Aug. 26, 1969 J. S. BODOLAY ET AL 3,462,913

COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

Filed June 5, 1967 8 Sheets-Sheet 1

Fig - 1 -

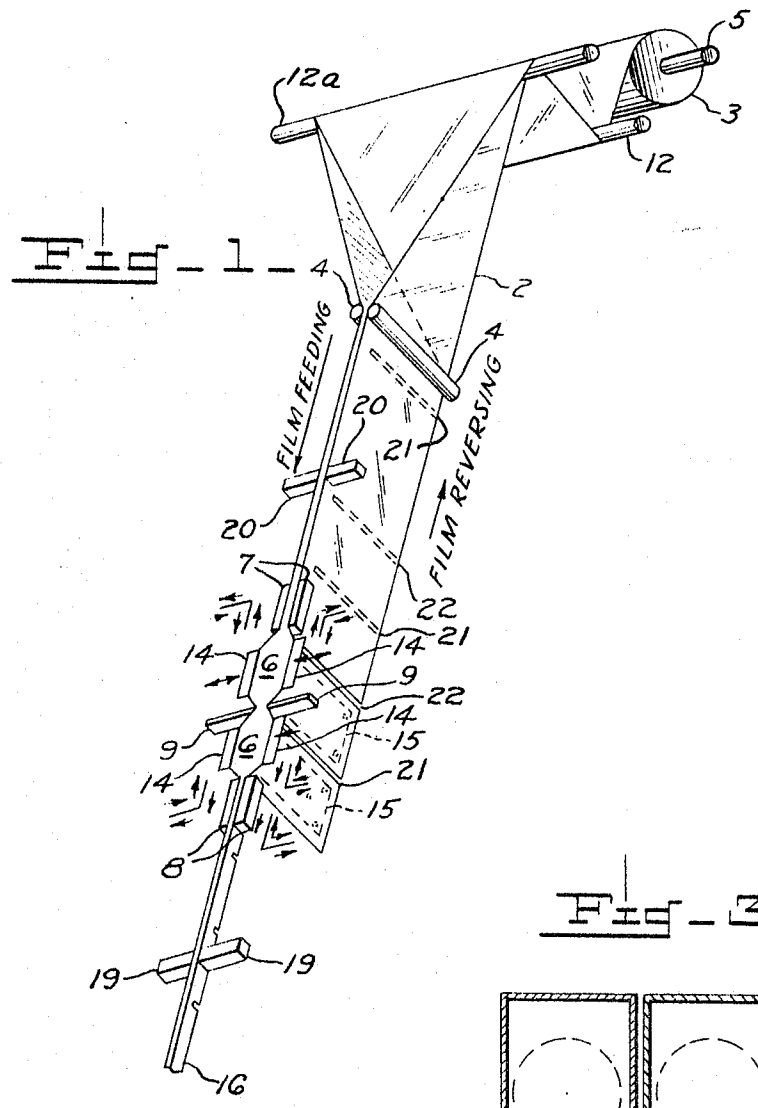


Fig - 3 -

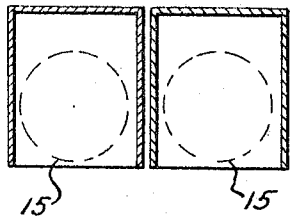
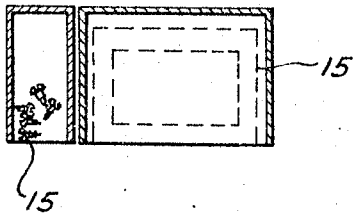


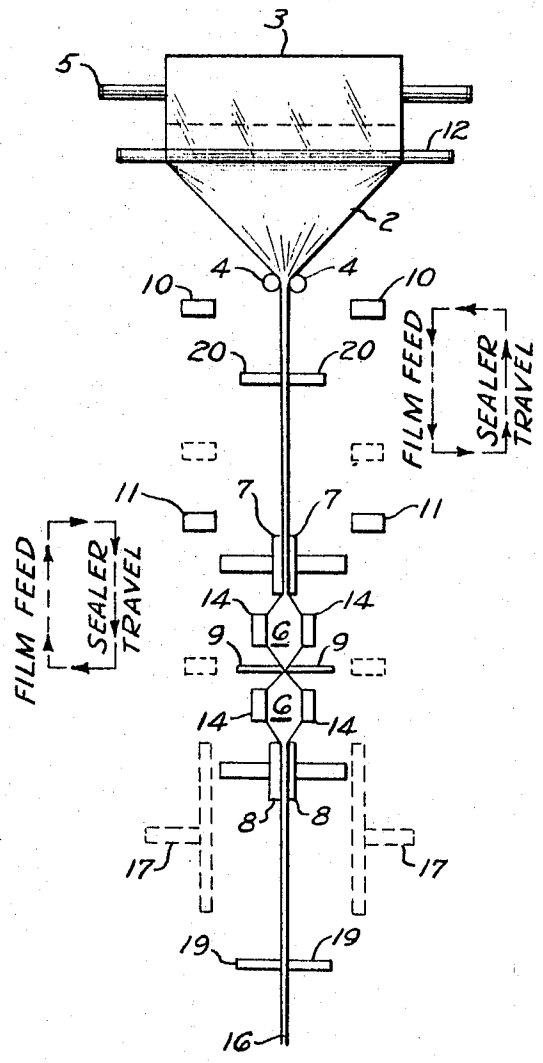
Fig - 2 -



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Fig. 4



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COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

