

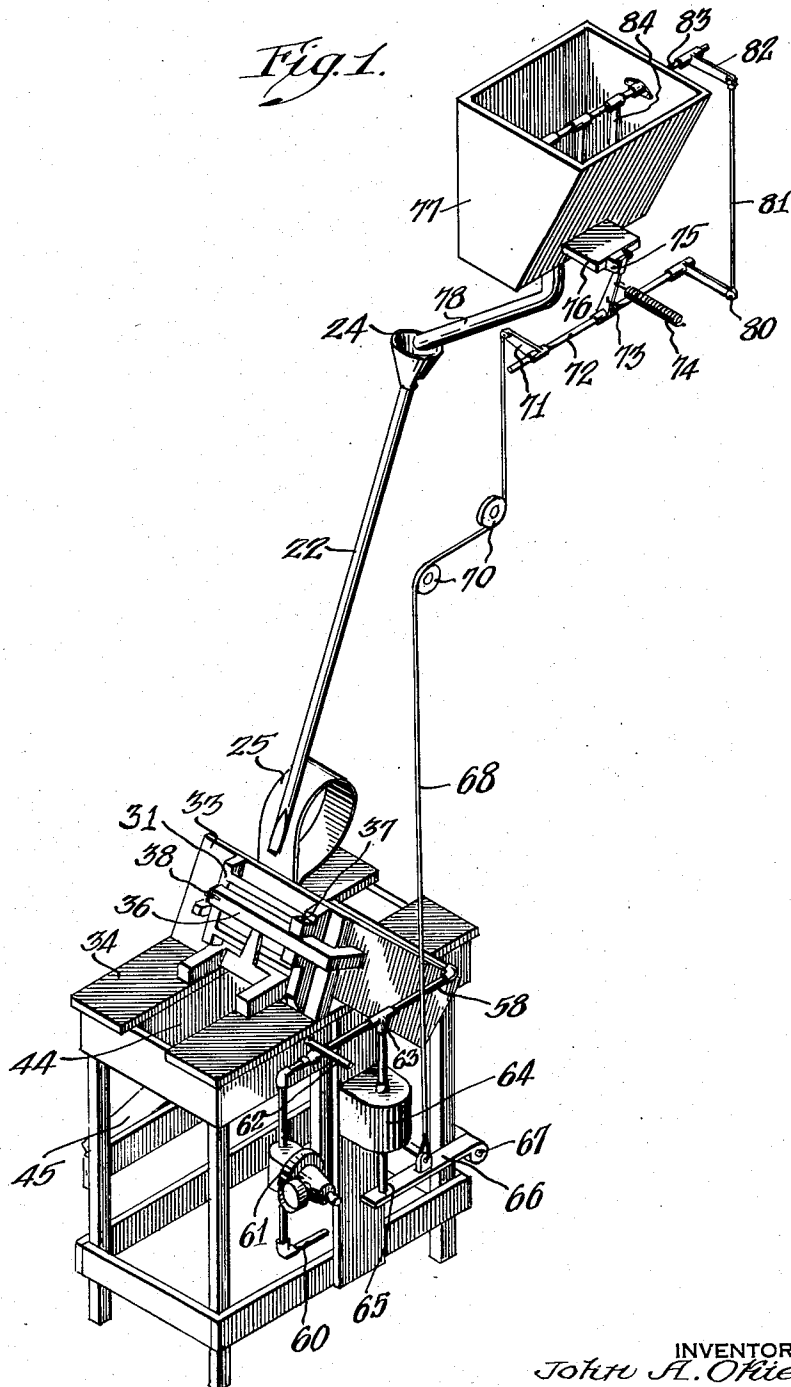
Dec. 8, 1953

J. A. OKIE
INSECTICIDE PACKAGE

2,661,981

Filed July 12, 1949

4 Sheets-Sheet 1



