March 1, 1966 A. D. CORNELL 3,238,082

SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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FIG. 1.

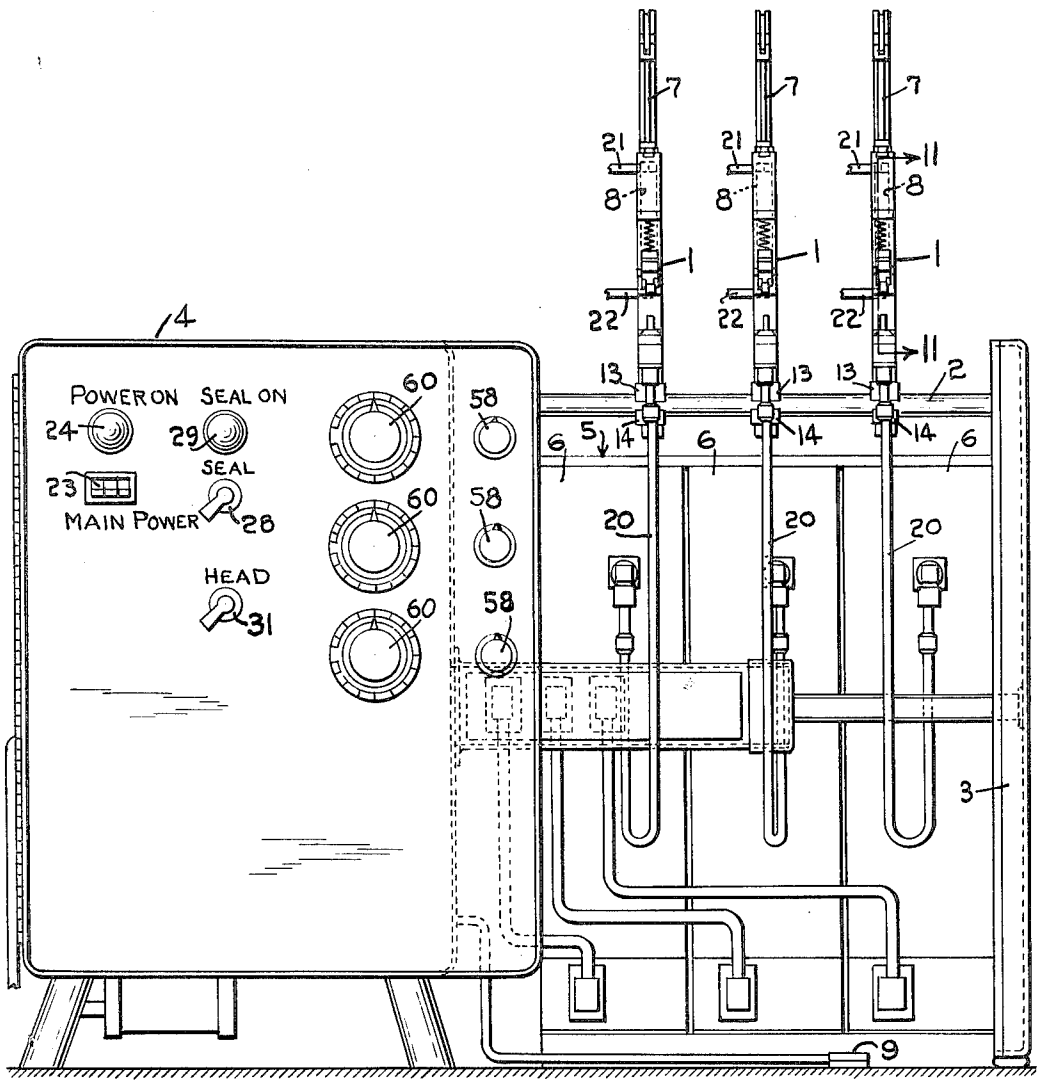


FIG. 2.

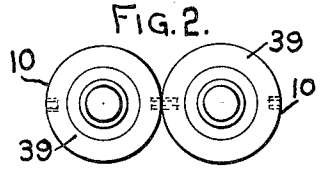


FIG. 2a.

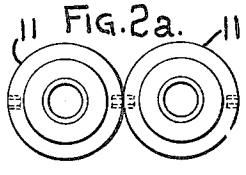


FIG. 3.

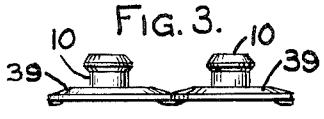
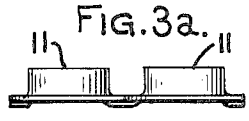


FIG. 3a.



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SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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FIG. 4.

