June 12, 1956 J. F. COLLEY 2,749,689

SEALING MACHINE

Filed July 1, 1953 4 Sheets-Sheet 1

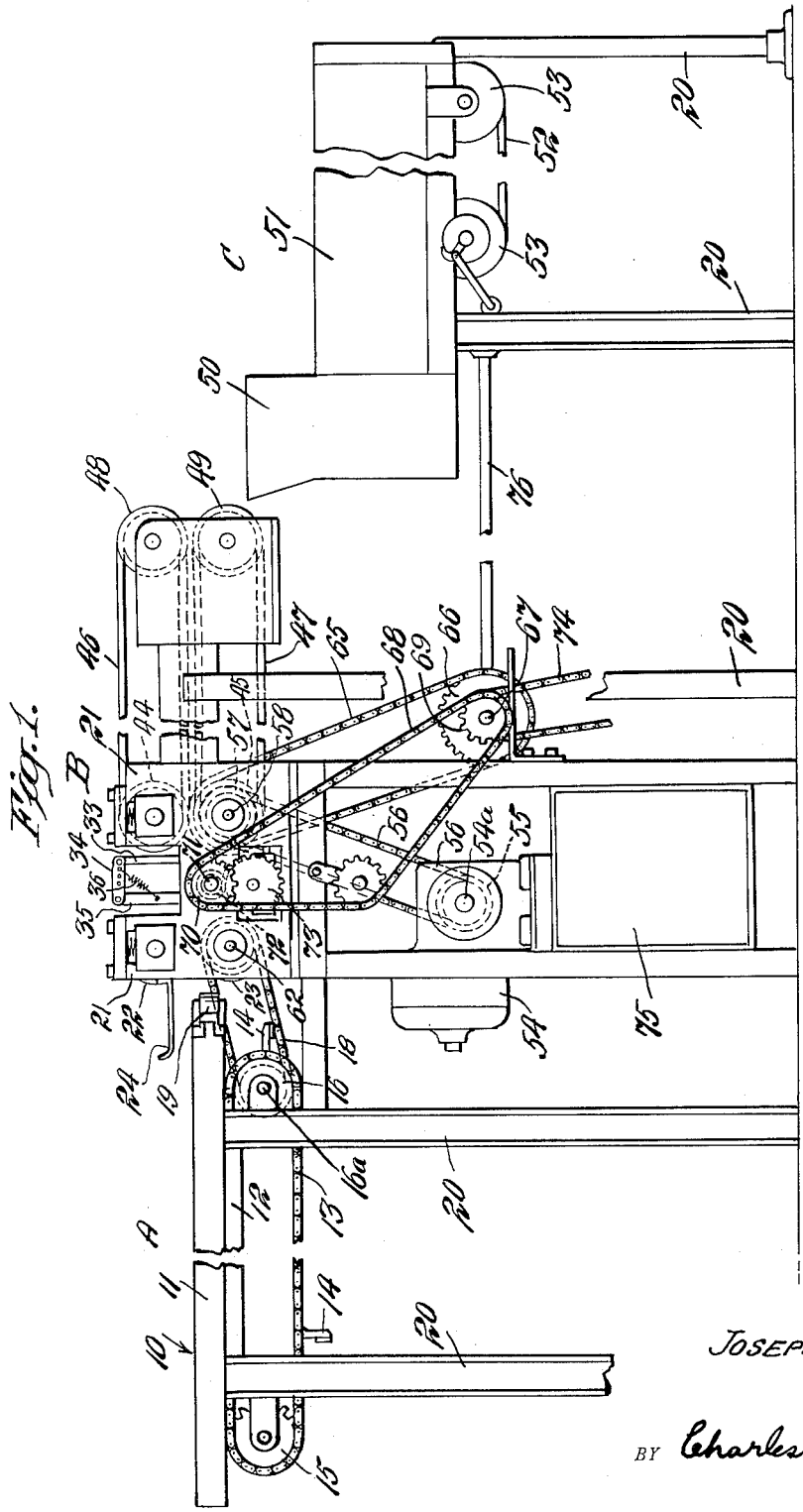


Fig. 1.

