

Nov. 8, 1966

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3,283,671

BAG MAKING MACHINE

Filed Dec. 16, 1963

6 Sheets-Sheet 1

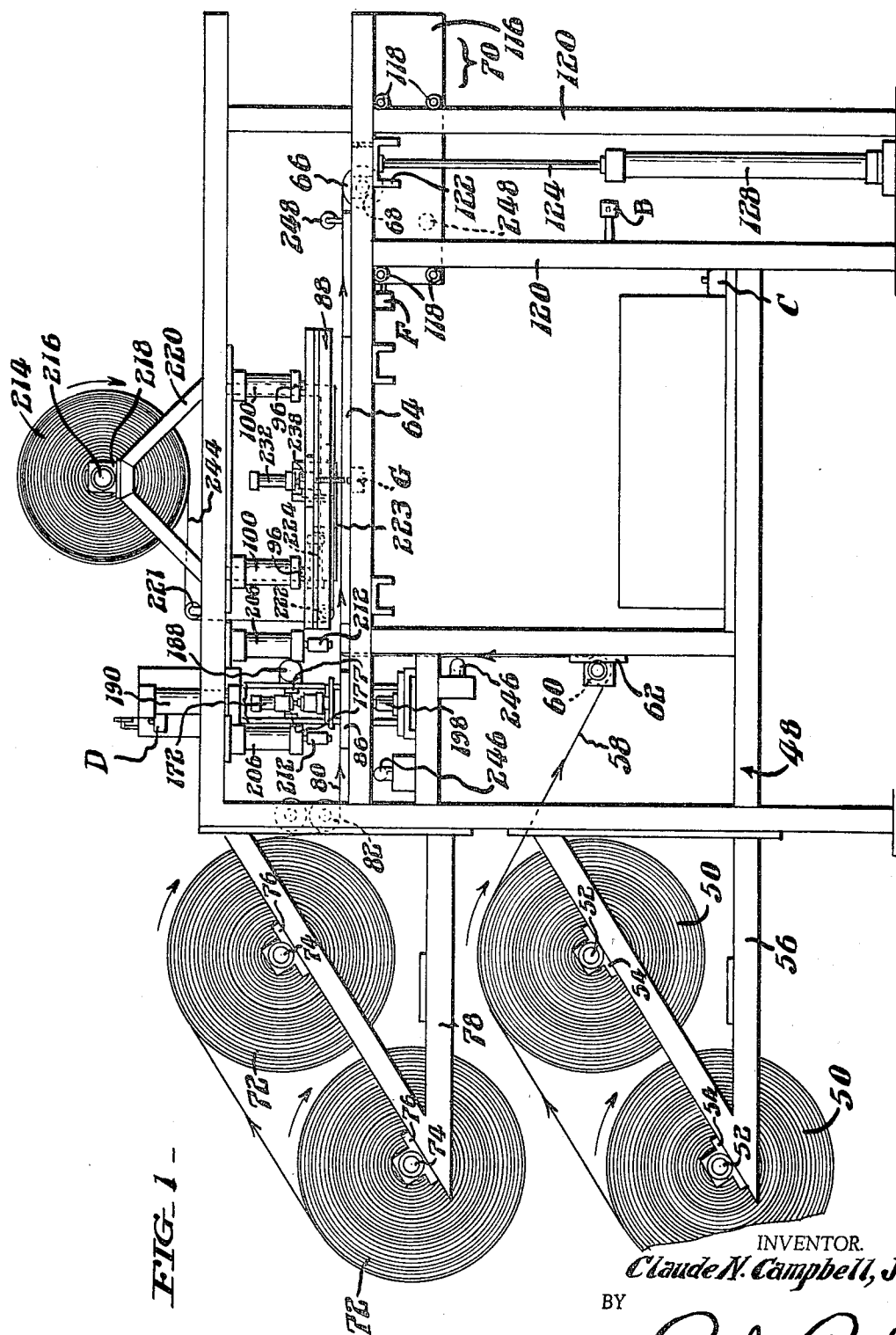