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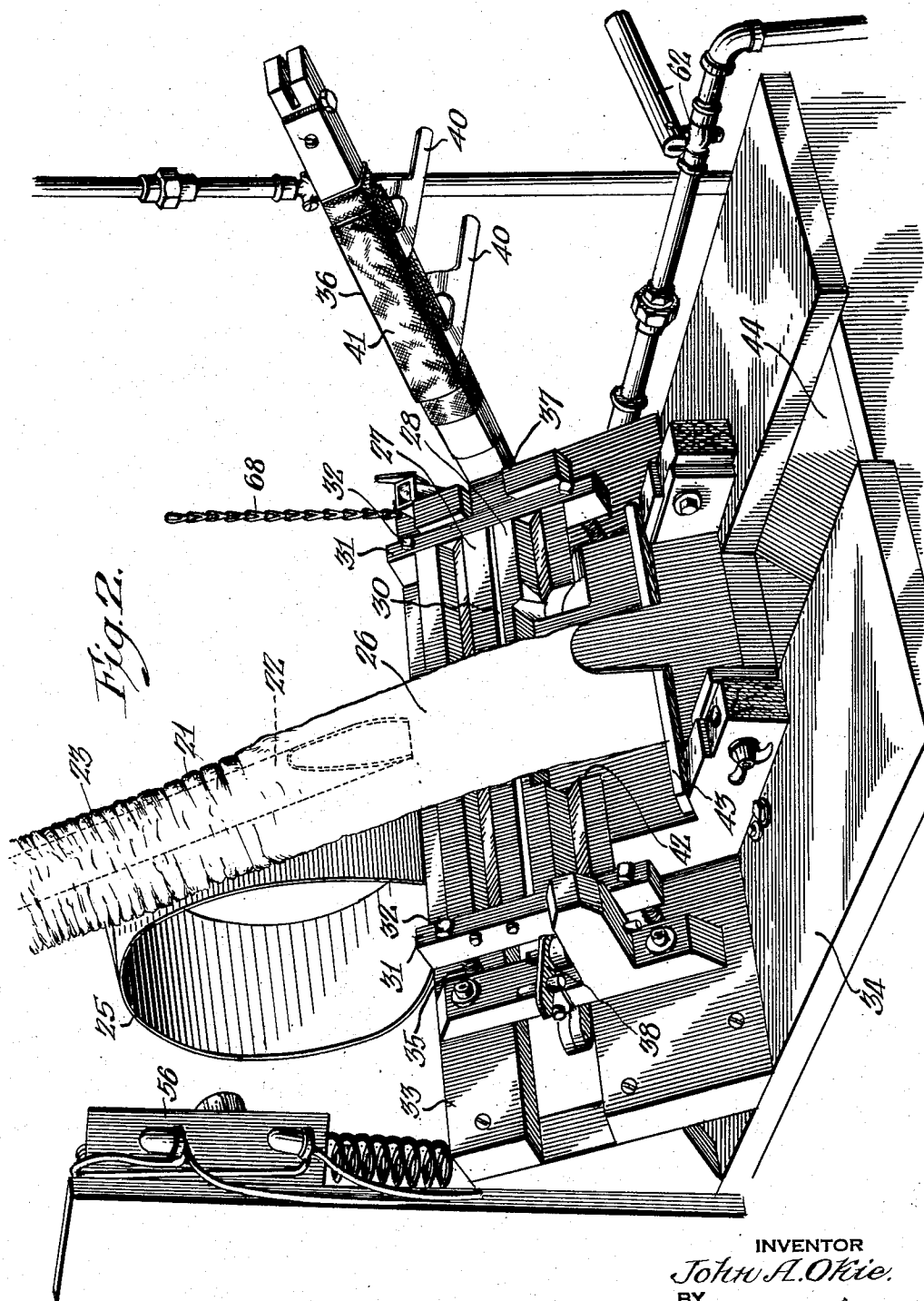
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4 Sheets-Sheet 3