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Fig. 5

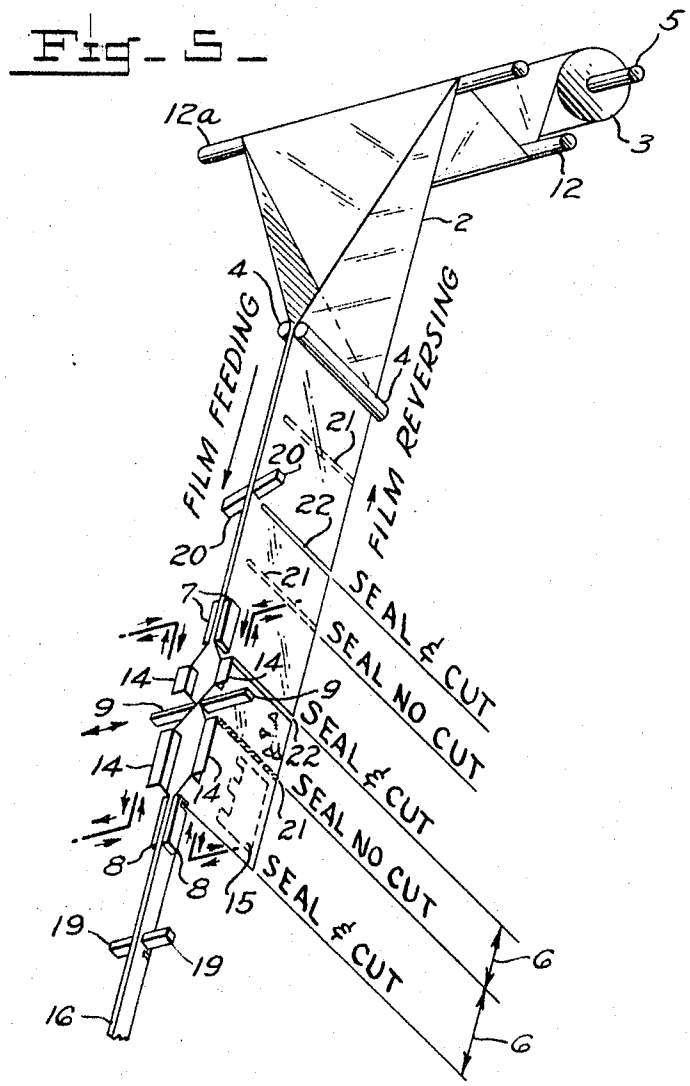


Fig. 6

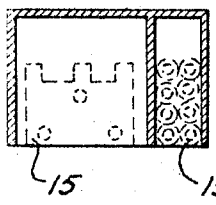
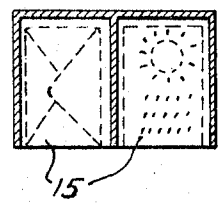


Fig. 7



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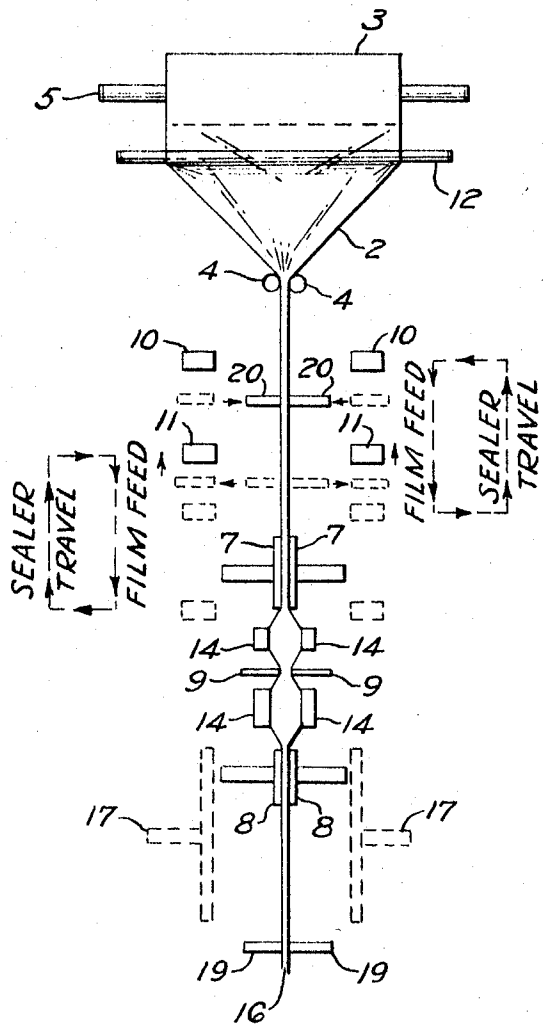
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Aug. 26, 1969 J. S. BODOLAY ET AL 3,462,913

COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

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Fig. 8



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COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

Filed June 5, 1967 8 Sheets-Sheet 5

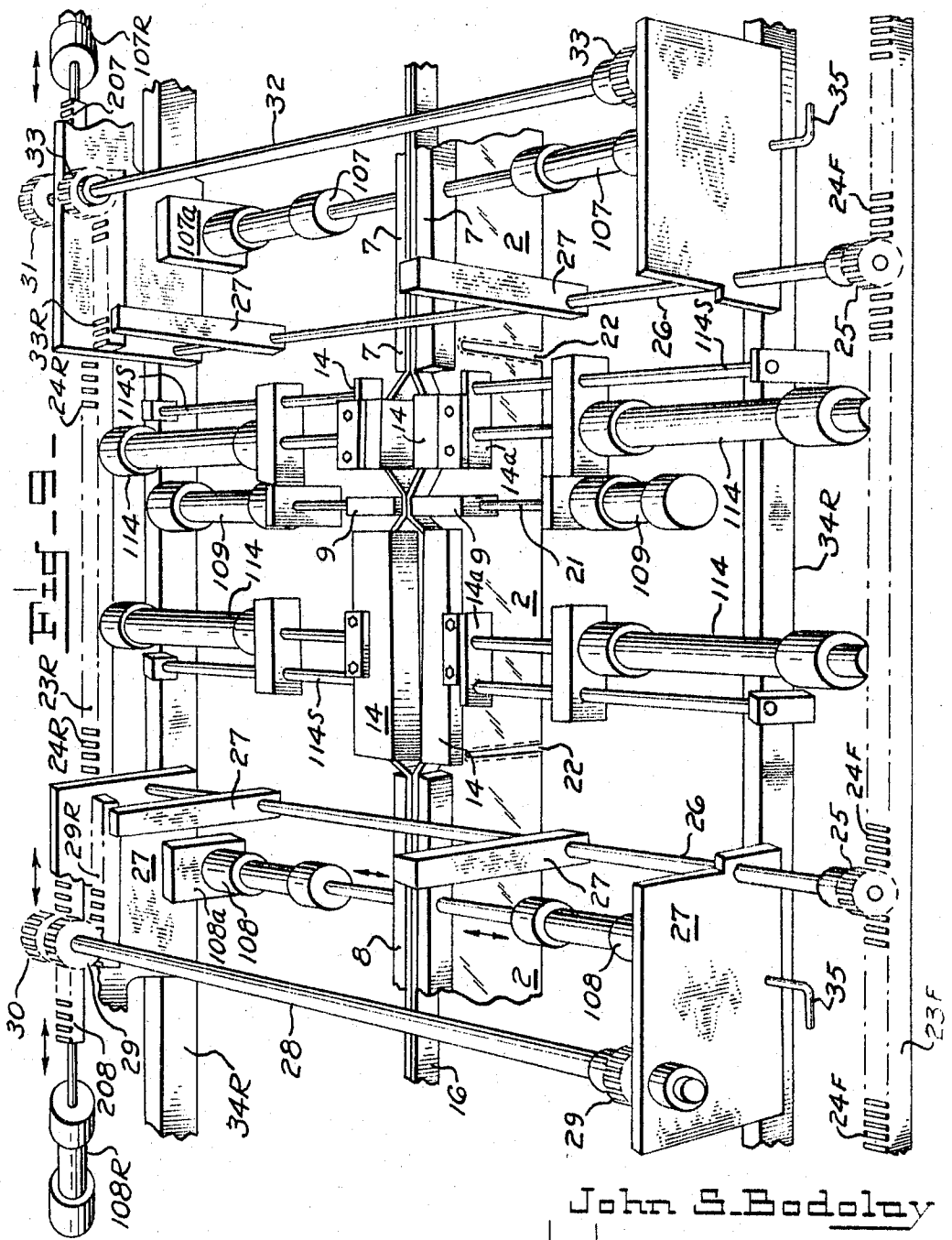


Fig - 5

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COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