FIG. 1 -

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6 Sheets-Sheet 2

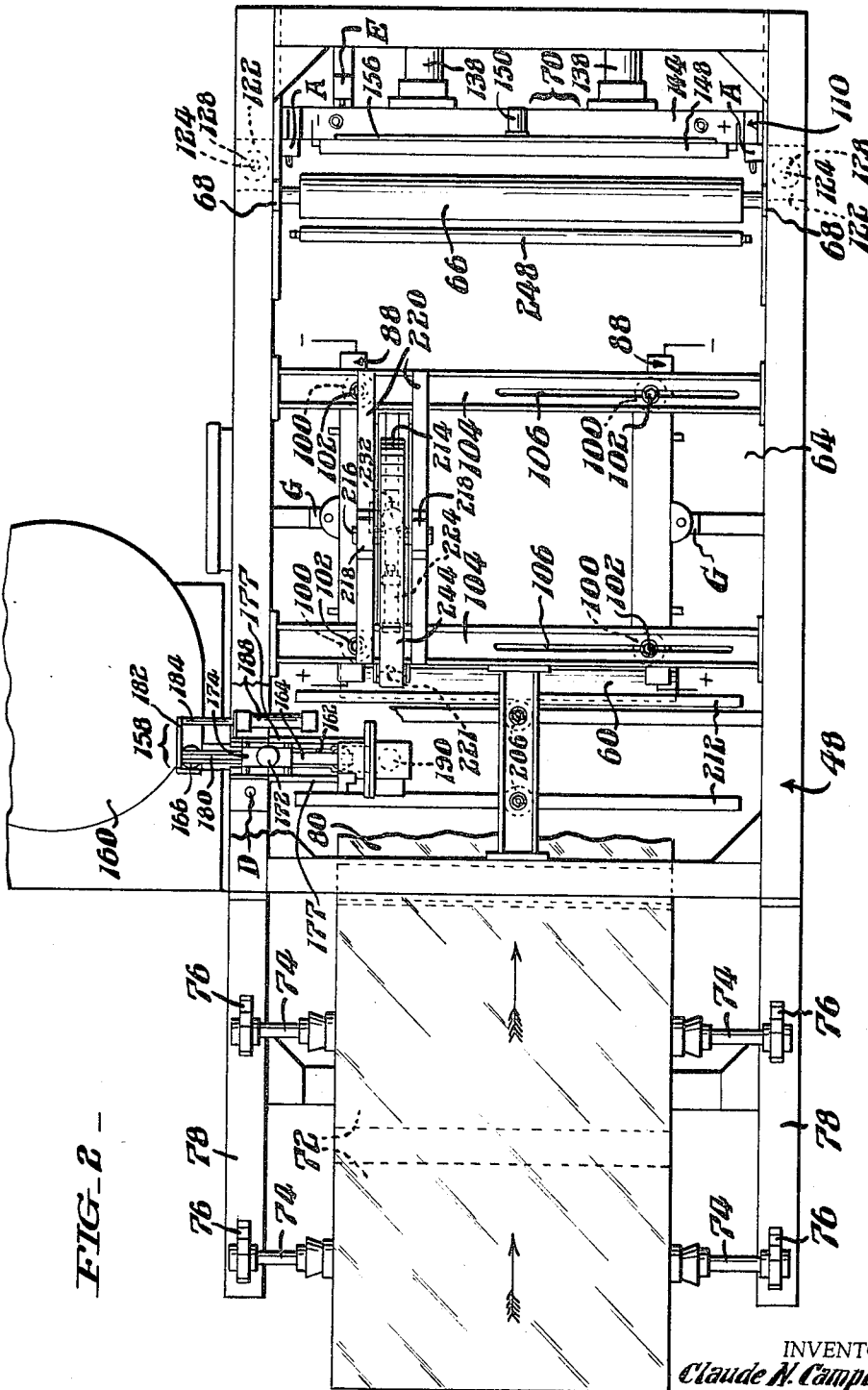


FIG. 2 -