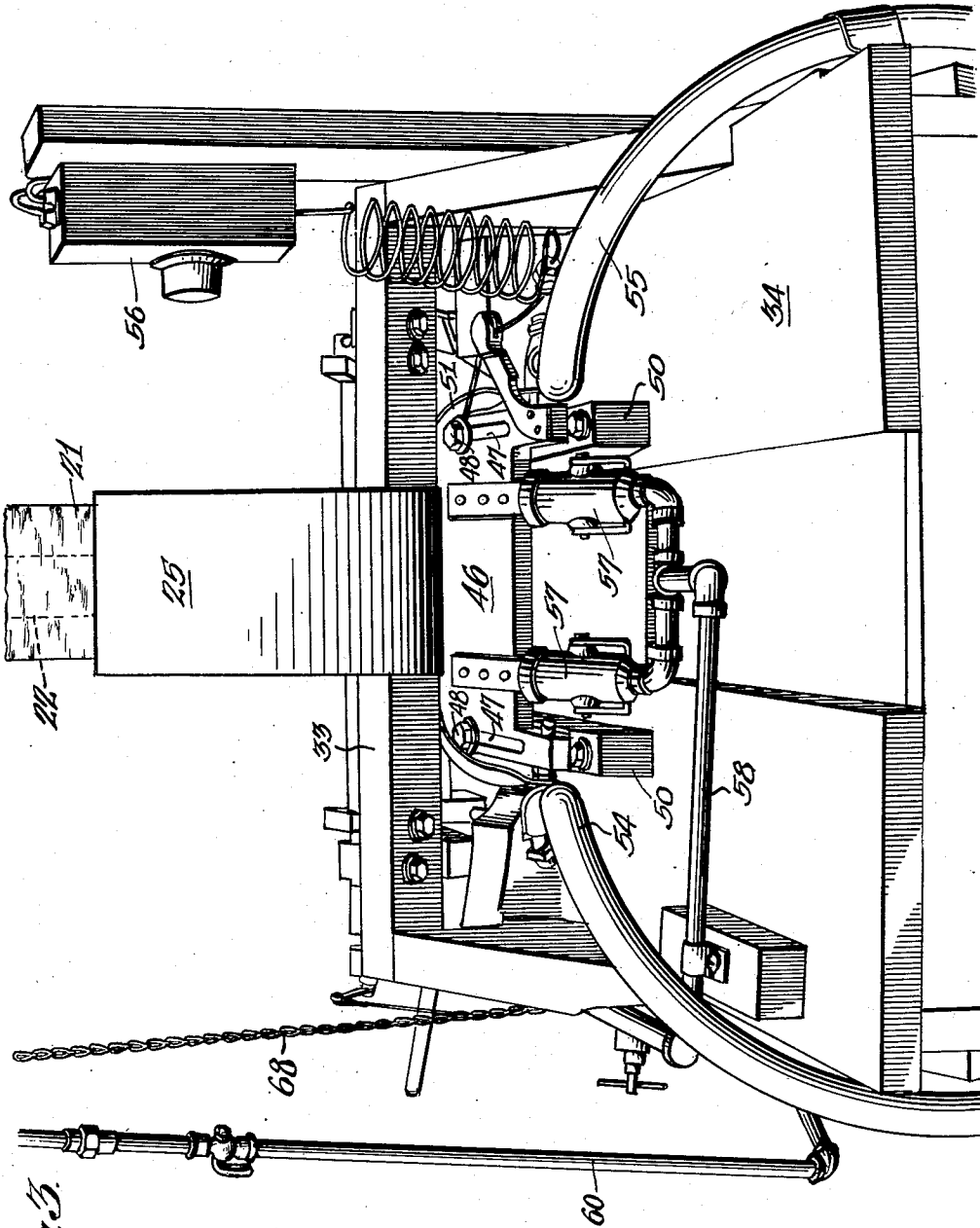


Fig. 3.