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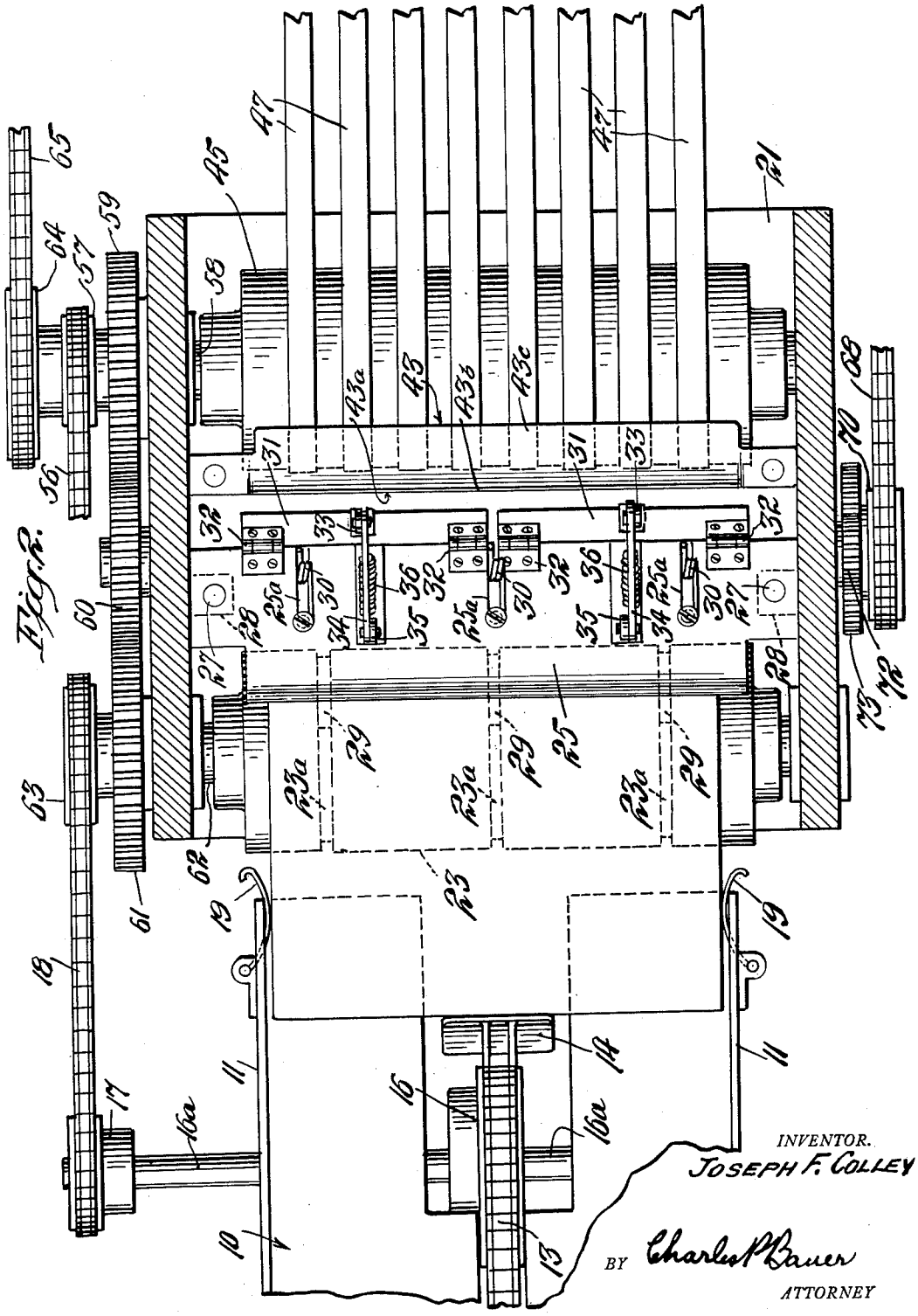


Fig. 2.