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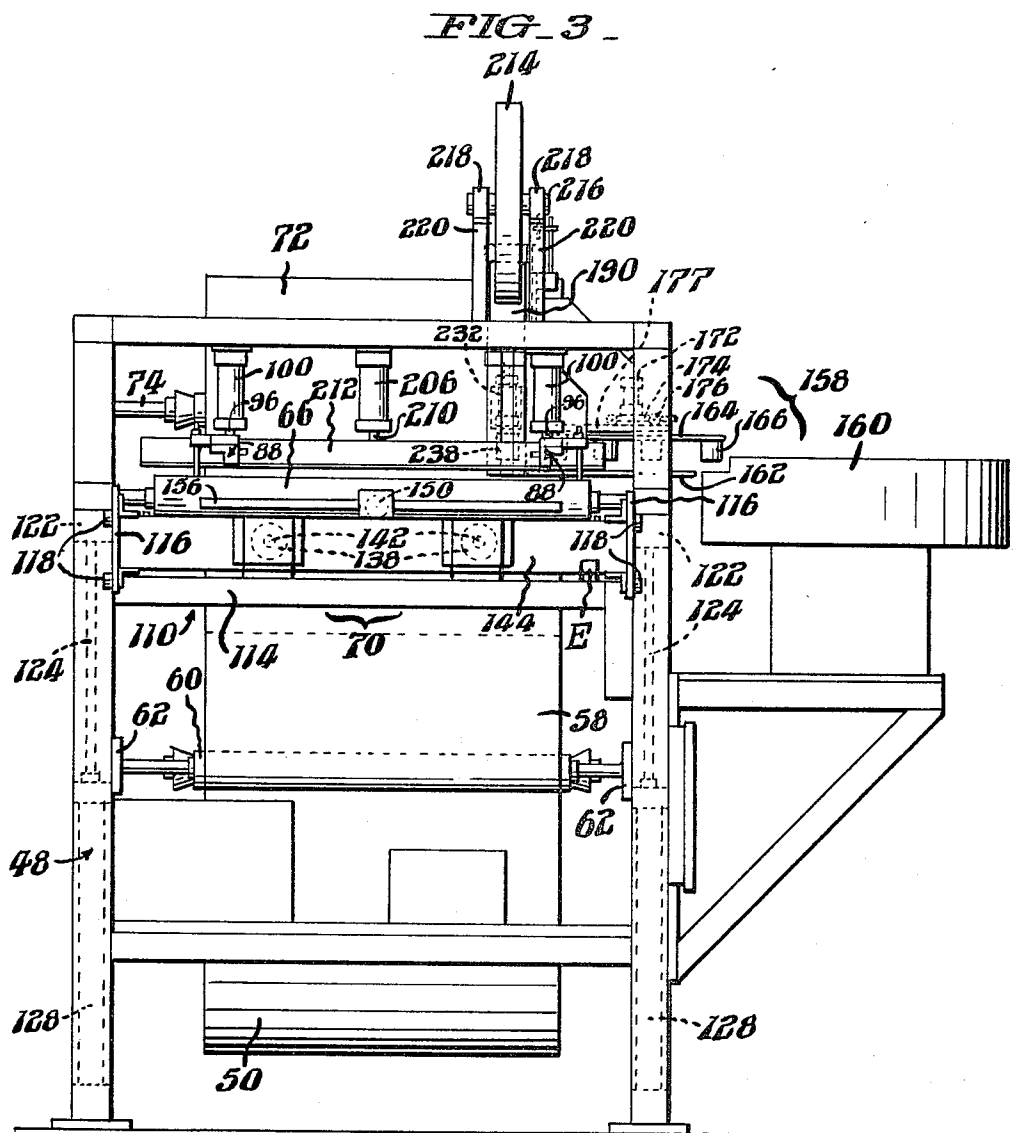
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6 Sheets-Sheet 3