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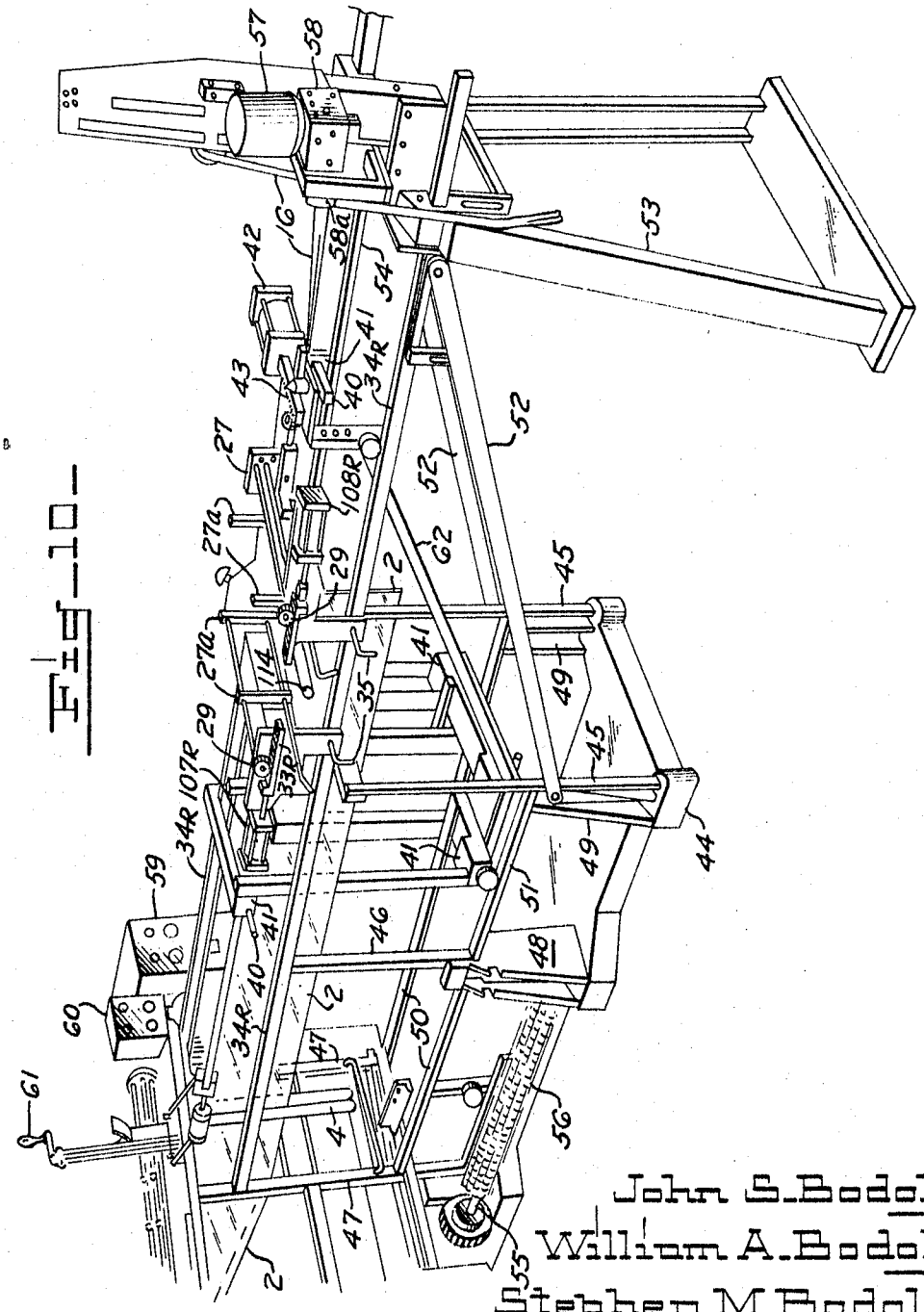


FIG. 10

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COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

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Fig. 11

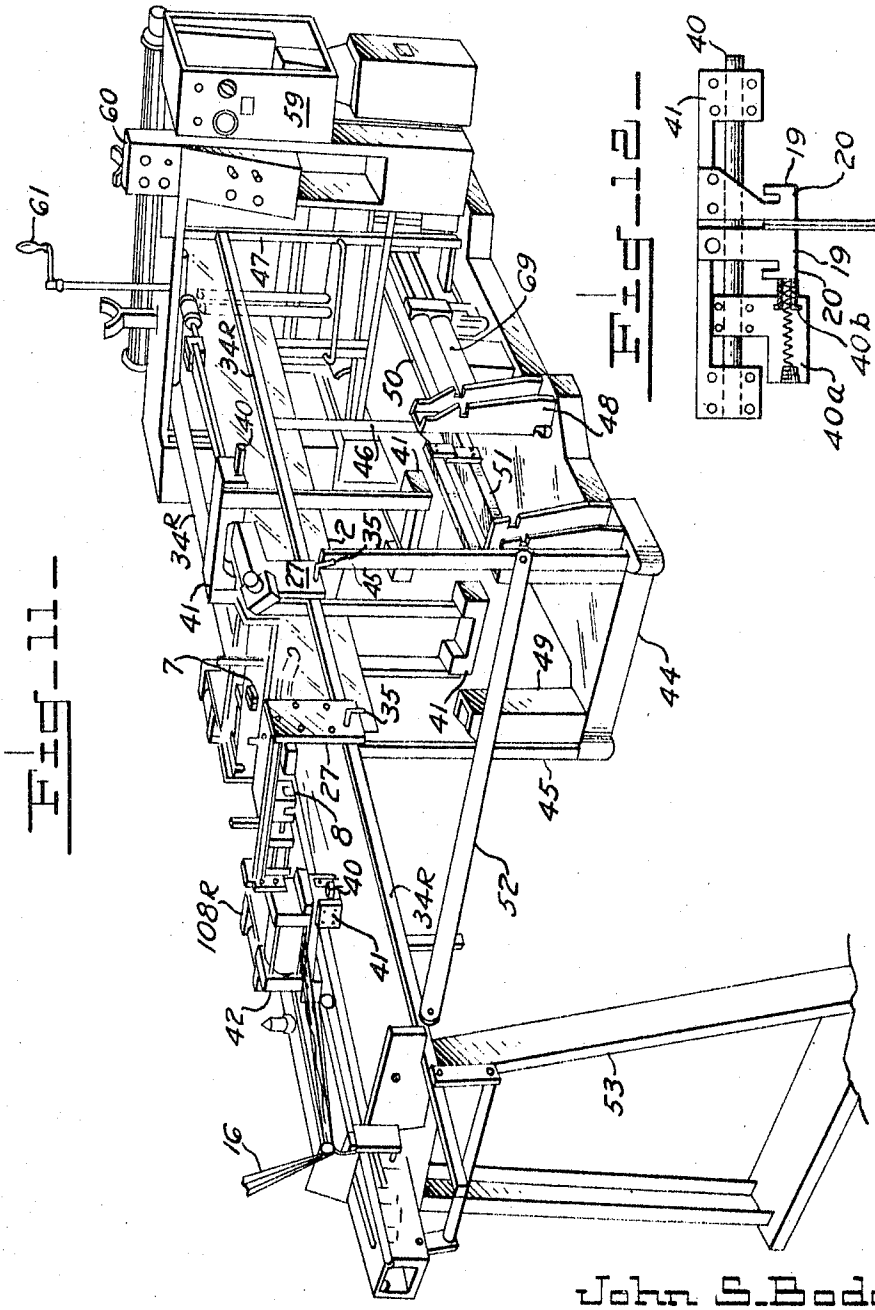


Fig. 12

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COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

