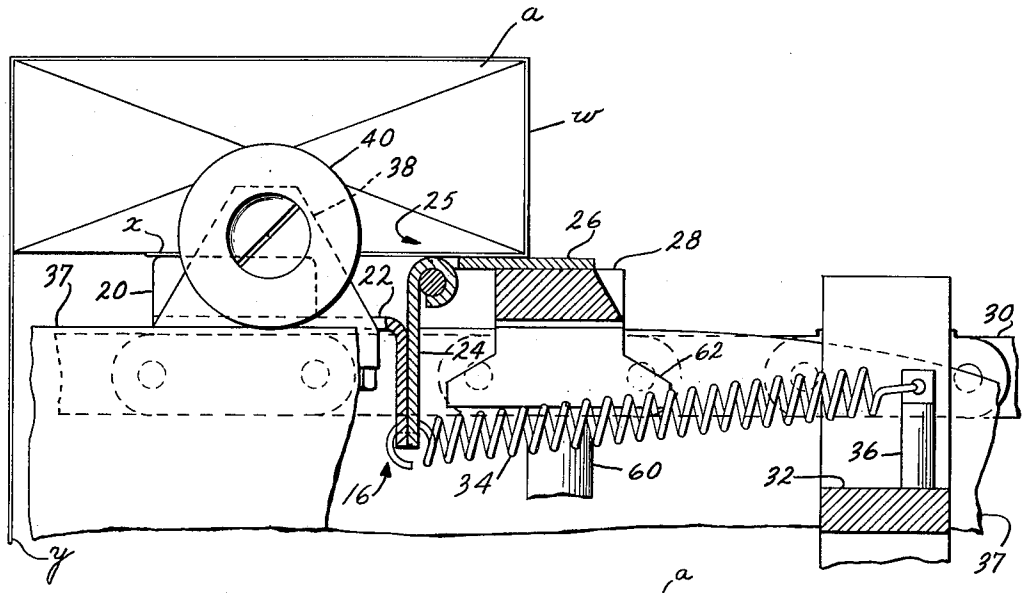
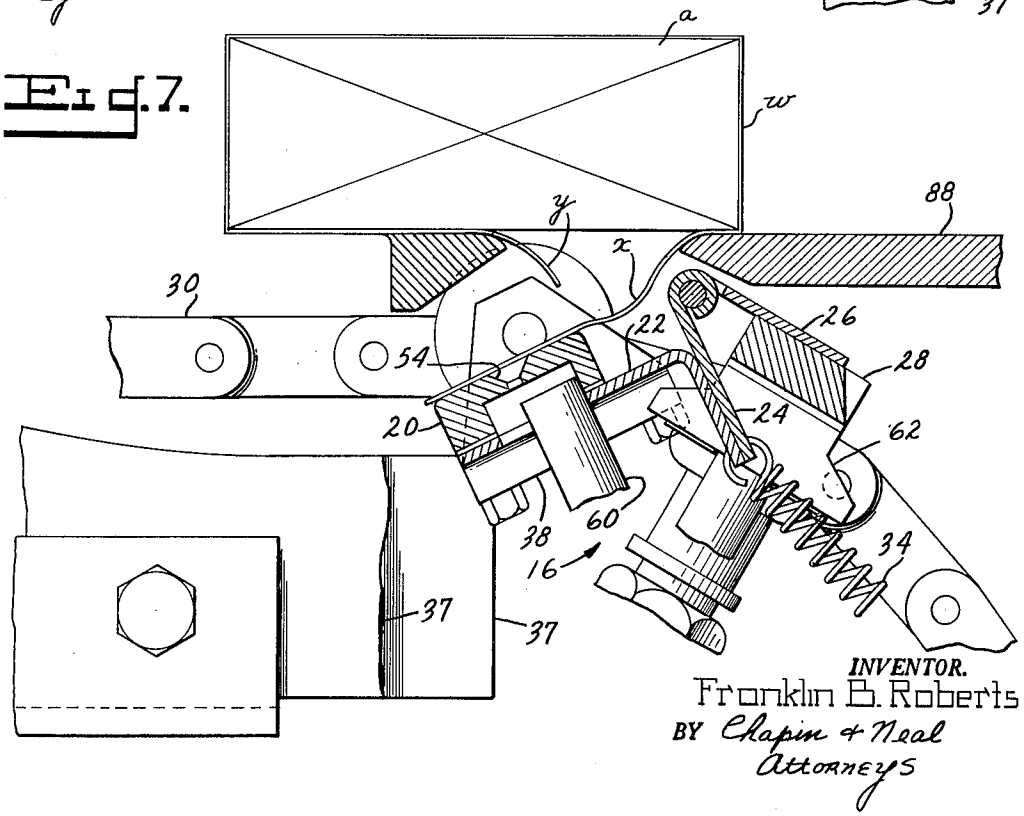


Fig. 7.