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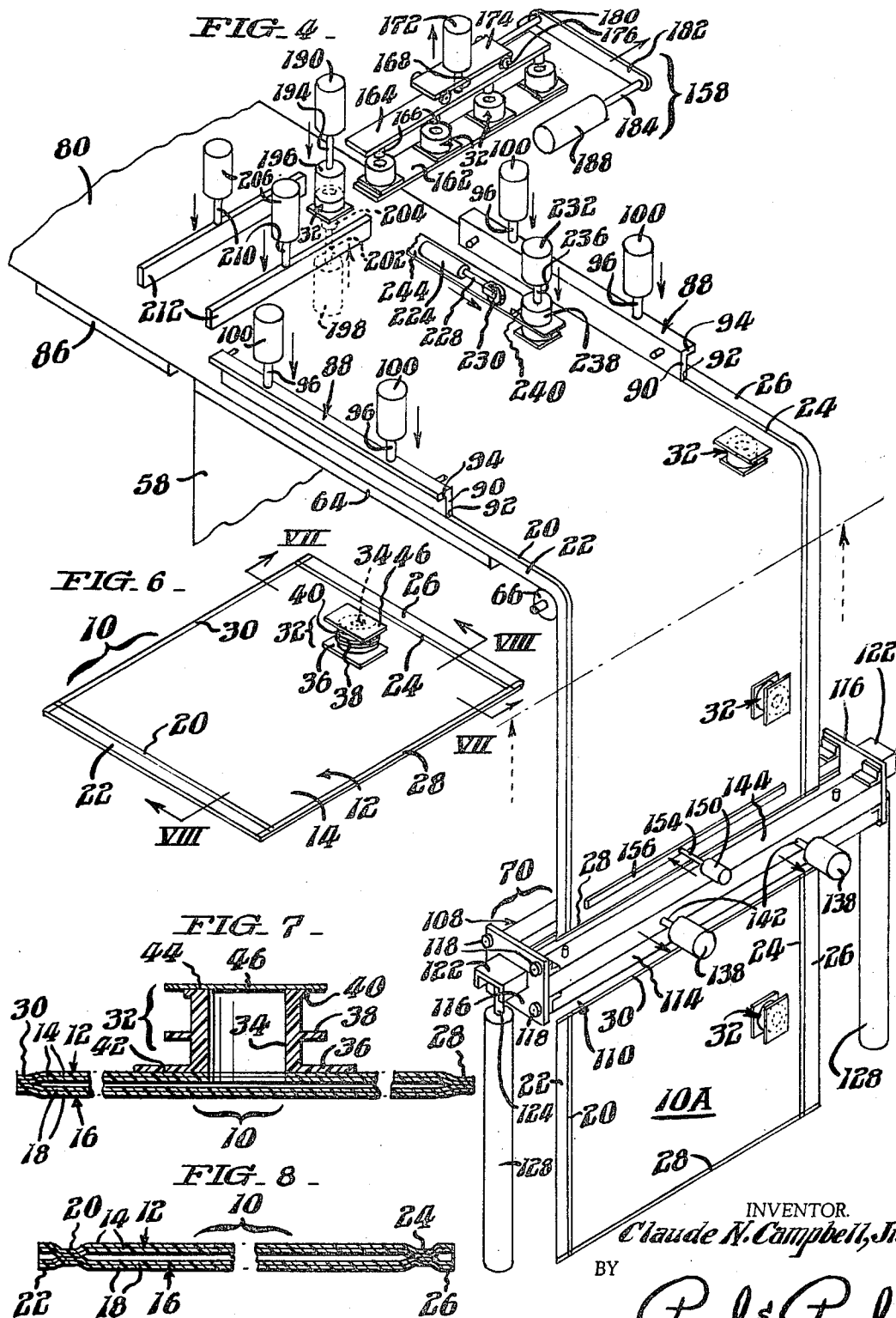
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BAG MAKING MACHINE