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Fig. 3.

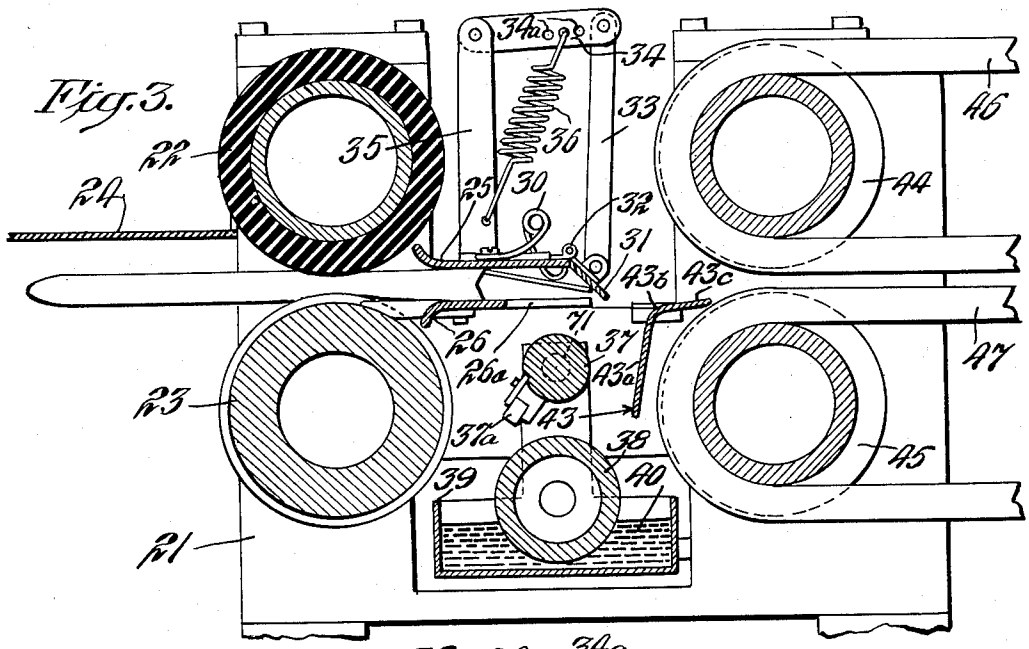


Fig. 4.