Filed June 5, 1967 8 Sheets-Sheet 8

Fig-13-

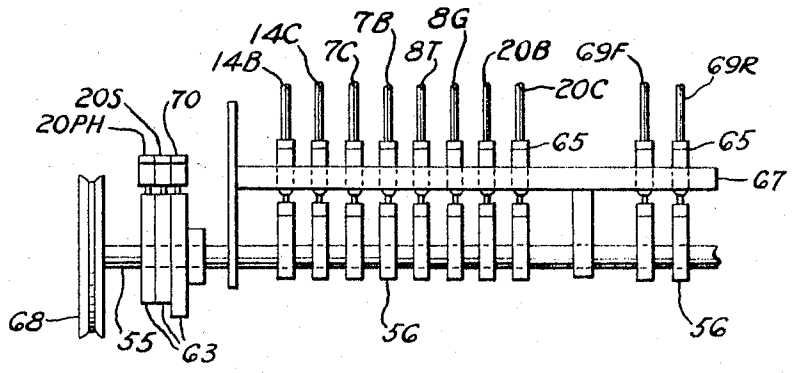


Fig-14-

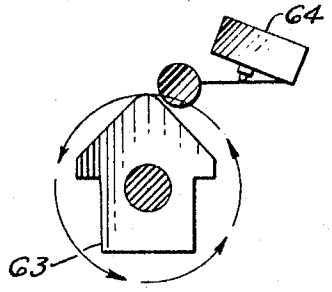
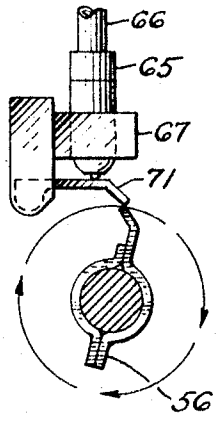


Fig-15-



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United States Patent Office 3,462,913 Patented Aug. 26, 1969

3,462,913

COMBINATION MULTIPLE BAG MAKING AND COMPARTMENT BAG MAKING MACHINE

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Filed June 5, 1967, Ser. No. 649,064
Int. Cl. B65b 9/08
U.S. Cl. 53—183 10 Claims

ABSTRACT OF THE DISCLOSURE

This invention is concerned with an improved development of a novel concept in bag making, filling, and sealing machines of the type of bag formed by the machine in our prior patent issued Mar. 17, 1959, Patent No. 2,877,609. In the aforesaid patent, we described our machine which formed a single bag having one pouch that was sealed along its edges and after the contents were placed therein, was sealed horizontally across the top. Since the development of that machine, we have built a new machine that will make more than one bag at the same time, and will make the bags of different sizes at the same time.

There has been a need in industry to package in more than one compartment, products that require, for example, hardware that go with a hinge. By packaging items like this, simultaneously, in one bag having more than one compartment, there is a tremendous cost saving. Further, the product is improved because of the efficiency in which the consumer can use the product.

It is an object of the within invention to provide a machine that will form more than one bag from a continuous web at the same time.

It is still another object of the within invention to provide a machine that will make more than one bag at the same time of different dimensions from a continuous web.

It is yet a further object of the within invention to provide a machine that will make bags at the same time of different dimensions which may have compartments separating one another within the same bag.

It is an additional object of the within invention to provide a machine that is versatile in the making of bags of different dimensions, sizes, and shapes from a continuous web.

It is still an additional object of the within invention to provide a bag making machine that will form a plurality of bags during one cycle of the bag making machine.

These and other objects are obtained by a process of controlling the location of heat sealers and cutters on the web in the machine at predetermined times under a synchronous control arrangement, all as more particularly described in the following detailed description and, particularly, in the drawings in which:

FIGURE 1 is a perspective diagrammatic view of the web as it is fed, formed, sealed, prepared for filling, and cut.

FIGURE 2 is a side elevational view of two bags of different size that have been formed during a single cycle of the machine.

FIGURE 3 is a side elevational view of two bags of the same size that have been formed during a single cycle of the machine.

FIGURE 4 is a top plan view in a diagrammatic form of FIGURE 1 showing the relationship of the various sealers with the web and their respective loci.

FIGURE 5 is a perspective diagrammatic view of the web as it is fed, formed, sealed, and compartmentized.

FIGURE 6 is a side elevational view of a compartmentized bag, having compartments of different sizes.

FIGURE 7 is a side elevational view of compartmentized bag, having equal size compartments.

FIGURE 8 is a perspective diagrammatic view of the web as it is fed, showing the loci of the clamps **19** and **20**, and heat sealers **10**, **11**, and **17**.

FIGURE 9 is an exploded perspective view of a portion of the web and the mechanism for center clamping, reciprocating and clamping, and bag mouth opening.

FIGURE 10 is a rear perspective view of the machine.

FIGURE 11 is a front perspective view of the machine.

FIGURE 12 is a front elevational view of the film feed clamps (front and rear).

FIGURE 13 is a top elevational view of the cam shaft showing the cams connected to the pneumatic actuating assembly.

FIGURE 14 is a cross-section view of a micro-switch and cam assembly as shown in FIGURE 13.

FIGURE 15 is a cross-section view of the cam and a pneumatic control valve which is actuated by said cam as shown in FIGURE 14.

FIGURE 1 is a perspective semi-schematic view of the film or web **2** of the machine as it stops and passes from one station to the next and ultimately to the concluding position. FIGURE 1 demonstrates the function of the machine as it forms individual bags as contrasted with bags that are joined together in FIGURE 5.

FIGURE 2 shows that the bags may be made of different sizes and FIGURE 3 indicates an arrangement wherein the bags may be formed exactly of the same dimension.

In FIGURE 1 the film roll **3** circumvents the support shaft **5** which enables the film supply roll **3** to operate freely. A film roll dancing bar **12** controls the unwinding of the film or web **3**. Bar **12** places a tensioning force upon the roll to keep it taut so that the web **3** will not wrinkle prior to being folded. The bar **12***a* is a fixed bar also for maintaining the tautness on the web prior to folding. Bar **12***a* works in conjunction with the dancing bar **12** which might be termed also as a floating bar since it does have a tendency to move around as the web moves, while at all times, exerting pressure on the web **2** to keep it from wrinkling.