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6 Sheets-Sheet 4



Nov. 8, 1966

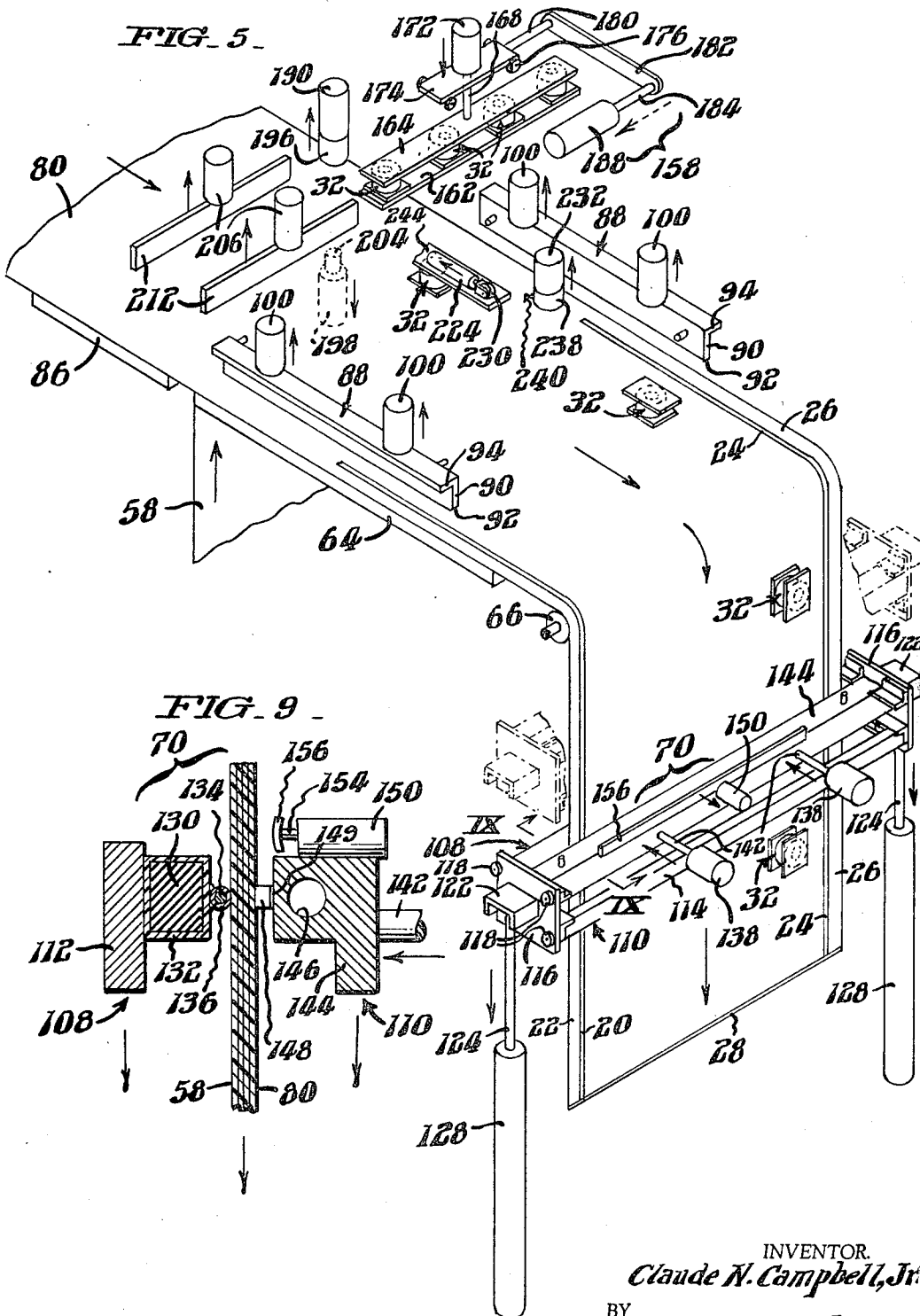
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BAG MAKING MACHINE

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6 Sheets-Sheet 5



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3,283,671

BAG MAKING MACHINE

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6 Claims. (Cl. 93—8)

This invention relates generally to bag making machines and particularly to machines for making bags using heat-sealable sheet material.

A principal object of the invention is to provide a machine for making such bags each consisting of two foldless mutually overlying sheet material panels.

Another object is to provide a machine for equipping such bags with nipples through which the bags may be filled and emptied, the bags, including the nipples, being completely closed by heat sealing.

Another object is to provide a machine for making such bags in one pass through the machine.