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3,220,160

UNDERLAP FORMING MEANS FOR WRAPPING MACHINES

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Filed May 16, 1962, Ser. No. 195,079
8 Claims. (Cl. 53—233)

The present invention relates to improvements in forming the underlap of a wrapper for an article.

The present invention is best understood as an improvement in the type of wrapping machines disclosed in U.S. Patent No. 2,810,246.

In that patent articles are continuously advanced as a wrapper is draped about an article and then the leading and trailing end portions thereof are folded against the bottom face of the article in lapped relationship to encircle the article within the wrapper. The means provided for so folding the wrapper end portions advantageously have the capability of disposing the trailing end directly against the bottom face of the article and then laying the leading wrapper end over the trailing wrapper end in lapped relationship.

The object of the invention is to attain higher rates of operation as they are encircled in a wrapper and also to give greater support to the articles as this is done so as to minimize, if not totally eliminate, the problems which result from articles being inadvertently displaced during the wrapping operation.

A further object of the invention is to attain the above ends in a simple, effective and economical manner.

The above ends are attained, in its barest essentials, by a first folder unit and a second folder unit. Means are provided for moving said folder units at different rates around closed paths. These paths have coextensive working portions wherein the wrapper is folded against the bottom of the article. Other remote portions of these paths are divergent to permit one folder unit to pass the other and thereby avoid a collision between the folder units which are traveling at different rates.

The above and other related objects and features of the invention will be apparent from a reading of the following description of the disclosure found in the accompanying drawings and the novelty thereof pointed out in the appended claims.

In the drawings:

FIG. 1 is an elevation, in longitudinal section, of underlap forming means embodying the present invention;

FIG. 2 is an enlarged view of a portion of FIG. 1;

FIG. 3 is a plan view, with portions cut away and in section of the elements seen in FIG. 2;

FIG. 4 is a section taken on line IV—IV in FIG. 3;

FIG. 5 is a section taken on line V—V in FIG. 3;

FIGS. 6 and 7 are sections, on an enlarged scale, taken generally on line VI—VI and showing different positions of one of the folder units.

Having reference first to FIG. 1, articles *a* are advanced over a first platform **10** by an overhead conveyor **12** comprising flights **14** which grip opposite end faces of the article. A wrapper *w* is draped around each article *a*. The leading end portion *x* thereof lies against the bottom of the article and the trailing end portion *y* trails therebehind as the articles are advanced over plate **10**. The means for so draping the articles and introducing them between the flights **14**, and the means for mounting and driving the conveyor **12**, may take the same form as disclosed in the patent above referred to and reference is made thereto for the constructional details of such means.

The articles *a* are transferred from the platform **10** to lap forming means comprising a series of first folding units **16** and a series of second folding units **18**.

Each folding unit **16** comprises a suction bar **20**, FIGS. 3 and 6, which is mounted on an angle plate **22** which in turn is secured to a leaf **24** of a piano hinge **25**. The central portions of the leaf **24** (FIG. 4) and the depending section of angle plate **22** are cut away to provide clearance for parts later described. The other leaf **26**, of the piano hinge **25** (FIGS. 1 and 6) lies in the same plane as the suction bar **20** and platform **10** and is secured tod a bar **28**. The opposite ends of the bar **28** (FIG. 4) are secured to a pair of matched chains **30**. The folding unit **16** may also comprise a bar **32** (FIGS. 3 and 5) which is secured at its opposite ends to the chains **30** with its central portion disposed below the level of the bars **20** and **28**. Springs **34** (FIG. 6) extends from spring pins **36** on opposite ends of the bar **32** and are hooked into openings in the plate **22** and hinge leaf **24**. The spring **34** thus urges the suction bar **20** to pivot away from the article *a*. This pivotal movement is controlled by fixed cam plates **37** (FIGS. 3, 4 and 6) at opposite ends of the bar **20**. Bearing brackets **38** are secured to the undersurface of the plate **22** at opposite ends of the suction bar **20**. A cam follower **40** is mounted on each of the blocks **38** and engages the fixed cam plates **37**.