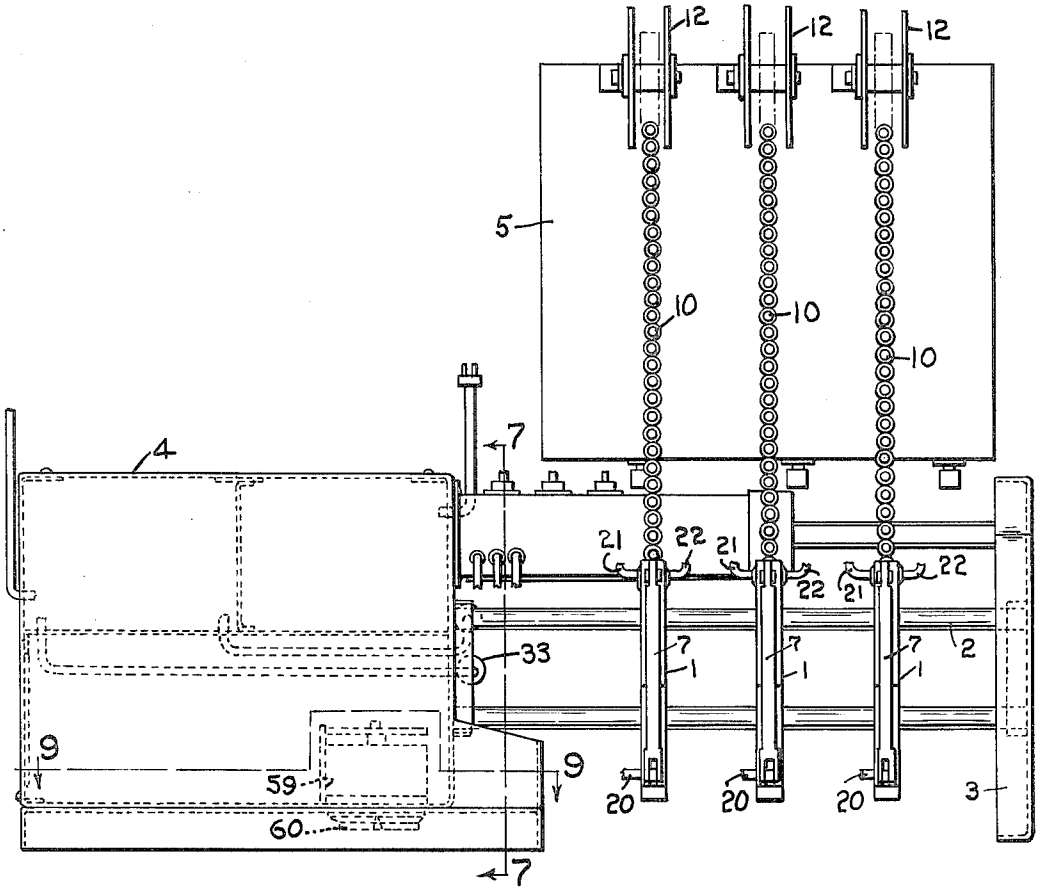
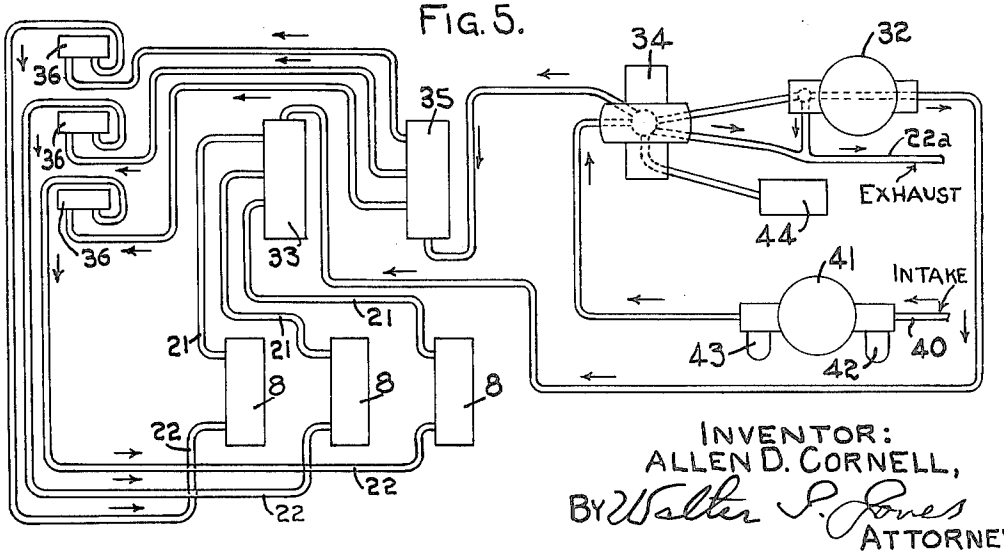


FIG. 5.



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SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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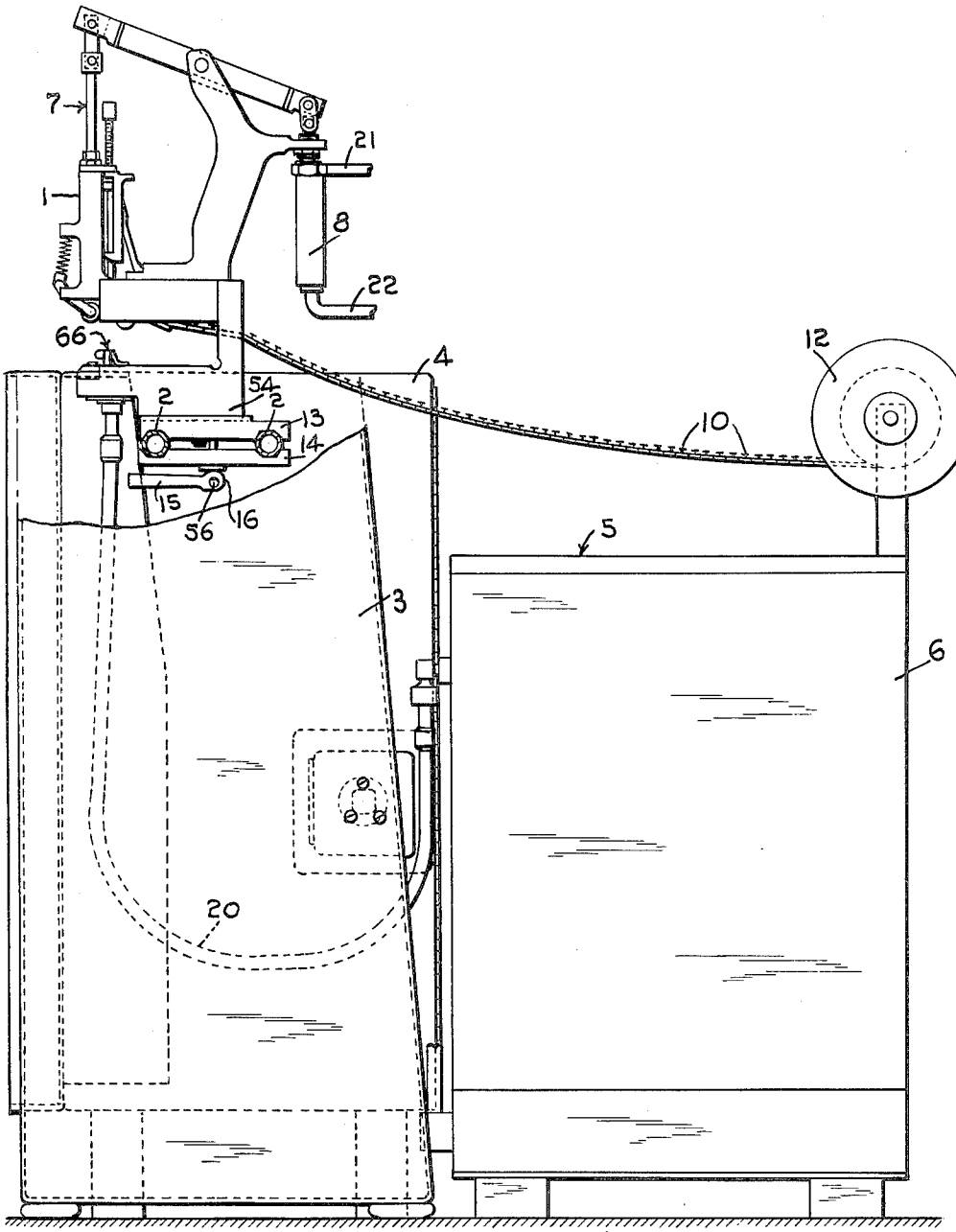
FIG. 6.