Other objects of the invention will become apparent when the following description is read with reference to the accompanying drawings, in which:

FIG. 1 is a front elevation of the machine;

FIG. 2 is a plan view of the machine;

FIG. 3 is an end view of the machine;

FIG. 4 is a diagrammatic perspective view showing the machine at one stage of operation;

FIG. 5 is a diagrammatic perspective view showing the machine at another stage of operation;

FIG. 6 is a perspective view of a bag produced by the machine;

FIGS. 7 and 8 are enlarged sections respectively on lines VII—VII and VIII—VIII in FIG. 6;

FIG. 9 is an enlarged vertical section on line IX—IX in FIG. 5;

FIG. 10 is a vertical section through a modified form of the means for sealing the nipples to the bag; and

FIG. 11 is a horizontal section on line XI—XI in FIG. 10.

The following description is directed to the specific form of the invention illustrated in the drawings and is not intended to be addressed to the scope of the invention itself, which may be practiced in a variety of forms.

Referring particularly to FIGS. 6, 7 and 8, a bag produced by a machine constructed in accordance with the invention, generally designated 10, comprises a panel 12 including two plies 14 of thermoplastic sheet material and a panel 16 including two plies 18 of thermoplastic sheet material. The bottom of the bag is heat sealed, as at 20, leaving an unsealed marginal area 22, while the top of the bag is heat sealed, as at 24, leaving an unsealed marginal area 26. The opposite side marginal areas of the bag are heat sealed, as at 28 and 30. Overlying the panel 12 is a tubular nipple 32 of thermoplastic material provided with a through opening, designated 34. The nipple 32 is provided with a flange 36 at its base, a flange 38 intermediate the ends thereof and a flange 40 at its top. The flange 36 is heat sealed to the panel 12, as at 42, and a patch 46 of thermoplastic tape is heat sealed to the flange 40, as at 44.

Referring to FIGS. 1 to 5, the machine constructed in accordance with the invention comprises a rigid open frame, generally designated 48. Carried by the frame are a pair of rolls 50 of thermoplastic sheet material each mounted on a horizontally extending shaft 52 opposite end portions of which are journaled in a pair of bearings 54 respectively carried by a pair of brackets 56. The sheets from the rolls 50 are plied together to make a web 58 which extends around a roller 60 opposite end portions of which are journaled in a pair of bearings 62 carried by the frame 48. The web 58 extends up-

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wardly from the roller 60 and then horizontally over a plate 64 and around a roller 66 opposite end portions of which are journaled in a pair of bearings 68 carried by the frame 48. From the roller 66 the web 58 extends downwardly to a web advancing means, generally designated 70.

Also carried by the frame 48 are a pair of rolls 72 of thermoplastic sheet material each mounted on a horizontally extending shaft 74 opposite end portions of which are journaled in a pair of bearings 76 respectively carried by a pair of brackets 78. The sheets from the rolls 72 are plied together to make a web 80 which extends around a roller 82 opposite end portions of which are journaled in the frame 48. From roller 82 web 80 extends horizontally over a plate 86 and together with the web 58 over the plate 64, around the roller 66 and downwardly from the roller 66 to the sheet advancing means 70.

It will be understood that the invention is not limited to a machine for making bags of thermoplastic sheet material. However, it is essential that the sheet material be heat sealable.

Disposed respectively on opposite sides of the webs 58 and 80 are a pair of elongated sealing bars 88 each having an upright leg 90 with an underlying sealing edge 92 and a horizontally extending leg 94. Extending upwardly from the bars 88 are a pair of rods 96 working in cylinders 100 secured by bolts 102 to channel members 104. Two of the bolts extend through elongated slots 106 formed in the members 104.

The web advancing means 70 comprises two coating parts, generally designated 108 and 110. The part 108 includes a rigid member 112, and the part 110 includes a rigid member 114. The members 112 and 114 each having opposite end portions secured respectively to a pair of plates 116. Each plate 116 mounts a set of rollers 118 working on upright guides 120. Affixed to each of the plates 116 is a channel stub 122 from which depends a rod 124 working in a cylinder 128 affixed to the frame 48.

Referring particularly to FIG. 9, the member 112 mounts a rubber cushion 130 provided with a Teflon cover 132. Suitably mounted upon the Teflon cover 132 is a back-up bar 134 provided with a Teflon cover 136.