The chains **30** are trained about a pair of sprockets **44** (FIGS. 1 and 3) and a pair of sprockets **46**. The sprockets **44** are secured to a shaft **48** which is driven from a power source through sprocket **49** (FIG. 3) and in proper timed relationship to the movement of the overhead conveyor **12** which controls the advance of the articles *a*, as will later be more fully apparent. The sprockets **46** rotate freely about the axis of the shaft **50** on which they are mounted.

Each suction bar **20** (FIGS. 2, 3 and 4) comprises an elongated plenum chamber **52** and has a series of holes **54** communicating therewith and opening on the upper surface of the bar **20**. An elbow tube **55** is secured to the bar **20** and communicates with the plenum chamber **52**. A vacuum hose **56** is connected to the tube **55** and extends through a support **58** mounted on the undersurface of the bar **32** and then is connected to a second elbow tube **60** which depends from a block **62** mounted on the undersurface of the bar **28** of the preceding folder unit **16**. The tube **60** projects into a passageway **64** having an opening **66** on the undersurface of block **62**. As the bar **28** of the preceding folder unit **16** turns around the shaft **48**, the opening **64** of passageway **66** is brought into registration with a tubular projection **68** having a cup **70** which sealingly engages the block **62**. The projection **68** communicates with a suction passageway within a hub **72**, on shaft **48**, which is connected to an appropriate vacuum source through a pipe **74**. The constructional details of the suction chamber within hub **72** are fully explained in U.S. Patent No. 2,952,957.

Each of the second folding units **18** comprises a bar **76** (FIGS. 2, 3 and 5) which is secured at its opposite ends to a pair of chains **78**. The chains **78** are trained around sprockets **80** secured to the shaft **48** around idler sprockets **82** and around sprockets **84** mounted on the shaft **50**. The chains **80** are driven by the sprockets **80** which, being of a greater diameter than the sprockets **44**, cause the chains **78** to move at a faster linear rate than the chains **30**. It will also be noted that the central portion of the bars **76** is offset to lie in the same plane as the platform **10** as the bars **76** are carried along the chains **78**. Thus the paths of travel of the folding units **16** and **18** are coextensive as they are carried along the upper parallel runs of the chains **30** and **78** through what can be termed the working portions of their paths of travel. The folding units **16** are so spaced that each unit **16** is disposed beneath and supports one of the

articles *a* along the upper run of chains **30**. The folder units **16** move at the same rate as the articles *a* so that this registered relation is maintained. The suction bar **20** is disposed beneath and adjacent the end of the leading end portion *x* of the wrapper *w*. Viewing the unit **16** immediately above the sprocket **50** in FIG. 1, it will be seen that the folding unit **18** associated therewith is spaced a substantial distance therefrom. In fact, it overlies the bar **32** of the preceding unit **16**, clearance for such overlying relation being shown in FIG. 5. As the folder unit **16** advances the article to the next illustrated position, the trailing end portion *y* of the wrapper *w* falls between the two units **16** and **18**. If necessary, fluid pressure assist means can be provided to aid in so disposing the end portion *x*, as is known in the art. The bar **76** traveling at a faster rate than the unit **16** overtakes the article *a* and, as shown in relation to the third article *a*, begins to fold the end portion *y* against the bottom of the article. As this occurs, the cam track **42** drops away allowing the suction bar **20** to pivot away from the bottom of the article *a* and carrying with it the wrapper end portion *x*. Further movement of the folding units **16** and **18** causes the wrapper end *y* to be more fully laid against the bottom face of the article *a* as the article is advanced onto a second platform **88**. As this occurs, the end portion *x* is laid against the bottom of the article and lapped over the end portion *y*. The underlap of the article is then complete and the articles may be advanced by known means for folding the lateral extensions of the wrapper or otherwise completing the wrapping operation.

At this point it will be noted that camming blocks **90** are secured to the bars **76** in alignment with the rolls **40**. In the event any bar **20** fails to pivot about its hinge **25** at the proper time, the blocks **90** will engage and displace the rolls **40** to prevent a collision between the folder units **16** and **18**.

As the folder units **16** and **18** turn around the shaft **48**, they move at the same angular velocity so that there is no relative movement therebetween. As the chains **78** pass from the sprockets **80** to the sprockets **82**, they diverge from the chains **30**, following a path which permits the folder units **18** to pass over the folder units **16**. This leap-frogging of the units **18** takes place along the bottom runs of the chains **30** and **78**. Thus, it is that the units **18** are brought into cooperative relation with successive folding units **16**.