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SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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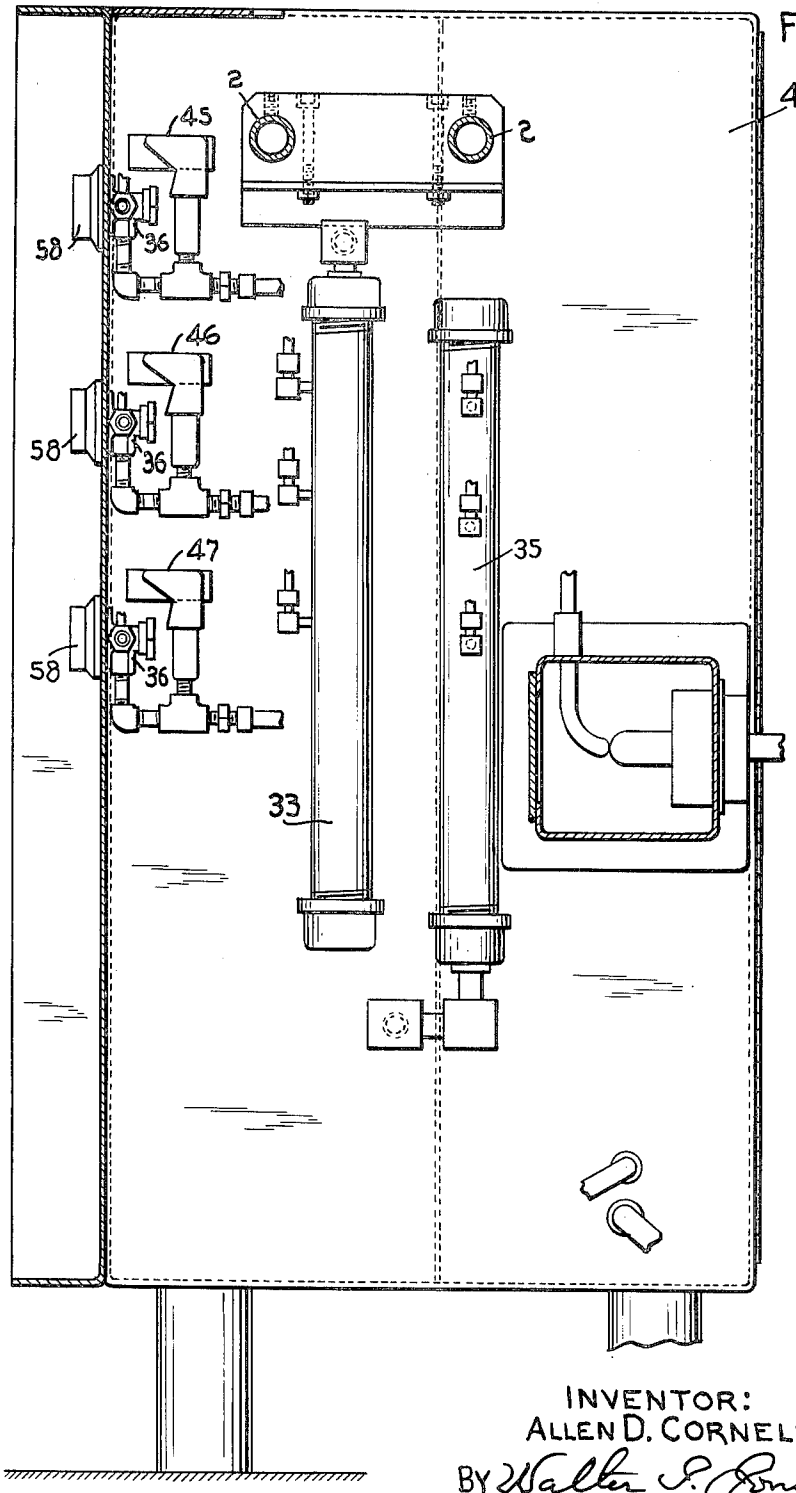
FIG. 7.



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SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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FIG. 8.