The web **2** is folded at the "folding station" which is located where the vertical guide rolls **4** appear in FIGURE 1. When the web **2** is placed upon the machine after the roll **3** has been used up, the person or operator in charge of the machine will place the roll **3** in position in the manner shown in FIGURE 1. He then folds the web **2** just in front of the vertical guide rolls **4** and drags the web through these two guide rolls **4**. The web is pulled all the way over to the other side of the "folding station" before the machine is put into operation.

Once the machine has taken control of pulling the web through the various components shown in FIGURE 1, the various functions take place in the sequence stated.

Reference may be made at this point to our prior United States Patent No. 2,877,609 which was issued on Mar. 17, 1959. In that patent, and particularly in the view of FIGURE 3, in said patent, we employed a single side sealer. In this invention a double side sealer is used. Reference should be made to FIGURE 4 of this specification. In FIGURE 4, just forward of where the web folds (forward of the vertical guide rolls **4**) are the vertical heat sealers **10**. In FIGURE 4 these are shown out of contact with the web **2**. However, the sealers **10** are moved under control of the machine which detail will be hereinafter described inwardly towards contact with the web **2**, and seal the folded web **2** together along the lines **21** shown in the view of FIGURES 1 and 5. The other vertical seal-

er 11 differs from our aforesaid patent. When these sealers 11 come into contact with the web 2, they leave a vertical seal which is indicated by the line 22 in the view of FIGURES 1 and 5. After the sealer 11 has made the seal "line" 22 in the web 2, the lines 21 and 22 alternate down the web 2. The location of the sealer 11 determines the width and dimension of the bag being formed. Arrangements are available on the machine as will be hereinafter explained to change the location of the sealers 10 and 11 so that bags of various sizes may be formed. In most instances for normal operation, it is usually the demand of industry that the bags be of the same size, but there are special circumstances and packaging techniques that require complementary bags of different sizes as will be stated hereinafter.

The web 2 is pulled from the roll 3 by the web pull clamping bars 19 and 20. See FIGURE 12. There is a web pull clamp 19 and 20 on each side of the film or web 2. The web pull clamps 19 and 20 start out by moving inwardly towards the web 2 from the dotted area shown by the arrows until they come in contact on each side of the web 2. Pressure causes them to squeeze against the surfaces of the web. They are then pulled in the direction of the arrows away from the supply roll 5 towards the end of the machine to the position of the dotted lines where they then are disengaged from contact with the web and are pulled back into the "out of" contact position shown by the arrow. The pull clamps 19 and 20 then reciprocate back to their original position awaiting preparation to make the same movement over again. The pull clamps 19 and 20 squeeze the web together, pull the web a predetermined distance, let go of the web, go back and do the same operation again and again in synchronism with the sealing and cutting operations as well be hereinafter explained.

At this position in the web there is a seal 21 and a seal 22, and the web has been moved one cycle. The distance that the web pull clamps 19 and 20 have been moved is shown in the view of FIGURE 8. The bags have now been formed. As the operation of the pull clamps 19 and 20 continues and the heat sealing operations continue on the web subsequently, eventually the web reaches the loading station. The loading stations 6 are at that portion of the machine wherein the stationary center web clamps 9 are located. One might say that the loading stations 6 are within the confines of the reciprocating clamps 7 and 8 (FIGURE 8).

FIGURE 1 shows the movement of the various clamps 7 and 8. Clamps 7 and 8 are obviously not in contact with the web 2 while the web 2 is moving. However, at the proper moment when the web is stationary, the clamps 7 and 8 come into contact with the web and clamp 7, for example, pushes downwardly away from the supply roll 3 causing the web 2 to open up because of the contact that the clamps have. Clamps 9 have made the web immovable since they are stationary. Clamps 7 and 8 coming in contact with the web 2, push towards the immovable clamps 9 causing the sides of the folded web to open up. Now there is a mouth or pouch formed in the top of the bag at the loading station 6 so that the subject matter which is to be packaged may be inserted within the mouth of the bag.

The openers 14 operate in conjunction with the clamps 7 and 8. The openers 14 pull the bags open. The openers 14, after the slack has been made by the operation of the clamps 7 and 8, engage the upper portion of the bag and pull it apart as well be explained hereinafter. This is similar to our original arrangement in our machine described in FIGURE 2 of Patent No. 2,877,609. However, the big change is that we have in this particular machine a second bag being formed and it is therefore necessary to have the additional clamp 7 in front of the fixed clamp 9. This improves over the view of FIGURE 2 of our prior Patent No. 2,877,609 in that we have now a double operation of opening the bag whereas in our original patent we only had one.

At this point the pouches are now open. With the pouches open, the subject matter or contents are inserted therein through the opening at the loading station 6. Contents indicated by the numeral 15 are inserted in the bags or pouches. As soon as the bag has been filled, the openers 14 come together (close) allowing the sides of the bag to come together as originally before the pouch forming operation took place. Sealer clamps 17 in FIGURE 14 move the filled bags out of position. At the same time, the clamps 7 and 8 are now reciprocated in the opposite direction from whence they had moved as shown by the arrows in the view of FIGURE 1. This returns the web 2 to a flat contact arrangement except for the contents which are at the bottom portion of the bags.

In FIGURE 8, the horizontal sealer 17 is shown. Once the clamps 7 and 8 have returned to their original position and the bag openers 14 have been closed, the horizontal heat sealers 17 come together and seal the horizontal top of the bag. At this particular sealer 17, there is located a cutter within the sealer and as the sealer does come together, it also seals and cuts simultaneously. This is a conventional type of sealer. The finished bag having contents 15 within it, now drops from the forces of gravity from the waste material at the top of the web indicated by the strip 16.

This differs from our previous patent and invention as described in Patent No. 2,877,609 in that there is now a strip 16 left from the web 2 whereas in our said patent as shown in the view of its FIGURE 15 and FIGURE 16, there was a circular shaped cut made in the web so that the bag would not tear off until the final cutting operation. Because of the improvement in web materials since the time of our filing the original patent application, it is no longer necessary to use the method as disclosed in the views of FIGURE 15 and FIGURE 16 of our prior Patent No. 2,877,609. The waste strip 16 has another function as in addition to the pull clamps 20 moving the web down to the various stations in the machine, the strip 16 is also pulled so that it assists in the pulling of the web along with the clamps 20. Clamps 19 operate in a similar fashion as the clamps 20 in that they come together, pull the web a predetermined distance, release the web to the control of clamps 7, 8 and 9, move out of contact with the web and reciprocate to the original position to start the cycle over again as already explained in the function of the clamps 20 and as described schematically in the view of FIGURES 4 and 8.