Various modifications of the structural arrangement herein disclosed will occur to those skilled in the art within the scope of the inventive concepts which are defined by the appended claims.

Having thus disclosed the invention, what is claimed as novel and desired to be secured by Letters Patent of the United States is:

1. In a wrapping machine, first and second folder units, a platform, said folder units being movable around closed paths, said paths having coextensive working portions extending towards said platform, said paths then falling beneath said platform to a point of divergence, the path of said second unit from said point of divergence back to said work portions being greater than the length of the path of said first unit between these points, said first unit being spaced a substantial distance from said second folder unit at the beginning of the working portions of said paths of movement, and means for moving said folder units around said paths with the second unit traveling at a faster rate and with a differential such that the second unit will pass over the first unit as the units pass from the point of divergence to the working portions of said paths.

2. In a wrapping machine, a plurality of first and second folder units, a first pair of endless chains to which opposite ends of said first units are secured in longitudinally spaced relation, a second pair of endless chains to which opposite ends of said second units are secured in longitudinally spaced relation, the number of said second units being greater than the number of said first units, said chains having upper, parallel, operative runs and divergent runs, first and second pairs of sprockets at each end of said parallel runs and said first and second pairs of chains being respectively trained about said sprockets, a first shaft mounting the sprockets at the infeed end of said parallel runs and a second shaft mounting the sprockets at the discharge end of said runs, said second sprockets having a greater diameter than said first sprockets, and means for driving said shafts and sprockets and moving both pair of chains in the same direction along said parallel runs, said second pair of chains moving at a faster rate, the paths of travel of said folder units being coextensive along said parallel runs, said first and second units being alternately spaced apart along said parallel runs with each second unit being spaced from the next preceding first unit at the beginning of said coextensive paths of travel sufficient to prevent colliding with said next first unit as it approaches same along said coextensive paths, each of said second units passing over the next succeeding first unit as they are carried along the divergent runs of said chains.

3. Apparatus as in claim **2** wherein the wrapping machine comprises a first platform adjacent the infeed end of said parallel runs and at the same level as the coextensive paths of said folder units, and means for draping a wrapper about an article with the leading end portion of the wrapper underlying the article and with the trailing end portion trailing therebehind, and further wherein means are provided for advancing the articles from said platform to said folder units with the article traveling at the same rate as said first folder units and in register with one of said folder units, said trailing wrapper portion being permitted to fall between the named first folder unit and the next suceeding second folder unit, and further wherein a second platform is provided at the discharge end of said parallel runs and said second platform also being at the same level as said coextensive paths and the first folder unit is provided with means for drawing the leading wrapper portion away from the bottom face of the article to permit the trailing wrapper portion to be folded against the bottom of the article, the article advancing means then advancing the article onto said second platform to thereby lay the leading wrapper portion against the bottom face of he article in overlapped relation to the trailing wrapper portion.

4. Apparatus as in claim **3** wherein the first and second pairs of chains are respectively trained about first and second pairs of sprockets at each end of said parallel runs, the sprockets at the infeed end of said runs being mounted on a first shaft, the sprockets at the discharge end of said run being secured to a second shaft, said second pairs of sprockets having a greater diameter than said first pairs of sprockets and means for rotating said second shaft at a given rate to obtain a greater linear rate of travel for said second folder units and further wherein means are provided for training said second pair of chains outwardly of said first pair of chains as the chains pass along their lower runs from said second shaft to said first shaft.

5. Apparatus as in claim **4** wherein each first folder unit comprises a mounting bar secured at its opposite ends to said first pair of chains, a suction bar pivotally connected to said mounting bar about an axis transverse to the direction of movement of said chains and underlying the terminal end portion of said wrapper when the first folder unit is so registered, each second folder unit comprises a folder bar having its opposite end portions raised and connected to said second pair of chains and means for pivoting said suction bar away from said article as the folder units approach said second platform.

6. Apparatus as in claim **5** wherein the means for pivoting the suction bar comprise spring means urging

the suction bar away from the article and a cam track maintaining said suction bar at the level of said first and second platforms at the infeed end of said coextensive paths and then permitting the suction bar to swing away from the article upon approaching said second plaform.

7. Apparatus as in claim 6 wherein each first folder unit further comprises a U-shaped bar secured at its opposite ends to said first pair of chains and providing an anchor for said spring means pivoting the suction bar.

8. Apparatus as in claim 7 wherein the folder bar of each second unit overlies the U-shaped bar of the next succeeding folder unit.

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