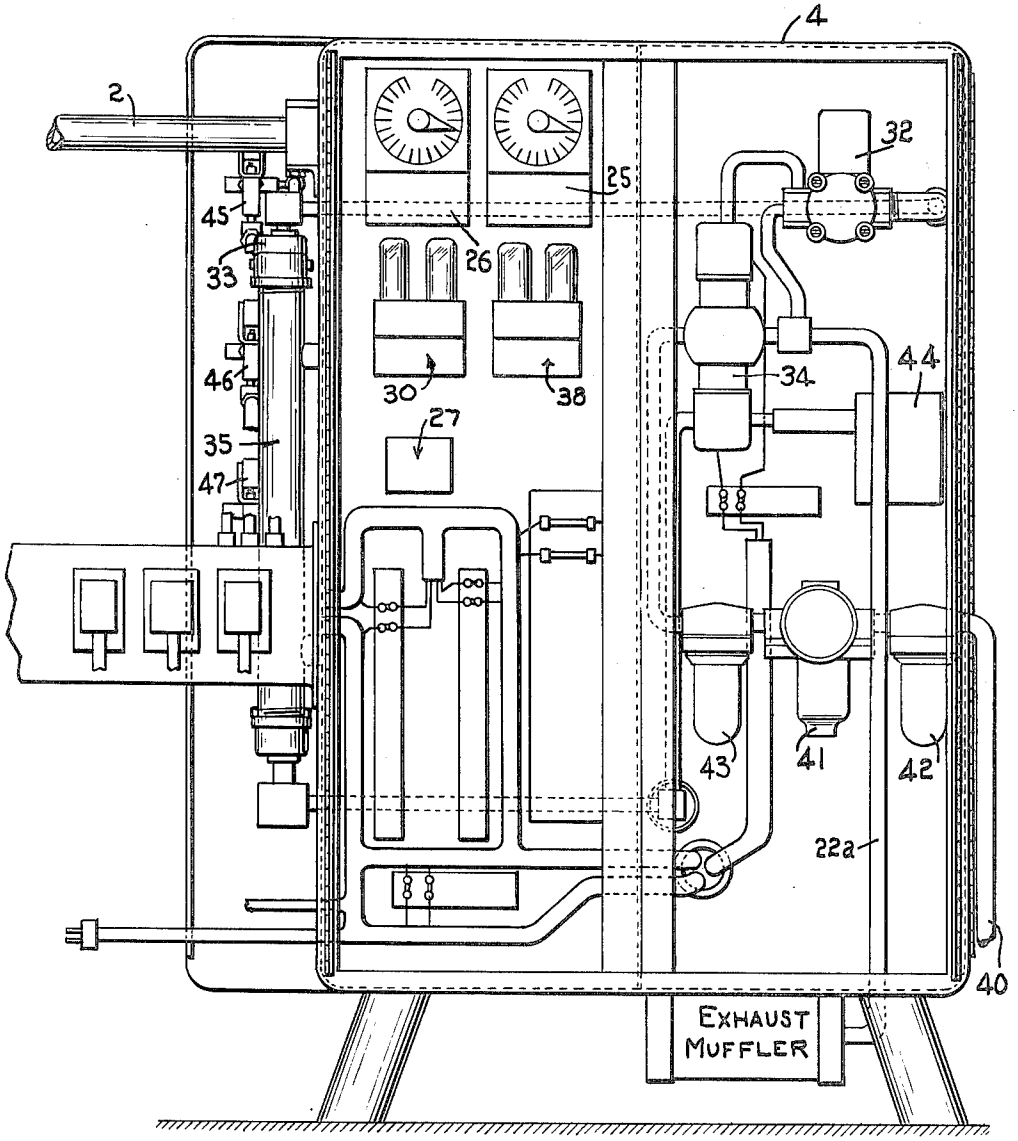

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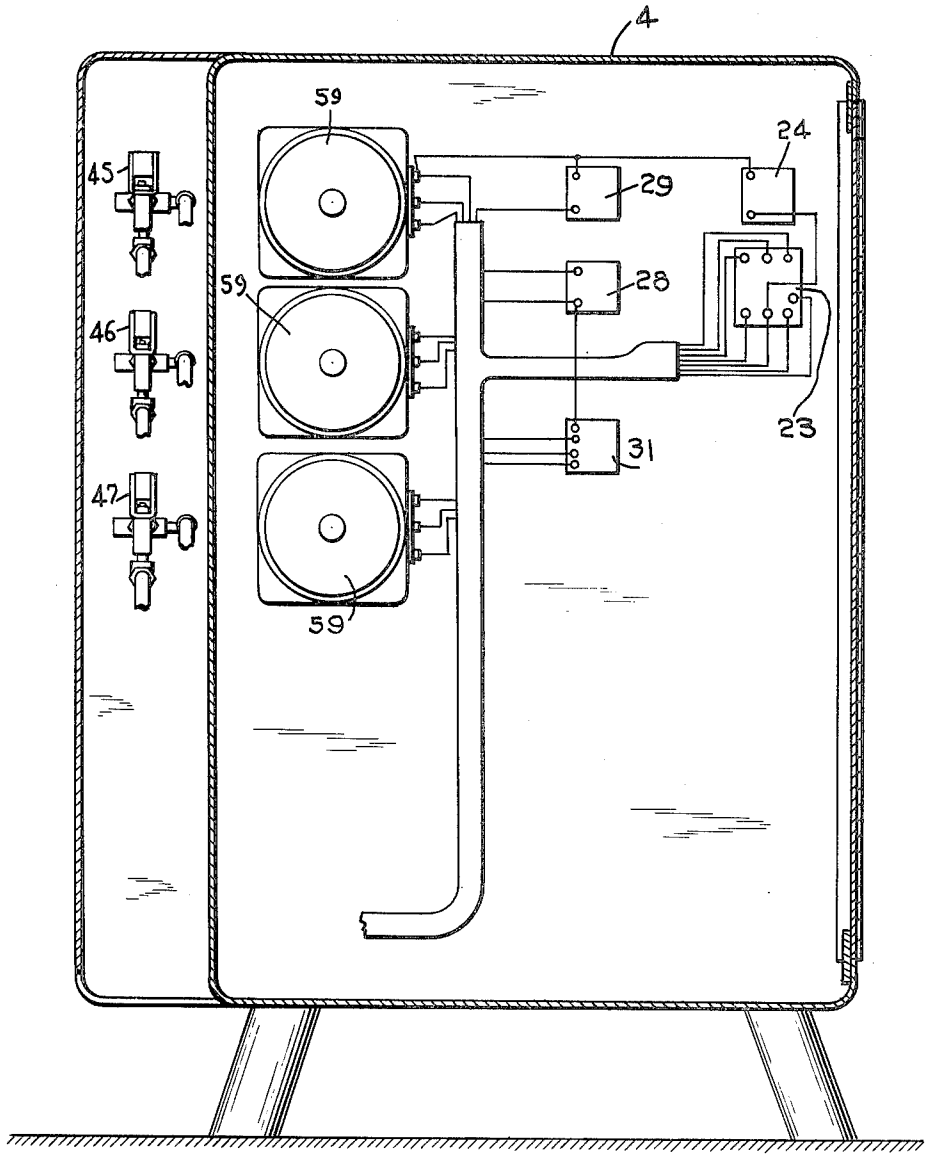
FIG. 9.