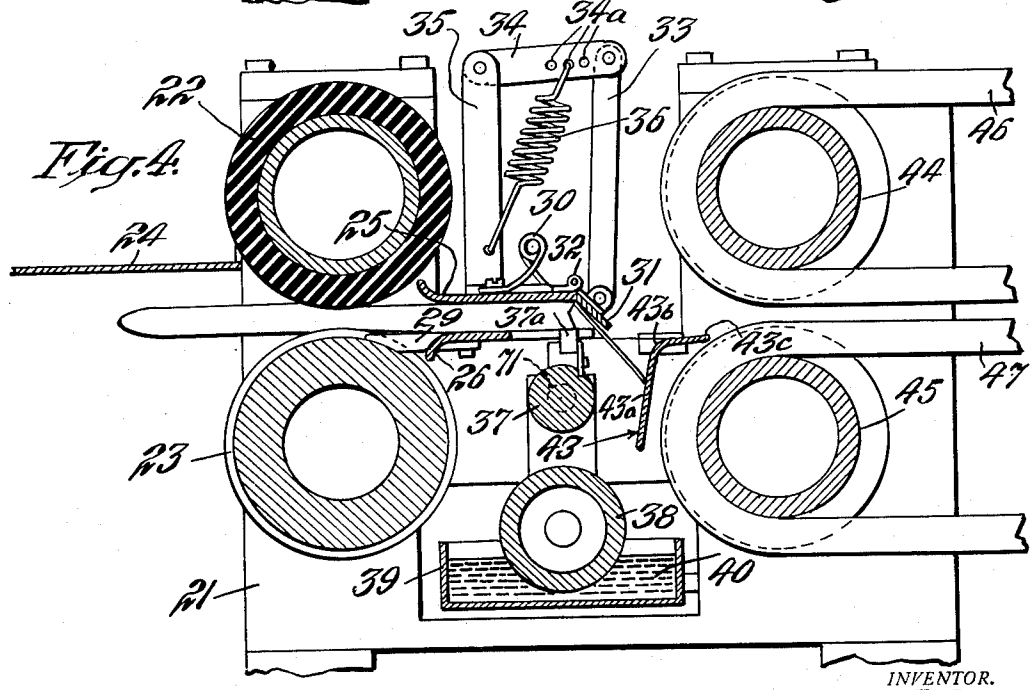
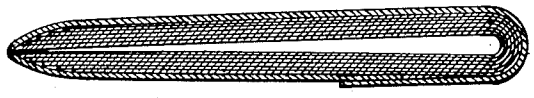


Fig. 7.



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Fig. 5.

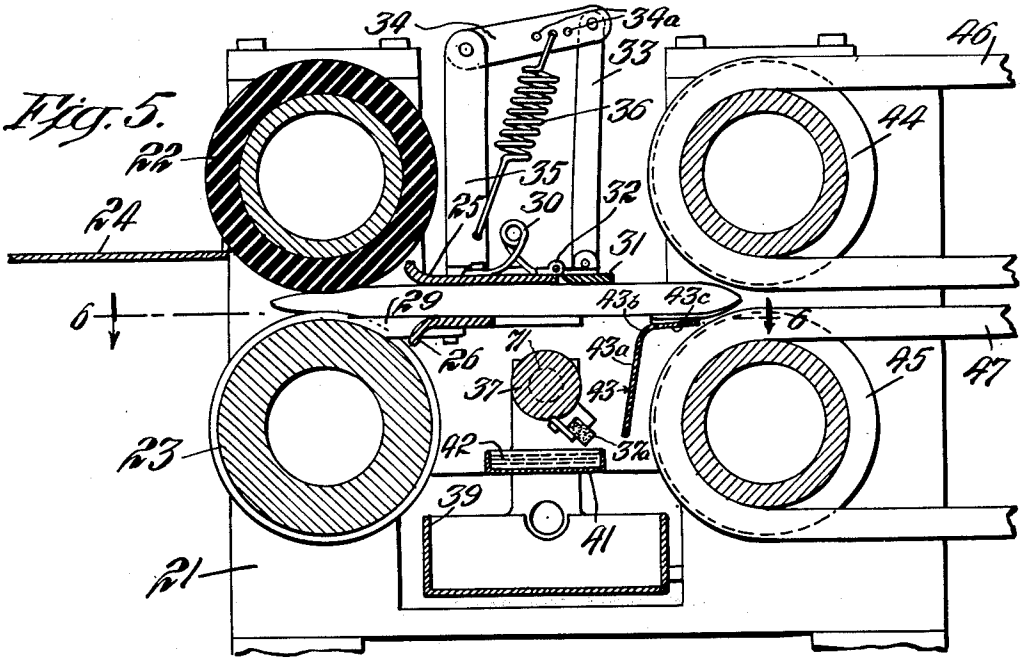
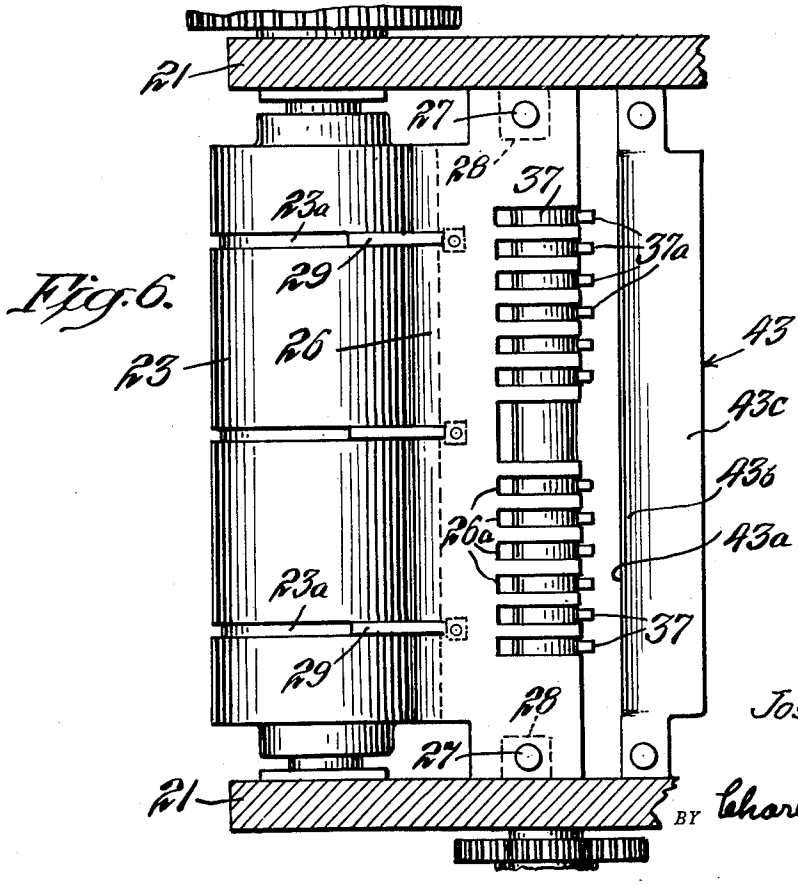