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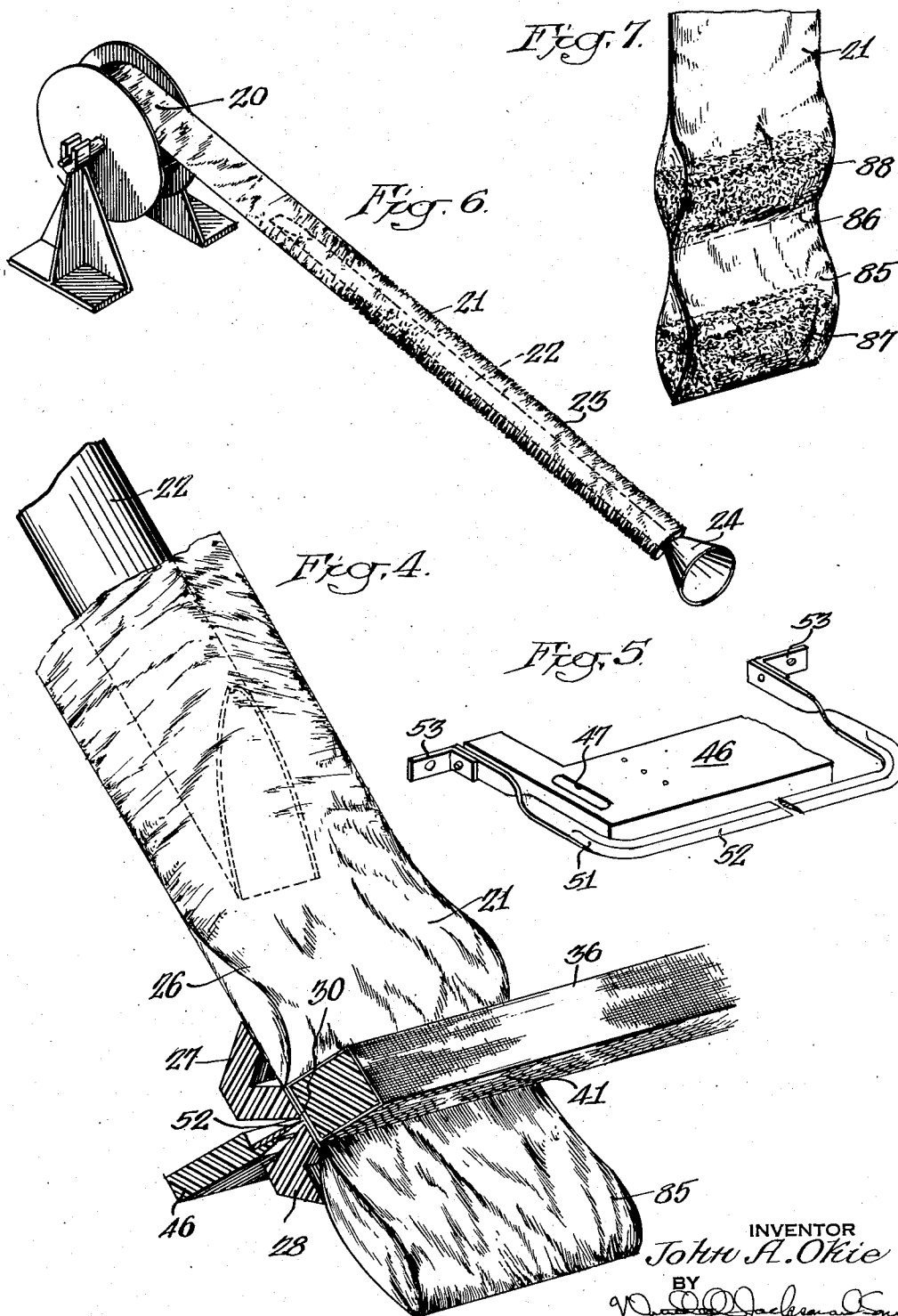
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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INSECTICIDE PACKAGE

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Application July 12, 1949, Serial No. 104,303

3 Claims. (Cl. 299-24)

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The present invention relates to packages for insecticides, to processes of packaging and to packaging mechanism.

The present application has been divided, the subject matter on the process appearing in my application Serial No. 168,087, filed June 14, 1950 for Method of Packaging and the subject matter relating to the packaging mechanism appearing in my patent application Serial No. 168,088, filed June 14, 1950 for Packaging Mechanism. Both of these are now abandoned.

A purpose of the invention is to package solid paradichlorobenzene in a polyethylene bag which is readily pervious to the vapor of the paradichlorobenzene, but inert to the solid, thus protecting the solid material and providing an atmosphere of paradichlorobenzene vapor around the bag.

A further purpose is to surround an elongated feed pipe or nozzle by an elongated thermoplastic plastic tube, preferably crinkled on the pipe, to feed successive charges of material to be packaged through the pipe, and to heat seal and cut off successive bags of plastic at the end of the pipe.

A further purpose is to simultaneously heat seal and cut the tube by a heated knife.

A further purpose is to clamp the tube on either side of the point of cutting and heat sealing, preferably by a cushion against which the knife operates.

A further purpose is to feed the tube progressively downward under the weight of each successive charge of material to be packaged.

A further purpose is to advance the knife by a plunger or plungers, desirably operated by the same mechanism which operates the feed.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate one only of the numerous embodiments in which my invention appears, selecting the form shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a diagrammatic perspective view of the machine employed in the present invention, omitting the plastic tube.

Figure 2 is an enlarged fragmentary front perspective of the cutting and heat sealing mechanism of Figure 1, and including the thermoplastic plastic tube omitted in Figure 1.

Figure 3 is a rear perspective of the mechanism shown in Figure 2 from the front.