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SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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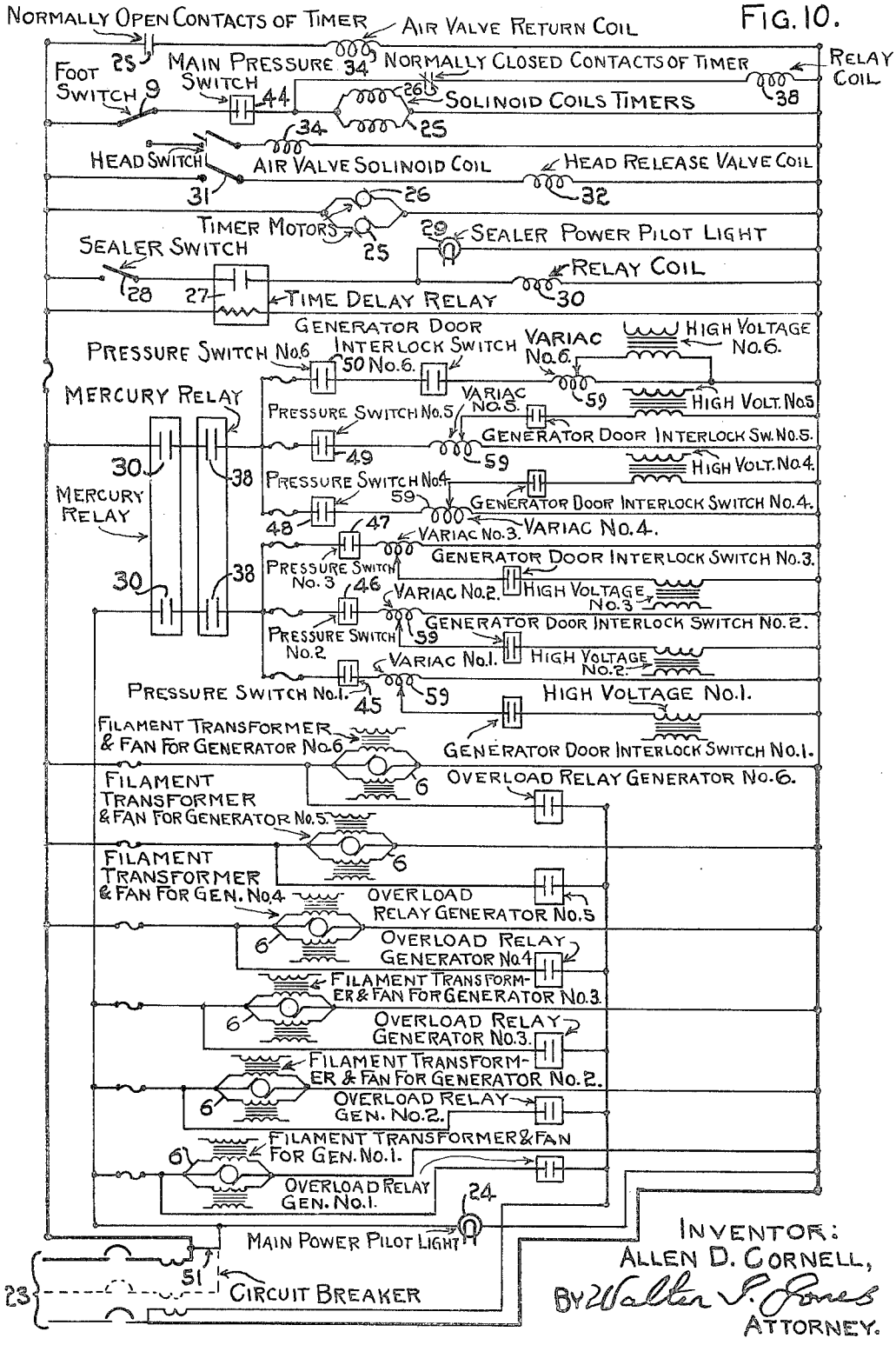
FIG. 10.



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SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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FIG. 11.

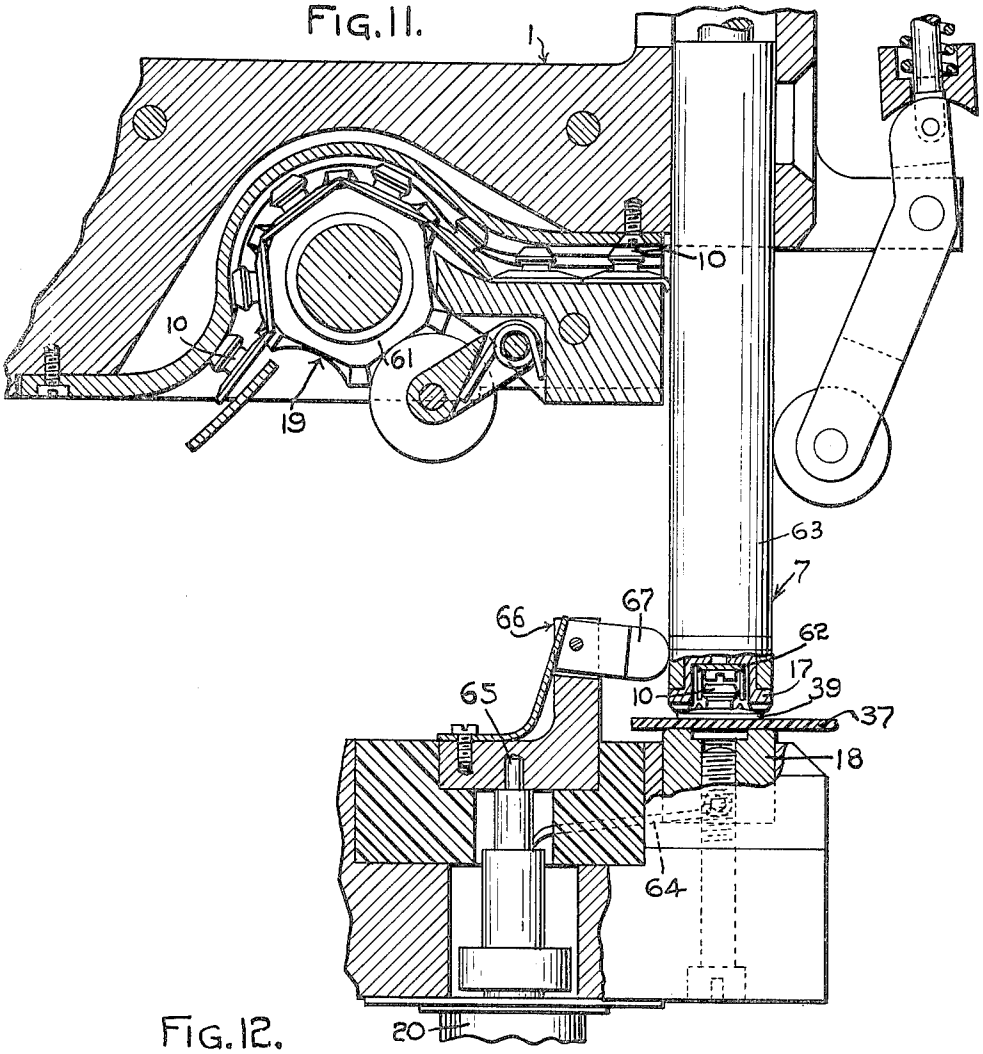
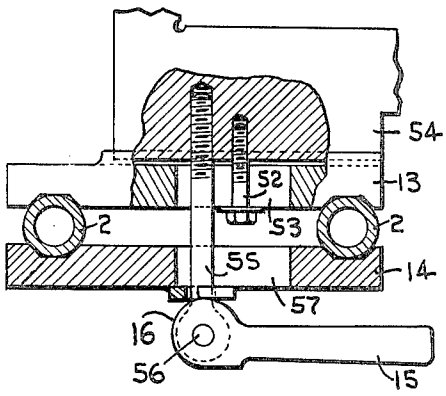


FIG. 12.