Fig. 6.



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2,749,689

SEALING MACHINE

Joseph Frank Colley, Savannah, Ga., assignor to Union Bag & Paper Corporation, New York, N. Y., a corporation of New Jersey

Application July 1, 1953, Serial No. 365,483

14 Claims. (Cl. 53—124)

The present invention relates to improvements in sealing machines. More particularly it pertains to a machine for sealing envelopes or bags, especially envelopes or bags which are non-uniform in thickness because of the nature of the product in the envelope or bag.

Household bags, such as lunch, garbage and sandwich bags, are packaged in envelopes for convenient use by housewives and others. Usually the sandwich and lunch bags are inserted in the envelope flat, whereas the stacked garbage bags are folded once. Such fold immediately creates a problem because the envelope bulges more at one side than the other. Other than the machine of the present invention, no machine has been found which will effectively seal the envelope so filled and turn out a package having a straight and neat closure. Consequently it has been heretofore necessary to seal these envelopes by hand. The present invention eliminates the hand sealing and provides a machine which automatically seals envelopes or envelope-like bags (all referred to herein as "envelopes") regardless of non-uniformity in thickness caused by the product in the envelope and delivers from the end of the machine a neat, straight and compact package.

A further object of the invention is to provide apparatus which will seal filled envelopes in a continuous operation at a lower cost.

It is a further object of the invention to provide apparatus of the type described well suited to operate in a practical and efficient manner.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

Figure 1 is a side elevation of the machine of the present invention;

Figure 2 is a top view of the sealing unit of the machine with the upper draw rolls omitted;

Figures 3, 4 and 5 are vertical sectional views of the sealing unit showing the various stages in the sealing of the envelope;

Figure 6 is a top view taken along the line **6—6** of Figure 5;

Figure 7 is a sectional view across an envelope filled with bags folded once.