Figure 4 is an enlarged fragmentary sectional perspective of the heat sealing and cutting.

Figure 5 is a fragmentary perspective of the knife and its supporting structure.

Figure 6 is a perspective illustrating the threading of the pipe through the thermoplastic plastic tube.

Figure 7 is an illustration of the completed bag

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at the moment of cutting, showing the next bag in process of formation.

Describing in illustration but not in limitation and referring to the drawings.

The present invention is concerned primarily with the packaging of an insecticide, although the process and principles of the machine are applicable to other types of packaging.

Paradichlorobenzene has been widely used as an insecticide to protect against moth and other insects such as silver fish in the home and in industrial establishments. The packaging of the material has presented a difficult problem, as it is desirable to have the vapor free to leave the package and permeate the atmosphere of a closet, bureau drawer, chest, or other space in which the insecticide is being used. Accordingly, various perforated metallic containers have been employed, these being bulky, inconvenient and subject to contamination of the clothing or other materials when they corrode or when they collect moisture.

Many of the available plastic sheet materials are not well suited to use in packaging paradichlorobenzene, because they are impervious to its vapors, and it is necessary therefore to open them or perforate them in order that the vapor can escape. Even though they may be opened or perforated, the extent of vaporization is limited to that permitted by air circulation through the openings or perforations, and the package is comparatively inefficient. Furthermore, there is a tendency for solid paradichlorobenzene to escape through any perforations and become mixed with clothing or other objects.

Accordingly the generally available plastic sheet materials offer no particular advantage over metals for packaging paradichlorobenzene.

I have discovered that polyethylene pliable sheet has the unique property of passing vapor of paradichlorobenzene very readily. Thus solid paradichlorobenzene in any suitable form such as flakes, crystals or powder can be completely sealed in polyethylene sheet, thus preventing the escape of any powdered material, and yet the vapor will freely pass through the polyethylene sheet and permeate the surrounding atmosphere. Unlike the prior art packages in which the vapor has escaped only through perforations, the vapor of the paradichlorobenzene passes freely through all portions of polyethylene, thus greatly increasing the efficiency of the package in creation of vapor concentrations to protect against insects.

The creation of a polyethylene bag for paradichlorobenzene is best accomplished by heat sealing the ends of polyethylene tubing. I find that very simple mechanism can accomplish this purpose. I preferably employ a vertically disposed feed pipe or nozzle around which the plastic tube extends, feed the plastic tube progressively downward as the bags are made, and make each bag by heat sealing the end of the tubing, filling one

charge into the end behind the heat seal, and then heat sealing and cutting off the tube behind the charge. I find that the new heat seal for the next bag can conveniently be made at the same time.

The tubular polyethylene sheet is conveniently supplied in a roll 20 as shown in Figure 6. A suitable length of tubing 21 from the roll or other source is threaded on a feed pipe or nozzle 22 as shown in Figure 6, suitably longitudinally compressing or crinkling the tubing as indicated at 23, so that the amount of tubing placed on the pipe can conveniently be several times the length of the pipe. The tubing is then cut off at the end adjoining the roll 20 and the feed pipe is placed in a vertical position with sufficient inclination to provide gravity feed of material as shown in Figures 1 and 2.

For connection to the feed hopper, the top of the pipe is desirably provided with a funnel 24.

At the lower end of the pipe it is suitably engaged by a spring grip 25 which holds back the mass of crinkled plastic tube and allows the lower end of the tube to feed downward as the weight of each successive charge pulls down on the tube. Thus the lower portion 26 of the tube below the grip 25 is comparatively straight and free from crinkling.

Below the end of the pipe and at one side of the tube are located spaced clamp pads 27 and 28 on either side of an intermediate slot 30 extending transversely of the tube. The pads 27 and 28 are mounted in a frame 31 which is resiliently supported on guide bolts 32, the bolts being mounted on a suitably upstanding portion 33 of a machine bed 34. Between the portion 33 of the bed 34 and the frame 31, the bolts 32 are surrounded by springs 35 which urge the frame toward the plastic tube.