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United States Patent Office

3,238,082
Patented Mar. 1, 1966

3,238,082

SNAP FASTENER HEAT SEALING ATTACHING APPARATUS

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Continuation of abandoned application Ser. No. 88,506, Feb. 10, 1961. This application Aug. 25, 1964, Ser. No. 393,808

1 Claim. (Cl. 156—380)

This invention aims to provide apparatus primarily for attaching, by heat sealing, snap fastener studs and/or sockets, preferably made of heat sealable plastics, to any suitable article where snap fasteners are desired as a means of closing an opening in the article.

This application is a continuation of U.S. application Ser. No. 88,506 filed Feb. 10, 1961, now abandoned.

An object of the invention is to provide an automatic attaching apparatus of simple construction that will apply heat sealable snap fastener members to articles of commerce by an arrangement of parts that reduces the apparatus to simple constructions and association of parts.

Another object of the invention is to provide apparatus for attaching plastic based snap fastener members which apparatus preferably has more than one attaching head supported in a simple, easily adjustable arrangement and construction whereby several snap fastener members may be heat sealed by one cycle of the apparatus.

Another object of the invention is to provide an apparatus including new and simple arrangements of several units making up the apparatus in which adjustment of the snap fastener applying heat sealing mechanisms relative to each other is an easy operation and the controls for the apparatus are in a control cabinet and the high frequency power unit is a separate unit and that the controls and circuits are reduced to their simplest constructions for a multiple snap fastener applying apparatus.

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

In the drawings which illustrate a preferred embodiment of the invention:

FIG. 1 is a front view of the apparatus showing three attaching heads;

FIG. 2 is a plan view of a part of a chain of snap fastener studs to be applied by the apparatus;

FIG. 2*a* is a plan view of a portion of a snap fastener socket chain;

FIG. 3 is an edge view of the fastener studs shown in FIG. 2;

FIG. 3*a* is an edge view of the sockets shown in FIG. 2*a*;

FIG. 4 is a plan view of the apparatus shown in FIG. 1;

FIG. 5 is a diagrammatic view of the compressed air operated elements of the apparatus and controls of the air system;

FIG. 6 is an end view, partly broken away, of the apparatus as viewed from the right of FIG. 1;

FIG. 7 is an enlarged section taken on the line 7—7 of FIG. 4;

FIG. 8 is an enlarged elevation as viewed from the rear of the controls cabinet with the doors open to show some of the controls;

FIG. 9 is an enlarged section taken on the line 9—9 of FIG. 4;

FIG. 10 is a wiring diagram of the electrical elements of the apparatus;

FIG. 11 is an enlarged section taken on the line 11—11 of FIG. 1; and

FIG. 12 is a view, partly in section, showing the clamping means for one of the attaching heads.

The apparatus of the invention, as illustrated by the drawings, is a result of the necessity of providing apparatus for heat sealing plastic snap fasteners to articles such as baby pants, raincoats, envelopes and many other articles of commerce. The necessity for providing a simple apparatus of economical construction for applying a plurality of heat sealed snap fasteners, as for instance, three at a time, to baby pants and five or six at a time to raincoats has been brought to the inventor's attention because of previously known apparatus which has been more costly and more complicated in construction. Furthermore, users of the type of apparatus required have needed several machines to suit their production requirements, thus involving large expenditures in connection with previously known equipment.

It is contemplated that many hundreds of applicant's types of apparatus wil be required in the next few years and, therefore, it will be understood by those skilled in the art that expensive equipment may be saved by the use of the invention covered by this application. In a previously known apparatus, if six attaching heads were used, six of each of sealing timers, air control timers, double solenoid valves and main air valves would be used. When six attaching heads are used in applicant's new apparatus, it is only necessary to use one each of these named devices.

It should be understood from the beginning that various parts of the aparatus may be of any satisfactory standard construction as to electrical parts, air operated parts, controls, etc. It should also be noted that some of the parts of the apparatus are shown diagrammatically and/or in simple outline because those parts taken separately do not constitute the invention. This is particularly true with respect to the air supply system, the electric supply system and various units making up those systems.

Referring now to the particular embodiment of the invention illustrated by the drawings, there is shown an apparatus which includes a fastener applying heat sealing mechanism herein shown as three attaching heads 1 (FIGS. 1 and 4). These heads 1 are located on a supporting stand which is constructed to provide supporting guide means in the form of two parallel bars 2—2 (FIGS. 4, 6 and 13). The bars 2—2 are supported at one end by a frame portion 3 located at one end of the stand and at their other ends by a controls containing cabinet 4.

High frequency power unit 5 is preferably made up of several individual high frequency generators 6 herein shown as three in number (FIG. 1), one for each attaching head 1.

An air system is provided for operation of the moveable parts 7 of the attaching heads 1 and the operation of these parts 7 will be described more fully hereafter. This air system is preferably constructed so that the controls are contained in the controls cabinet 4 and may be connected to a supply of compressed air separate from the apparatus and the controls connected to the air operative cylinders 8 located at the attaching heads 1 (FIGS. 1 and 6). A diagram of the air system is shown in FIG. 5.

The various controls for the high frequency energy used at the fastener applying mechanism for heat sealing plastic snap fasteners to suitable articles are all mounted in, or attached to, the controls cabinet 4 except for the foot

operated switch **9** as best shown in FIG. 1. A diagram of the electrical parts of the apparatus is shown in FIG. 10

This apparatus is preferably constructed to attach either snap fastener studs **10** (FIGS. 2 and 3) or snap fastener sockets **11** (FIGS. 2*a* and 3*a*) or both (as desired) and these fasteners are formed of any suitable heat sealing plastic material.

The fastener members **10** and **11** may be fed to the attaching heads **1** in any suitable manner but it is preferred to supply them in chain form in reels **12** mounted on the power unit **5** as best shown in FIGS. 4 and 6.

The attaching heads **1** are mounted on the bars **2** by clamping means which include opposed plates **13** and **14** and a moveable pivoted handle **15** having a cam **16** which bears against a washer underneath the plate **14** (FIG. 12). By this clamping means it is possible to set the heads in various desired spaced relationship depending on the required locations of the snap fastener members upon the articles to which they are to be attached.