As can be seen from the multiple operations of the various sealers cutters and clamps, it is necessary that there be proper timing. It is to be especially noted that the sealers 10 and 11, as well as the horizontal sealer 17 and the pull clamps 19 and 20, operate simultaneously. That is to say that when the vertical sealers 10 and 11 engage the web and apply heat to it, the horizontal sealer 17 is also engaging the web at its position away from the position of the vertical sealers 10 and 11 and all are sealing at the same time. It is further to be noted that when the clamps 19 and 20 are in contact with the web they are in contact with the web at the same time; they pull the web at the same time; they release the web at the same time. This maintains rigidity and the lack of wrinkles in the web so that every bag that is made is formed free of wrinkles in the seal lines in a clean, smooth appearance.

The heat sealers 10, 11, and 17 are of the bar type substantially similar to the sealers 91 and 92 of FIGURE 13 in our Patent No. 2,877,609.

The structure of clamps 19 and 20 is shown in detail in FIGURE 12. The clamps 19 and 20 are L-shaped.

The heat sealers 10, 11, and 17 are energized by electricity. When they contact the film 2 which is made of a synthetic material, the film folds adhere to one another.

The heat sealers **10**, **11**, and **17** are of a standard commercial type. The electricity to the heat sealers is carried by wires not shown from the electrical control boxes **59** and **60**. The electricity is not applied fully to the heat sealers **10**, **11**, and **17**, until they make contact with the web **2**.

The cam shaft **56** has a timer mounted upon it which trips a circuit breaker causing the electricity to be applied fully to the heat sealers **10**, **11**, and **17** only when they contact the web **2**. This is similar to the heat sealing operation in our Patent No. 2,877,609.

As already stated in the description of the drawings, FIGURE 9 is an exploded perspective view of a portion of the web and mechanism for controlling the operation of the center clamping of the reciprocating clamping and of bag mouth opening. This particular machine is operated essentially by air cylinders which substantially differs from our original disclosure in Patent No. 2,877,609 where we utilized for the purposes of explanation, gears, pinions and the racks almost entirely in our transmission system.

Briefly the operation of air cylinders is controlled by air entering a cylinder and the pressure of the air forces a piston within the cylinder to move outwardly from the cylinder. This is a technology all its own and it is not the purpose of this patent application to teach the operation of air cylinders.

In FIGURE 9, in the middle thereof, is the web **2**. The film strip **16** can be seen to the left of the view in the area of the reciprocating drive shaft **28** for longitudinal motion. The structure of the various clamps can be seen in the view of FIGURE 9. Before explaining the operation, the various parts and mechanism of the FIGURE 9 will be identified.

Front reciprocating clamps **7** are to the right of the view of FIGURE 9. The rear reciprocating clamps **8** are to the left of FIGURE 9. Stationary center clamps **9** are in the proximate middle of FIGURE 9. The bag mouth openers **14** are located on each side of the center clamp **9**. The film strip **16** can be seen as already stated. The lines **21** and **22**, indicating where the sealing operations have taken place in the web, are shown and can be observed by looking towards the middle of the view of FIGURE 9 just below the area where the bag mouth openers **14** are located. Four air cylinders **114** for operating the bag openers **14** are located at four different places. The cylinders **114** have extending, therefrom, the pistons which are in permanent engagement with the bag mouth openers **14** as can be seen by looking at the view of FIGURE 9. In the embodiment shown, the piston rams are screwed by threads into the head **14***a* of the bag mouth openers **14**. As stated, there are four separate air cylinders **114**. There are also four separate bag mouth openers **14** comprising the bag opener assembly. In view of the previous description when the air cylinders are actuated, the piston rams, controlling the mouth openers **14**, either withdraw or extend the bag mouth openers into or out of contact with the film or web **2**. This opens or closes the pouch.

There is, in addition to the cylinders and their rams **114**, a balancing or stability ram **114S** The ram **114S** stabilizes the motion of the rams extending from the air cylinders **114** so that there will not be an imbalancing or twisting of the clamps **14** when they are moved into and out of engagement.

The stationary center clamp **9** is controlled by two separate air cylinders **109**. Again a similar operation of the ram extending from the air cylinders **109** which is permanently engaged with the clamps **9** controls the movement of the clamps **9** in contact with and out of contact with the web **2**. Clamps **7** have their own cylinders **107** with their respective rams for moving the clamps into contact and out of contact with the web **2** as can be seen.

Similarly clamps **8** have their own air cylinders **108** for performing the same function of engaging the clamps into contact with and out of contact with the web **2**. Clamps **107***a* and **108***a* are the respective blocks for mounting the air cylinders **107** and **108** respectively. As stated, the air cylinders **107** and **108** are for the clamping motion of the clamps **7** and **8** respectively.

In order to obtain reciprocating or longitudal motion of the clamps **7** and **8** as already described, there are a separate set of air cylinders, **107R** and **108R**. These can be seen just below the arrows in the view of FIGURE 9. The rams of **107R** are connected to the drive rack **207**. The air cylinder **108R** for reciprocating motion is connected to the drive rack **208**. As can be seen from the view of FIGURE 9, the racks **208** have teeth upon which the reciprocating drive gear **30** and **31**, respectively, mesh. It can be quickly and readily understood that when the rams of **108R** and **107R** operate from the pressures of the air in the air cylinders, they will cause the racks **208** and **207** to move longitudinally so that the reciprocating drive shaft **28** and the reciprocating drive shaft **32** will be caused to rotate since the respective gears **29** and **33** will be meshing with the motion of the rack **29R** and **33R**. This will cause **29R** and **33R** to move in the direction of the arrows. By so moving clamps **7** and **8** will move in the same direction as the racks **29R** and **33R**.

Oftentimes when the bag sizes are to be changed, it is necessary to make adjustments, obviously, to position the clamps **7**, **8** and **9**. The adjustments are made by means of an arrangement as can be seen in the lower part of the view of FIGURE 9 and also on the upper portion. In the lower portion are racks **23F** and **23R** which are in the back of the view of FIGURE 9 or the top of it. The teeth of the racks are indicated by **24F** and **24R**. The adjusting gear **25** determines the position of clamp **8**. Similarly, the adjusting gear **25** on the shaft **26** (to the right of the openers **14**) determines the position of the clamps **7**. There are locking screws **35** for securing the position of the clamps. The locking screw **35** is connected into the frame **34R** of the machine. There are vertical frames **27** which support the shafts **26**. They are fastened to a portion of the frame which has not been shown in the view of FIGURE 9, since if it were, it would be impossible to see the details of structure. This can be seen, however, looking at the views of FIGURES 10 and 11.

FIGURE 11, as stated, is a perspective view of the machine frame and some of the component parts that have been discussed previously. For the purposes of explanation, the rear of the machine is that portion shown in FIGURE 11 near the names of the inventor on the left side thereof. The front of the machine is to the right of the words "FIGURE 11."