Referring more particularly to the drawings there is shown in Figure 1 a sealing machine made up of three sections, namely a conveyor section A for carrying the filled unsealed envelopes to the unit, a sealing unit B, and a stacking section C.

The conveyor section, Figures 1 and 2, is made up of a table **10** on which the filled unsealed envelopes flap

forward can be placed. Such table has side rails **11** to prevent the envelopes from sliding off the sides and keep them in proper position. The table has a trough **12** running its full length in which rides an endless sprocket chain **13** provided with a series of spaced lugs **14** to move the envelopes on the table in spaced relation to the sealing unit. The sprocket chain **13** runs over sprocket wheel **15** and **16** at each end of the table. The shaft **16***a* carrying the sprocket wheel **16** is provided at one end with another sprocket wheel **17** by means of which it is driven through the sprocket chain **18** in synchronism with the draw roll of the sealing unit. The side rails of the table at the end adjacent the sealing unit have spring loaded self centering guides **19** which square up and center the moving envelopes. The table and conveyor assembly has suitable supports **20** for elevating it to the proper height.

From the conveyor table the envelope moves to the sealing unit (Figures 2 and 3). Here the envelope first passes between a pair of draw rolls supported on each side by a frame **21**, upper roll **22** being rubber faced and the lower roll **23** being of knurled steel. The combination of a rubber faced roll and the knurled steel prevents the envelope from slipping in any direction. A plate **24** mounted on the frame and projecting in the direction of the approaching envelope serves to push the flap of the envelope downward and guide it into the draw rolls. The upper roll is spring loaded to compress the filled envelope (Figure 1). This forms a uniformly shaped package and allows the sealed envelopes to fit into a smaller shipping carton.

The draw rolls move the filled envelope with the flap on top between a pair of upper and lower package guides or pressure plates **25** and **26** (Figure 3). These plates are held by bolts **27** to the sides of the frame with suitable separating blocks **28** between them to assure uniform space to make the envelopes compressed by the draw rolls (Figures 2 and 6). The lower plate **26**, shown in Figure 6, is equipped with a series of doffers **29** which project backward into corresponding grooves **23***a* in the lower draw roll **23** and serve to peel or strip the envelope from the draw rolls. The upper plate **25** has a series of slots **25***a* through which extend flap guide springs **30**. These springs are secured at one end to the plate and extend below such plate to contact the envelope flap as it passes under the plate (Figure 3). These springs start the flap downward and are the first step in the folding of the flap. As the envelope continues its movement the flap is further folded when it makes contact with one or more pressure loaded deflector plates **31** fastened by a series of hinges **32** to the upper plate **25**. The deflector plate or plates, which may either be straight or slightly curved, are normally at an angle to the upper plate as shown in Figure 3. As shown herein, the deflector plate is maintained in this angular position by spring loaded fulcrum arms **33** and **34** linked together, the end of the arm **33** being secured to the deflector plate and the end of the other arm **34** being mounted on a fulcrum bracket **35** secured to the upper plate **25**. The springs **36** between the bracket **35** and the arm **34** serve to determine the pressure which the deflector plate will apply to the envelope flap and envelope. The holes **34***a* in the fulcrum arm **34** permit such pressure to be varied which is desirable for different types of bags packaged in the envelope being sealed. In some cases the contents of the envelope exert a greater back pressure and therefore require greater pressure to properly fold and position the flap. It is also possible to substitute weights for the springs **36** so that the application of different weights will vary the pressure which the deflector plate or plates apply against the flap and envelope.

In the case of bags which are folded prior to inser-

tion in the envelope which results in a package having different bulk on one side than the other, as shown in Figure 7, it has been found advantageous to split the deflector plate into two parts, as shown in Figure 2. This permits a different pressure to be applied on each part so that a greater pressure may be exerted on the side of the envelope having the greater bulk. If the envelope being sealed is uniform in thickness a single deflector plate has been found satisfactory.