The attaching heads **1** may be of any suitable construction but those illustrated have an upper moveable attaching die **17** for holding a snap fastener member and a lower fixed die **18** as best shown in FIG. 11. Also shown in this FIG. 11 is a feeding means **19** for feeding the fastener chain to the upper die **17**.

Each attaching head is electronically connected to its own power supply unit **6** by means of a cable **20** and the connection between this cable **20** and the upper and lower dies is best shown in FIG. 11.

The air cylinders **8** which operate the moveable parts of the heads **1** are connected to the controls of the air system in the controls cabinet **4** by suitable tubing indicated as air supply tubes **21–22** (FIGS. 1, 4, 5 and 6).

To prepare the apparatus for operation, it is necessary to move the main power switch **23** (FIGS. 1 and 10) to an on position. This energizes the pilot light **24** and the filaments and fans of the generators **6**, motor of the air timer **25**, motor of the sealer timer **26** and the time delay relay **27**.

Next, the sealer selector switch **28** is moved to an on position, thereby energizing the sealer pilot light **29** and at the same time energizing the control relay **30**.

An air supply control head switch **31** (FIG. 1) is now moved to a position which energizes the valve **32** (FIGS. 8 and 10). Compressed air now flows through the valve **32** to the manifold **33**, then on to the top of each cylinder **8**, thereby insuring that the moveable parts **7** of the attaching heads **1** will be in their up positions.

The apparatus is now ready for attaching snap fastener members to an article which may be placed between the upper and lower attaching tools **17** and **18**. The operator now steps upon the foot switch **9** (FIG. 1), thereby causing electrical energy to flow through the electrical circuitry of the machine causing the following mechanical motions to take place. Air valve **34** now operates to exhaust air from the manifold **33** and associated tubing **21**. This valve **34** also directs air to the manifold **35** and through the manual control valves **36** (FIGS. 5 and 7), the tubing **22** and to the bottom of each head operating air cylinder **8** which in turn moves the mechanical leverage of each head, thereby forcing the moveable attaching tools **17** downwardly toward the work **37**, as shown in FIG. 11.

During the movement of the tools **17**, snap fastener members are picked from the ends of the fastener chains and carried downwardly against the work **37**.

When the fasteners are set tightly against the work **37** the timers **25** and **26** are energized along with the mercury relay **38** which remains energized until the sealer timer **26** has completed its cycle during which time high frequency electrical energy passes from the attaching tools **17** and **18** through the work **37** and fastener flanges **39**, thereby sealing the flanges tightly against the work to complete attachment of the fasteners to the work.

When the sealing timer **26** has completed its predetermined cycle, the mercury relay **38** is deenergized, thus ending the sealing cycle. Thereafter, air timer **26** completes its cycle and the double solenoid air valve **34** redirects air to the manifold **33** and exhausts the air from the manifold **35** through the tubing **21**, thereby causing the pistons (not shown) in the cylinders **8** to be forced downwardly and in turn move the moveable tools **17** away from the work **37** and to their uppermost normal positions.

A suitable air system for the apparatus illustrated, and thus far described, is shown diagrammatically in FIG. 5 and now will be described so that those skilled in the art will more fully understand the general principles of this relatively simple air system.

In FIG. 5 there is illustrated an air intake pipe **40** leading from a supply of compressed air to a unit **41** which controls air pressure to the system. This unit **41** includes an air filter *42* and a lubricator *43*. As composed air passes the lubricator a certain amount of lubricant is carried through the system by the air whereby the various valves of the air system may be automatically lubricated. From the unit **41** air passes to the air valve **34** which controls the air flow to the manifolds **33** and **35**. Air flows from the manifold **35** to manual air valves **36** which permit individual control of the air cylinders **8**.

Air then continues to the bottom ends of the head operating cylinders **8** thereby operating the attaching heads as described above.

In order for air pressure to return the fastener attaching heads to their normal positions, air flows from the valve **34** through the valve **32** and then to the manifold **33** as described above. When air is being moved under pressure to one end of each cylinder **8**, it is being exhausted from the other end of each cylinder through the proper tubing, in each instance and out through the exhaust tube **22***a* (FIGS. 5 and 8).

Referring now to the line wiring diagram shown in FIG. 10, the operation of the electrical circuitry of the machine may be described generally in connection with FIG. 10. The main power switch **23** is connected to any suitable power supply to admit electrical energy to the complete circuit. When the main power switch **23** is placed into the on position, electrical energy flows to light the main power pilot light **24**. At the same time the filament transformers and fans of the high frequency power generator units **6** become energized. In this case six of these high frequency power generators are shown so that there may be anywhere from one to six head units or fastener attaching units as desired. The closing of the main switch **23** also energizes the two timer motors **25** and **26**, and the time delay relay **27**. Next, the sealer switch **28** is closed, thereby energizing the sealer power light **29** and the relay coil **30**. The head switch **31** is now turned to the on position. This energizes the coil in the single solenoid operated air valve **32**. The machine is now ready for cycling and when the operator steps on the foot switch **9**, one coil in the double solenoid air valve **34** is energized. So long as the operator retains pressure on the foot switch, said valve **34** remains energized and the moveable upper attaching tool **17** of each attaching head is moved against the work **37**. Also, when the foot switch is depressed, air pressure is present in manifold **35** and closes the head control pressure switch **44**. For independent control of each head, similar pressure switches **45**, **46**, **47**, **48**, **49** and **50** are shown. Here again (in FIG. 10), six of these pressure switches are shown although the main apparatus illustrates the use of only three attaching heads so that three switches **45**, **46** and **47** are shown in FIG. 5. These independent head control pressure switches fail to operate at any time when the respective manual control valves **36** are in the off positions since no air pressure can exist past said valves.

When the operator releases the foot swtich **9**, it then returns to the normally closed position and this energizes the clutch mechanisms of the timers **25** and **26** and at

the same time it energizes the relay coil of the mercury relay **38**, thus allowing the high frequency sealing cycle to take place in each of the attaching heads. When the sealing timer **25** has come to the end of its predetermined cycle, the internal switch of the sealing timer **26** opens, thereby deenergizing the mercury relay **38** which in turn deenergizes the high frequency cycle. Thereafter a switch inside of the air timer **25** closes, thus energizing the other solenoid in the double solenoid air operated valve **34** thereby returning the heads to their normal positions.