The rear of the machine is supported by the trapezoidal support stand assembly **53**. Running down each side of the machine horizontally are the main frame side rail members **34R**. The rail members **34R** connect with the top of the stand **53** on each side thereof. Vertical members **45** are located approximately half-way between the front of the machine and the stand assembly **53**. There is a vertical frame member **45** on each side of the machine. The members **45** are connected together by the flat machine bed plate **44**. Part way up the vertical member **45** are the diagonal struts **52** which connect the vertical members **45** with the side rails **34R** proximate the trapezoidal stand assembly **53**. The machine lower strut rail **51** is horizontal and parallel to the upper rail **34R** and runs from the vertical support member **45** towards the front of the machine. Strut **51** stops and is connected to vertical member **46**. Vertical member **46** is connected to the center bed post support member **48**. Vertical member **46** is also connected to the top rail support member **34R** and is parallel to the other vertical member **45**.

Near the front of the machine is the vertical member **47** also parallel to members **46** and **45** respectively. Vertical member **47** connects the base plate **44** with the upper rail **34R**. The rear bed post member **49** supports

the vertical member **45** and the rail **51**. Lower struct **50** connects the center bed post **48** with the vertical member **47**.

In the view of FIGURE 10, the sealer cylinder rack **43** can be seen connected to the sealer actuating cylinder **42**. The clamp transmission rack **40** can be seen in FIGURE 11 connected to the clamp transmission housing **41** beneath the air cylinder **108R**.

The cam shaft **55** which is connected to the pneumatic cams **56** can be seen in the lower left portion of the view of FIGURE 10 towards the front thereof. The cam shaft **55** which operates the various cams **56** controls and times the air entering the various pneumatic cylinders which operate the components as aforedescribed. The details of the control circuit for operating from the cams has been left out of this disclosure. The sequence of the operation has already been stated in the explanation of the views of FIGURES 1, 4, 5, and 8. The cams need only be adjusted in order to operate the pneumatic valves in accordance with the timing as already described in the aforesaid figures. Since pneumatic controls and valves are not new, any explanation as to the setting of the cams on the cam shaft **56** would be extraneous material and would complicate the explanation of the within invention.

The motor **57** which can be seen above the trapezoidal support member assembly **53** clearly in the view of FIGURE 10 is for pulling the salvage material which is left over from the web for the purpose of maintaining that salvage material in a taut manner. The motor **57** rotates a shaft which enters and turns within the gear box **58** operating a transmission system not shown to ultimately rotate the roller **58***a*. The roller **58***a* actually is the means by which the salvage material is pulled.

Near the front of the machine is the electrical control box **59**. Located in the control box is the main power switch and other control switches, and other electrical members such as relays and fuses which are necessary for the cycling and operation of the sealers. These also are part of a separate control circuit which is a matter of timing the electricity to the sealers at the appropriate moment of contact. In control box housing **60**, most of the relays are located.

As stated, the newly formed bags may be varied in size. One of the elements necessary for varying the size of the bags is the bag depth adjusting handle **61**. This handle **61** adjusts the location of the folding of the web as it comes off the roll. Reference is made to the view of FIGURE 5 wherein vertical guide rolls **4** maintain the fold of the web **2** taut. The handle **61** positions the depth of the folded web **2** just prior to the contacting the guide rolls **4**.

In addition to the strut **52**, there is located a carriage support strut **62** which can be seen clearly in the view of FIGURE 10. Strut **62** connects the upper clamp transmission housing **41** with the lower clamp transmission housing **41**. It is to be noted that there are many clamp transmission housings **41** both at lower levels and at upper levels throughout the view of FIGURE 10. Each of these clamp transmission housings **41** is for driving the sealer bars in and out of contact with the web as previously explained.

In FIGURE 12, the clamp transmission housing **41** can be seen in more detail. Clamp transmission housing **41** carries the clamp transmission rack **40** which actuates the pull clamp **19**. The same situation exists for the other pull clamps **20**. For this reason, in FIGURE 12, the numbers **19** and **20** have been used to designate the same member.

It can be recalled that earlier it was noted that there are forward and rear sealing assemblies. In the view of FIGURE 1, the rear assembly is located at **19** and the forward sealers are located at **20**. FIGURE 12 is a front elevational view of the sealer assemblies with the web **2** therebetween when the sealers are in contact therewith. Since the front assembly **20** is identical to the rear assembly **19**, for the purpose of saving space and explanation, both numbers have been placed upon the drawing of FIGURE 12. Fastened to the rack **40** in the view of FIGURE 12 can be seen the spring button housing **40***a*. The spring button **40***b* connects the spring button housing **40***a* with the clamps **20** and **19**. Actually, **40***a* is not connected to the button **40***b*, but is in contact therewith and maintains a force of pressure upon it.

The various pneumatic valves are set into motion and operated by the pneumatic cam shaft **55**. In our original invention, U.S. Letters Patent No. 2,877,609, we employed a cam shaft with cams for actuating and operating a completely mechanical transmission system consisting of gears, racks and pinions which system was demonstrated in the view of FIGURE 26 of said patent. We have substituted, almost entirely, the mechanical components of FIGURE 26 of said patent with pneumatic valves which are controlled from the cam shaft **55**.

FIGURE 13 is a top elevational view of cam shaft **55**. A cam shaft belt pulley **68** is mounted at one end of the shaft. This receives its motion from a pulley belt and motor not shown. The shaft **55** rotates with the rotation of the pulley **68** being integrally secured thereto. It is to be noted that one complete revolution of the pulley **68**, and particularly the shaft **55**, completes one complete cycle of the operation of the entire machine as aforesdescrcibed.

There are three cams abutting one another designated by the numeral **63**. A cross-section of these cams can be seen in the view of FIGURE 14. These cams actuate a typical micro-switch **64**. There are three micro-switches **64** of the same physical characteristics of **64** designated as **20PH**, **20S** and **70**. The micro-switch **70** is for the purpose of stopping the machine. Switch **70** breaks the circuit and stops the machine after one revolution when the machine is set for manual operation. When the machine is set for automatic operation, the breaking of the circuit by the switch **70** is by-passed by a conventional electrical circuit not shown.

The switch **20S** closes the circuit for the purpose of energizing the sealers **20** which are shown in FIGURE 4, FIGURE 5, and FIGURE 8. The cam is set so that the electrical circuit is closed at the moment the sealers come into contact with the web so that the sealers will be at proper heat-seal temperature at the moment of contact of the sealers with the web.

The switch **20PH** pre-heats the sealers. This switch is actuated at a time in advance of switch **20S** so that the heaters in the sealers will be pre-heated to a high enough temperature so that when the switch **20S** is closed, the correct temperature at the correct time will be applied to the web by the sealers **20**.

The cams **56** can be seen in cross-section in the view of FIGURE 15 as well as in top view of FIGURE 13. The cams **56** are designed to operate the pneumatic valve controls. There is an elongated arm on the cams **56** which trip an arm **71** extending outwardly from the bottom of the mounting bar **67**. The mounting bar **67** may be referred to as a poppet mounting bar and the valve which comprises the arm just beneath it may be referred to as a poppet valve arm **71**. When the arm **71** is tripped, it opens the air circuit through the valve **65** to the hose **66** and releases the air that is contained therein. Accordingly, the air flow in the hoses attached to the poppet valves **65** in FIGURE 13 perform the following functions:

Hose **14B** causes to be operated the bag openers **14** to open position. The hose **14C** causes to be operated the bag openers **14** into closed position.