Cooperating with the pads 27 and 28 of the clamp and bridging the slot 30 is a cushion 36 on the other side of the tube, pivoted at 37 to the upstanding portion 33 of the bed 34 on one side of the frame and, in closed position as seen in Figure 1, latching at 38 to the opposite side of the portion 33 of the bed plate. When the cushion is pressed into latching position the springs 35 are slightly compressed so that the pads firmly grip the tube against the cushion on either side of the slot 30. The cushion carries spring clips 40 holding a suitable heat resisting cushion material 41 on the surface of the cushion. The material employed at 41 may be any suitable heat resisting fabric or elastomer which does not weld with polyethylene. For example, a cotton fabric coated with a commercial silicone oil has been found to be quite satisfactory. Any other well known heat sealing cushion material may be used.

The lower portion of the frame 31 is recessed at 42 to aid in access to the finished bag by the hand for removal. Spaced at a suitable distance below the slot 30 is the bottom abutment 43 mounted on the front of the upstanding portion 33 of the bed. In the front of the bed an opening 44 is provided, which empties into a chute 45 to receive the finished bag.

At the back of the upstanding portion 33 is mounted a heating head 46 best seen in Figures 3 and 5. The head is directed toward the slot 30 and has elongated slots 47 (Figure 3) which receive guide bolts 48 from guides 50 on the bed, to guide the forward and retraction motion of the heating head.

Mounted on the head 46 at its opposite ends is

a knife 51 extending across the length of the slot 30. The knife is an elongated metal strip having a cutting face 52 and having end terminals 53. In the preferred embodiment it is made of a suitable electrically conducting metal of relative high electrical resistance, such as steel, Nichrome, or bronze.

The knife is electrically connected to electric power leads 54 and 55. In circuit with the knife and the power source is a control rheostat 56 which regulates the extent of electric resistance heating of the knife. The knife is preferably kept at the temperature of about 175 to 200° F.

The heating head is actuated by fluid plunger cylinders 57 supplied with fluid by fluid pipe 58. The fluid preferably used is compressed air. The cylinders contain internal springs and exhaust connections, not shown and well known, which retract the knife when the cylinders are cut off from their source of air pressure.

The fluid under pressure is received through a main pipe 60 and a pressure regulator 61 to a main control valve 62 in position to be operated in any suitable way. In the illustration shown it has not been considered necessary to mechanize the operation of the valve 62 by the machine and accordingly it is placed for operation by the hand of the operator. Beyond the valve 62 the fluid pipe branches at 63, one branch 58 passing to the air cylinders for the knife as already explained.

Another branch passes to an air cylinder 64 which operates a piston 65 pivotally connected to a lever 66 which is mounted on a fixed pivot 67. Intermediate between the ends, the lever connects to a suitable flexible connection 68 which passes over guide pulleys 70 and connects to a rocker arm 71 on a rock shaft 72. The rock shaft carries another rocker arm 73, spring urged by a spring 74 to the position of actuation when the air cylinder is operated, and pivotally connected at 75 to a valve 76 in the bottom of a hopper 77 containing material to be packaged, such as paradichlorobenzene crystals. Below the valve a pipe 78 leads into the funnel 24 at the top of the feed pipe 22. The rock shaft 72 has another rocker 80 which is connected by a link 81 to a rocker 82 on a rock shaft 83, which extends across the top of the hopper and carries agitators 84 in the hopper.

Figure 7 illustrates bag 85 which has been filled with its contents 87 and has just been cut on line 86 and heat sealed on both sides of that line. Immediately above the bag 85 the next bag is partially formed, having been heat sealed at the bottom and having received its charge of material 88 to be packaged.

In operation, with the hopper full of material to be packaged, a length of thermoplastic plastic tubing 21, preferably polyethylene, is threaded on the pipe 22 as shown in Figure 6. By crinkling, a considerable amount of plastic tubing can be threaded on the pipe.

The pipe, threaded through the plastic tube, is now placed in position in the machine as shown in Figure 1, and the bottom of the tube is positioned slightly below the slot 30 while the clamp is locked by swinging the cushion into the closed position and engaging it with the latch 38, thus gripping the tube. The valve 62 is then opened, actuating pneumatic or other fluid plungers 57 to move the knife forward against the tube. The knife is hot due to the resistance heating from the electric current, and in a few seconds it cuts the plastic while at the same time

the knife sides on either side of the actual cutting edge fuse together the plastic on both sides of the cut. This same behavior will occur whether the plastic is polyethylene or some other thermoplastic plastic such as polyvinyl chloride, polyvinyl acetate, polyvinyl chloride-acetate, cellulose acetate, cellulose acetate-butyrate, or the like.