The lower plate **26** is provided with a series of slots **26***a* which allow a liquid applicator to apply adhesive or water to the face of the envelope against which the flap will fold. Such applicator **37***a*, made of metal for use with adhesive and of sponge rubber for water, is affixed to an applicator roll **37** and is provided with a series of segments positioned and of the proper size to fit between the slots **26***a* in the lower plate. The applicator roll **37** rotates at the proper speed to apply a series of spots of adhesive or water on each envelope passing through the unit. During such rotation the segments of the applicator **37***a* pick up sufficient adhesive from the adhesive roll **38** which in turn revolves in the pot **39** of adhesive **40** (Figures 3 and 4). In the case of water the adhesive roll **38** is omitted and a pan **41** inserted above the pot **39** so that the segments of the applicator **37***a* pick up the water **42** directly from the pan (Figure 5). Where adhesive is used doctor blades are employed for the roll and applicator to allow the correct amount of adhesive to be applied to the envelope. It will be understood that this machine is suitable for use with either gummed envelopes in which case only water is used or for ungummed envelopes which require adhesive.

As the envelope continues its movement, as shown in Figure 4, and the flap is bent downward first by the springs **30** and then by the deflector plate **31**, the flap and then the envelope come into contact with the sealing plate **43**. This plate is mounted on each side frame and extends across the unit. It is made up of (1) a vertical surface **43***a* which keeps the flap in downward position; (2) a curved corner **43***b* which starts the gradual sealing action; and (3) a horizontal surface **43***c* which is angled upward slightly to assure a gradual tightening of the sealing as the envelope passes over it. The envelope with the sealed flap then enters between a second pair of upper and lower draw rolls **44** and **45**, which further press the sealed envelope and deliver it to a series of conveyor belts, those associated with the upper draw roll **44** being designated as **46** and those with the lower draw roll **45** as **47**.

It will be noted in Figure 5 that the first and second pairs of draw rolls are so spaced that the first set does not release the sealed envelope until the second set has received it. Furthermore, the sealed flap is still being held by the sealing plate when the envelope enters the second set of draw rolls.

The conveyor belts hold the sealed envelope tight to allow the adhesive to set up. Such belts fit into a series of grooves in the draw rolls **44** and **45** at one end and grooved idler rolls **48** and **49** at the other end. The lower belts **47** ride over a guide plate whereas the upper belts **46** run under a series of guide rolls. This arrangement assures a tight grip on the sealed envelope as it passes from one end of the conveyor to the other.

At the end of the sealing unit B the sealed envelopes drop from between the belts **46** and **47** to a catch box **50** from where they are carried in vertical position into a storage conveyor **51**. The bags are moved in this storage conveyor by means of belts **52** passing over rolls **53**.

The entire machine is driven by a gear head motor **54** through shaft **54***a* to which is attached a sprocket **55** over which passes a roller chain **56** which in turn drives sprocket **57** affixed to the shaft **58** of the bottom draw roll **45**. On the same shaft is gear **59**, which drives the upper draw roll **44** through a gear not shown and also drives intermediate gear **60**, which in turn drives the lower draw roll **23** through gear **61** on shaft **62**, which gear in turn drives the upper draw roll **22** through a gear not shown. Also affixed to shaft **62** is a sprocket **63** over which passes chain **18** which drives the conveyor chain as previously described. Returning to shaft **58** there is affixed thereto a sprocket **64** over which passes a roller chain **65** which drives a sprocket **66** on a countershaft **67**. This shaft drives the applicator roll **37** through the chain **68** passing over sprockets **69** and **70**. The shaft **71** of the applicator roll **37** drives a gear **72** which in turn drives gear **73** and the adhesive roll **38**. The countershaft **67** also drives through the chain **74** a pump (not shown) which pumps adhesive or water from the supply tank **75** to the pot **39** or the pan **41**. The countershaft also drives the drive shaft **76** which operates the mechanism of catch box **50** and the storage conveyor **51**.