The hose **7C** causes to be operated the belt clamps **7**, **9**, and **8** in closed position. The hose **7B** causes to be operated the belt clamps **7**, **9**, and **8** in open position.

The hose **8T** causes to be operated clamps **7** and **8** in their longitudinal motion as controlled by the racks **208** and **207** as operated by the pneumatic cylinders **108R** and **107R**. The hose **8T** causes the clamps **7** and **8** to move away from one another. Hose **8G** causes to be operated

the same clamps 7 and 8 by the same cylinders 107R and 108R, but in this instance, causing their motion to be towards each other.

Hose 20B causes to be operated the sealing clamps 10, 11, and 17 as shown in FIGURE 4 to their open position. The hose 20C causes to be operated the same sealing clamps 10, 11, and 17 into their closed position.

The hose 69F causes the clamps 19 and 20 to move in the direction of the web down the machine away from the control panel, while the hose 69R causes to be operated and moves the same clamps back towards the original starting position, all as shown in FIGURE 8 by the dotted lines where it is stated "Sealer," "Travel," "Film Feed."

Each of the cams 56 is set on the cam shaft in the correct position as the shaft rotates in order to obtain correct timing for the aforedescribed operation during a complete revolution of the cam shaft 55.

In forming a bag with two compartments, we seal and do not cut as shown in FIGURE 5. The cutting element is physically removed from the conventional sealing bars, either 10 or 11, depending upon the desired size or shape of the bags as shown in FIGURES 6 and 7. The position relationship between the physical positions of the sealers 10 and 11 is varied by conventional mechanical methods. This determines the size relationship of each sealer location and thereby the bag size that is formed. The closer the sealers 10 and 11 are to each other, the smaller the bags or compartment size will be; and conversely the further apart, the larger the size of the bag will be.

This specification is but one embodiment of our invention and it is contemplated that various mechanical equivalents may be employed as substitutes for various details to produce our end result.

We claim:

1. A machine for making, filling and closing a plurality of bags including the forming of a first bag and of a proximate bag simultaneously, comprising a source of web material, means for folding the web material, means for sealing the web material so as to close the web on the forward, middle and rearward edges of at least two bags in a single operation, means for severing the aforesaid sealed edges simultaneously with the sealing operation so as to leave an uncut portion along the mouth edge of the newly formed bags, means for advancing the aforesaid bags into a filling position, means for opening the mouths of at least two bags simultaneously in preparation for the filling, means for finally sealing the top edges of at least two bags simultaneously after the said opening of the mouth, said means for opening the mouth of at least two bags simultaneously comprising a set of center clamps and two sets of reciprocating clamps, each set of said set of said reciprocating clamps comprising a bar on each side of the web, means for maintaining the bars squeezed against the top of the web, means for permitting said bars to move with the web to a predetermined position, means for causing said bars to disengage the web and return to their original position, and means for causing said center clamps to engage the top of the web, causing the web to become squeezed therebetween simultaneously with the closing of the said reciprocating clamps, and causing the release of the web by opening simultaneously with the opening of the reciprocating clamps.

2. A machine for making, filling and closing a plurality of bags including the forming of a first bag and of a proximate bag simultaneously comprising a source of web material, means for folding the web material, means for sealing the web material so as to close the web on the forward, middle and rearward edges of at least two bags in a single operation, means for severing the aforesaid sealed edges simultaneously with the sealing operation so as to leave an uncut portion along the mouth edge of the newly formed bags, means for advancing the aforesaid bags into a filling position, means for opening the mouths of at least two bags simultaneously in preparation for the filling, means for finally sealing the top edges of at least two bags simultaneously after the said opening of the mouth, said means for sealing the web material comprising at least two separate sealing means, a first sealing means for closing the rearward vertical edge of one bag, a second sealing means for sealing the rear vertical edge of the said proximate bag, and the forward vertical edge of the folded web, said sealing means operating while said web is being advanced, said means for opening the moth of at least two bags simultaneously comprises two sets of reciprocating clamps, each set of said clamps comprising a bar on each side of the web, means for maintaining the bars squeezed against the top of the web, means for permitting said bars to move with the web to a predetermined position, and means for causing said bars to disengage the web and return to their original position.

3. A machine as described in claim 1 wherein the means for opening the mouths of at least two bags simultaneously comprises means for causing slack in the top edges of each bag at the filling position, and a plurality of bag mouth openers for pulling the face to face web surfaces of each of the bags apart simultaneously.

4. A machine as described in claim 3 wherein the mouth openers are located between the two inside surfaces of the bags at the filling position.

5. A machine as described in claim 1 including means for severing the top edge of at least two bags simultaneously.

6. A machine as described in claim 3 including means for severing the top edge of at least two bags simultaneously.

7. A machine for making, filling and closing a plurality of compartments, said compartments having a first compartment and a proximate compartment, simultaneously, within a unitary bag comprising a source of web material, means for folding the web material, means for sealing the web material so as to close the web on the forward, middle and rearward edges of at least two compartments in a single operation, means for severing the forward and rearward edges simultaneously with the sealing operation so as to leave an uncut portion along the mouth edges of the compartments formed, means for advancing the aforesaid bag into a filling position, means for opening the mouths of at least two compartments simultaneously in preparation for the filling, means for finally sealing the top edges of at least two compartments simultaneously after the said opening of the mouth, said means for sealing the web material comprising at least two separate sealing means, a first sealing means for closing the rearward vertical edge of one compartment, a second sealing means for sealing the rear vertical edge of the said proximate compartment, and the forward vertical edge of the folded web, said sealing means operating while said web in being advanced, said means for opening the mouths of at least two compartments simultaneously comprising a set of center clamps and two sets of reciprocating clamps, each set of said reciprocating clamps comprising a bar on each side of the web, means for maintaining the bars squeezed against the top of the web, means for permitting said bars to move with the web to a predetermined position, means for causing said bars to disengage the web and return to their original position, and means for causing said center clamps to engage the top of the web, causing the web to become squeezed therebetween simultaneously with the closing of the said reciprocating clamps, and causing the release of the web by opening simultaneously with the opening of the reciprocating clamps.

8. A machine as described in claim 7 wherein said means for opening the mouths of at least two compartments, simultaneously, comprises two sets of reciprocating clamps, each set of said clamps comprising a bar on each side of the web, means for maintaining the bars

squeezed against the top of the web, means for permitting said bars to move with the web to a predetermined position, and means for causing said bars to disengage the web and return to their original position.

9. A machine as described in claim 7 wherein the means for opening the mouths of at least two compartments simultaneously comprises means for causing slack in the top edges of each compartment at the filling position and a plurality of bag mouth openers for pulling the face to face web surfaces of each of the compartments apart simultaneously.

10. A machine as described in claim 9 wherein the mouth openers are located between the two inside surfaces of the compartments at the filling position.

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