At the same time that the opening of valve 62 causes the knife to move forward, the pressure fluid is admitted into the cylinder 64, causing the piston 65 to move up and likewise swinging the lever 66 up at its free end, and allowing the flexible connection 68 to move up under the action of spring 74. This causes the rock shaft to open the valve 76 and to move the agitators 84 in the hopper, so as to discharge a charge of material through the pipe 78 into the funnel 24 and down the feed pipe 22 into the bottom of the plastic tube. The valve 76 in the hopper may be of the measuring type as well known, which will discharge the same charge regardless of how long it is kept open.

As soon as the valve has been open for a sufficient length of time to allow the knife to cut and heat seal the tube, the operator will close the valve, thus causing the knife to retract under the action of the springs in the cylinders 57, and thus causing the hopper valve 76 to close by the action of the spring in the cylinder 64 which moves the piston 65 downward and pulls down on the flexible connection 68 to close the valve 76 and at the same time again agitate the hopper.

As soon as the heat seals have cooled slightly, the operator opens the clamp by releasing the latch 33 and swinging the cushion to the position shown in Figure 2. The bulk of the crinkled portion of the tube above the spring grip 25 does not feed down due to the engagement of the spring grip but the lower portion 26 feeds down under the action of gravity of the charge until it touches the abutment 43, and the lower portion 26 is comparatively smooth and free from wrinkles, but flattened as shown in Figure 2.

The operator now again closes the clamp to make the cutoff and seal at the top of the first bag and the seal at the bottom of the next bag, and opens the valve 62, causing the knife to move into contact with the tube, cutting it and heat sealing at both sides of the cut. At the same time the air cylinder 64 causes the hopper valve to open and deposit a charge of material to be packaged in the bottom of the next bag. As soon as the valve 62 is closed the knife retracts and the hopper valve closes. The bottom of the tube is then in the condition shown in Figure 7, the bottom bag 85 being fully heat sealed and just cut off and the next bag having received its heat seal immediately above the cut line 86, while the next charge has entered the bag above. There are thus two charges, 87 in the lower bag and 88 in the upper bag.

It will be evident that while the charge 88 above the cut comes down while the cut and heat seals are being made, due to the clamping the weight of this charge is not borne by the upper heat seal until after the clamp is removed. Therefore the heat seal by this time is somewhat cooled and therefore stronger.

As soon as the clamp is opened, the lower bag is removed from its position on the abutment 43 and dropped through opening 44 into the discharge chute 45. Due to action of gravity under the weight of the charge 88, the forward or

lower end of the tube now moves downward until it contacts the abutment 43. Thus the feeding of the plastic tube is accomplished by the combination of the gravity action on the charge and the retarding action of the spring grip 25. The next operation can then begin, by again closing the clamp, opening and then closing the valve 62, opening the clamp, removing the lower bag, and allowing the next bag to feed under gravity action.

It will be evident that by the present invention it is possible to package a large number of bags with any suitable material, preferably a dry granular or powdered material, and the invention is therefore applicable to a wide variety of plastic packaging tubes and materials to be packaged, although it is primarily intended for use in obtaining a vapor permeable package of paradichlorobenzene by flexible polyethylene sheet.

It will be evident that while a flexible polyethylene bag is fully permeable to the vapor of paradichlorobenzene it is otherwise hermetically sealed, and therefore will not accumulate moisture or allow escape of solid material.

The bag is at the same time so soft and convenient that it can be readily used as the manner of a sachet bag to intersperse among clothing and provide protection against insects, particularly moths.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the process, machine and product shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

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

1. An insecticidal article which comprises: (1) a sealed bag of polyethylene sheet which freely passes the vapor of paradichlorobenzene and (2) solid paradichlorobenzene in the bag, the vapor of the paradichlorobenzene passing freely through the bag and entering the air around the bag, the polyethylene sheet being exposed freely to the atmosphere on the outside and to the paradichlorobenzene on the inside.

2. An insecticidal article consisting of (1) a tube consisting of polyethylene sheet having fused seals at both ends and (2) paradichlorobenzene inside thereof, the polyethylene sheet being exposed free to the atmosphere on the outside.

3. The use of a sealed polyethylene envelope, freely exposed to the atmosphere on the outside, and having paradichlorobenzene on the inside, to inhibit insects in places outside of said envelope.

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