The operation of the invention will be apparent from the foregoing description. By employing this invention filled envelopes or envelope-like bags, even though non-uniform in thickness because of the contents packaged therein, may be sealed more efficiently and quickly than by any known machine. Furthermore the machine will deliver a neat, straight and compact sealed envelope.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a machine of the class described means for compressing and moving a filled envelope, pressure plates spaced to receive the compressed envelope therebetween as it moves from the compressing means, a pressure loaded deflector plate hingedly connected to the upper pressure plate and normally disposed at an angle thereto, said deflector plate applying pressure to the flap and face of the envelope, an applicator which applies liquid to the envelope for sealing the flap as the envelope passes between the pressure plate, a sealing plate adjacent the deflector plate comprising a vertical surface which maintains the flap in a downward position, a curved corner which starts the gradual sealing action and a horizontal surface angled upwardly which tightens the sealing as the envelope passes over it, and means for pressing and moving the sealed envelope, said compressing means being spaced from the said pressing means so that the compressing means does not release the envelope until the pressing means has received it.

2. In a machine according to claim 1, means for conveying the filled envelopes to the compressing means.

3. In a machine according to claim 1, means beyond the pressing means for stacking the sealed envelopes.

4. In a machine according to claim 1, in which the compressing means comprises upper and lower draw rolls.

5. In a machine according to claim 4, in which the lower draw roll is provided with a series of grooves and the lower pressure plate has a series of doffers secured thereto, which doffers project backward into the said grooves and strip the envelopes from the draw rolls.

6. In a machine according to claim 4, in which the lower pressure plate is provided with a series of slots to receive the liquid applicator and the liquid applicator is provided with a series of segments to fit between the slots.

7. In a machine of the class described means for compressing and moving flap forward a filled envelope, a pressure loaded deflector plate normally disposed at an angle to the face and flap of the envelope and applying pressure first to the flap and then to the face as the enve-

lope moves from the compressing means, an applicator which applies liquid to the envelope for sealing the flap as the envelope passes beneath the deflector plate, a sealing plate adjacent the deflector plate comprising a surface vertical to the plane of the envelope which maintains the flap in a downward position, a curved corner which starts the gradual sealing action and a horizontal surface angled upwardly from the plane of the envelope which tightens the sealing as the envelope passes over it, and means for pressing the sealed envelope, said compressing means being spaced from the pressing means so that the compressing means does not release the envelope until the pressing means has received it.

8. In a machine according to claim 7, spaced upper and lower pressure plates beyond the compressing means to receive the compressed envelope.

9. In a machine according to claim 8, in which the deflector plate is hingedly connected to the upper pressure plate.

10. In a machine according to claim 8, flap guide springs projecting downwardly through slots in the upper pressure plate against the flap whereby the flap is given its initial downward fold.

11. In a machine of the class described means for compressing and moving flap forward a filled envelope, at least two pressure loaded deflector plates normally disposed at an angle to the face and flap of the envelope

and adapted to apply different pressures across the face of the envelope as it moves from the compressing means, an applicator which applies liquid to the envelope for sealing the flap as the envelope passes beneath the deflector plate, a substantially L-shaped sealing plate adjacent the deflector plate which maintains the flap in a downward position and tightens the sealing as the envelope passes over it, and means for pressing and moving the sealed envelope, said compressing means being spaced from the pressing means so that the compressing means does not release the envelope until the pressing means has received it.

12. In a machine according to claim 11, spaced upper and lower pressure plates beyond the compressing means to receive the compressed envelope.

13. In a machine according to claim 12, in which the deflector plates are hingedly connected to the upper pressure plate.

14. In a machine according to claim 12, flap guide springs projecting downwardly through slots in the upper pressure plate against the flap whereby the flap is given its initial downward fold.

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