When using four or more attaching heads, and in order to keep the current requirements and wire sizes to a minimum, a 220 volt center tapped supply is required. To indicate this wiring change, dotted lines are shown (FIG. 10) in connection with the main power switch **23**. For this wiring usage the wiring link **51** must be removed. This type of wiring arrangement will be understood by anyone skilled in this art.

The above description of the wiring circuit of the apparatus in connection with FIG. 10 is not supposed to be in the strictest detail as to all of the parts shown because anyone skilled in the art will understand that, in particular, the high frequency generators may vary in construction and, therefore, some of the devices such as the overload relays, variacs, interlocks, etc. have not been referred to by numbers. However, printed designations are indicated in connection with FIG. 10 to assist in identifying the parts.

Applicant's apparatus, described above, provides satisfactory equipment for attaching a plurality of heat sealable plastic studs or sockets, of snap fastener members, to an article in any desired spacing relative to each other. For instance, the attaching heads **1** may be moved toward and away from each other on the bars **2—2** for any desired spacing as set forth above. Furthermore, the heads **1** may be adjusted forwardly and backwardly relative to each other so that they may be in other than a straight line if such arrangement is desirable. This latter adjustment may be accomplished by any suitable mechanism but there is disclosed in FIG. 12 a simple bolt and slot arrangement including a bolt **52** passing through a slot **53** in the base plate **13** and threaded into the base **54** of the head **1**. The head **1**, in each instance, is slidably mounted upon the plate **13**.

From an inspection of FIG. 12, it will be apparent that the clamping means handle **15** and cam portion **16** is mounted upon a screw **55** by means of a pivot pin **56**. The screw **55** is carried by the base **54** of a head **1** and the shank of the screw passes through the slot **57** in the plate **14** and also through the slot **53** in the plate **13**. Thus, the clamping means for permitting adjustment of the heads toward and away from each other cooperates with the clamping screw **52** of the adjusting means for the head forwardly and backwardly as best shown in FIG. 12.

As previously stated, the apparatus includes a support for the attaching heads in the nature of the parallel bars **2—2**, end frame portion **3** and controls containing cabinet **4**. In conjunction with this is the high frequency power unit **5**. There is also included an air system (FIG. 5) and an electrical system (FIG. 10).

As stated before, the various valves and units of control for the air system and the various electrical devices that make up the electrical controls and power supply may be standard commercial units. Therefore, the detail constructions of these devices are not necessary of description to anyone skilled in the heat sealing and mechanical attaching machine arts.

In the air system the units **32**, **34**, **41**, **42**, **43** and **44** are best shown within the controls containing cabinet in FIG. 8. The air manifolds **33** and **35** are best shown in FIGS. 7 and 8. The pressure switches **45**, **46** and **47** for independent control of the air to each air operated cylinder **8** for each head **1** are best disclosed in FIGS. 7 and 8, and the knobs **58** for control of these switches are shown in FIGS. 1 and 7.

The controls for the electrical system are generally shown in various figures of the drawing more or less in unit outlines in addition to their being disclosed as symbols in FIG. 10. In this case the high frequency power units **6** (one for each head) are shown in FIGS. 1 and 6. The air timer **25** and the sealing timer **26** are shown in FIGS. 8 and 10 and the time delay relay device **27** is best shown in FIG. 8.

In order to adjust the power supply of each attaching head **1** I have shown variacs **59** (FIGS. 4 and 9). In the wiring diagram (FIG. 10 for each head) and in FIGS. 1 and 4 I have shown knobs **60**, as three in number, one for each of the heads **1** mainly shown and described.

While any suitable feeding means may be used to feed the chained snap fastener members from the reels **12** to the upper and lower attaching tools **17** and **18**, I have shown in FIG. 11 a rotary clutch operated member **61** mechanically connected for operation as a part of each attaching head. As the upper tool **17** is moved toward the lower tool **18**, a snap fastener member is picked up, by a yieldable clutch like device **62**, from the end of the fastener chain and carried toward the work **37**.

The upper tool **17** is formed of suitable metal for conducting electrical energy and the sleeve part **63** of the upper moveable means **7** of the attaching head **1** is of insulating material as shown in FIG. 11.

The lower tool **18** is of metal and connected to one lead end **64** of a coaxial cable **20** (FIGS. 1 and 11) supplying power from a generator **6** and the other lead end **65** is connected to a special contact device **66** including a pivoted contact **67**.

When the metal tool **17** engages the contact **57** and presses the flange of the fastener against the work **37** at the end of the down stroke of the moveable part of the attaching head, high frequency heat sealing power is supplied between the upper and lower tools **17** and **18** and the fastener flange **39** is heat sealed to the work **37** as will be understood by those skilled in the art. At the proper predetermined intervals of time, the apparatus operates to cut off the power supply and air pressure returns the moveable part of each head **1** to its normal position and the work **37** may now be removed.

It should be understood that no attempt has been made in the drawings to carry out all of the wiring and piping details because this is not the invention. Therefore, the piping design for the air (FIG. 5) and the wiring diagram (FIG. 10) are relied upon to teach those skilled in the art these features of the disclosure. In this connection it will be noted that some of the piping and wiring shown in FIGS. 7 and 8 is broken off and incomplete and that such devices as terminal boards and fuse boards are more or less diagrammatically shown in connection with some of the wiring.

It should be understood that applicant has illustrated and described an apparatus that has been built and tested in connection with a customer's product as per the disclosure and description of the application but the invention should not be limited thereby because it is best defined by the following claim.

What is claimed is:

An apparatus for attaching a plastic snap fastener from a continuous strip of such fasteners comprising, in combination, a plurality of snap fastener member applying heat sealing mechanisms, each in the form of a completely assembled combination heating and attaching unit, each mechanism including upper and lower dies, fastener feeding means and means operable to cause reciprocation of said upper die to separate a plastic fastener member from a strip and place the member against an article to which it is to be attached, said lower die being stationary and said upper die operating exclusively in vertical planes with respect to the article whereby a fastener member is separated from a strip and secured to the article in a single operating stroke of said upper die, said apparatus includ-

ing a supporting guide bar constructed to support said fastener applying mechanisms as individually adjustable units in movable spaced relation to each other, and clamping means interposed between said mechanisms and said guide bar, said clamping means being releasable to permit relative adjustment of said mechanisms as complete units whereby fastener members may be applied in any desired spaced relationship to each other on an article.

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EARL M. BERGERT, *Primary Examiner.*

P. DIER, *Examiner.*