Referring particularly to FIGS. 2, 3, 4 and 9, a pair of cylinders 138 are affixed to the member 114. Working in the cylinders are a pair of rods 142 which mount a bar 144. Extending longitudinally through the bar 144 is a channel 146 through which a coolant may be circulated to keep the bar 144 cool. Carried by the bar 144 is a bare bar 148 rectangular in transverse section and insulated from the bar 144, as at 149.

Affixed to the bar 144 is a cylinder 150, and working in the cylinder is a rod 154 which carries a stripper bar 156. Associated with the stripper bar 156 is a back-up (not shown) carried by the member 112.

Referring particularly to FIGS. 1 to 5, nipple feeding mechanism, generally designated 158, includes a conventional parts feeder 160, which feeds nipples to a horizontally extending plate 162. Overlying the plate 162 is a horizontally extending plate 164 from which depend a series of pins 166. The plate 164 is affixed to the lower end portion of a rod 168 working in a cylinder 172. Affixed to the cylinder 172 is a plate 174 fitted with a set of rollers 176. The rollers 176 work on guides 177. Extending rearwardly from the plate 174 is a rod 180, extending laterally from the rod 180 is a bar 182, and extending forwardly from the bar 182 is a rod 184 working in a cylinder 188 affixed to the frame 48.

Referring particularly to FIGS. 1 to 5, affixed to the frame 48 is a cylinder 190 in which works a rod 194

mounting a sealing head 196. Referring particularly to FIGS. 1, 4 and 5, affixed to the frame 48, directly under the head 196, is a cylinder 198 in which works a rod 202 mounting a punch 204.

Referring particularly to FIGS. 1 to 5, affixed to the frame 48 are a pair of cylinders 206 in which work rods 210 mount hold-down bars 212.

Carried by the frame 48 is a roll of thermoplastic tape 214 through which extends a shaft 216 opposite end portions of which are journaled in bearings 218 carried respectively by a pair of brackets 220. The tape, designated 244, extends from the roll thereof horizontally to and then around a roller 221, downwardly from the roller 221 to and around a roller 222, then horizontally over a plate 223.

Affixed to the frame 48 is a cylinder 224 in which works a rod 228 mounting a head 230, which overlies the end of the tape 244. Also affixed to the frame 48 is a cylinder 232 in which works a rod 236 mounting a sealing head 238 and a cutter 240.

The mutually overlying webs 58 and 80 are first clamped between sealing bar 148 and stripper bar 156 on one side and the associated back-up bars on the other side. Then sealing bar 148 is energized and brought up to sealing temperature. Next, while sealing bars 88, hold-down bars 212 and sealing heads 196 and 238 are in raised positions and punch 204 is in lowered position, web advancing means 70 is lowered, thus advancing the webs a distance equal to the width of one bag. In the meantime, plate 164 positions a nipple on the advancing web 80, directly under the sealing head 196. In addition, a portion of tape 244 is fed to a position under sealing head 238.

Now hold-down bars 212 are lowered to clamp web 80 to plate 86. Then plate 164 is raised to release the nipples 32 and is retracted for registry with the nipples in the advanced position thereof.

Then sealing head 196 is lowered unto the underlying nipple 32, and punch 204 is raised. The head 196 seals the nipple to the web 80 while the punch 204 makes a hole in the web 80, which hole registers with the central opening 34 through the nipple. The punchings may be removed in any suitable way, as by suction means.

The sealing bars 88 are now lowered and brought up to sealing temperature to seal the bottom and top of a bag, as at 20 and 24. At the same time, the sealing head 238 is lowered unto the portion of tape 244 overlying a nipple 32 to seal the same to the underlying nipple, while the cutter 240 severs the patch 46 from the tape 244.

By the time the web advancing means 70 reaches its lowermost position, a seal 28 and a seal 30 have been completed and a fully formed bag 10A is severed (by the sealing operation) from the continuous webs 58 and 80. It will be noted that the trailing side of a leading bag and the leading side of a trailing bag are sealed and severed from each other simultaneously. The sealing bar 148 is now retracted. The stripper bar 156 is already in position and strips webs 58 and 80 from sealing bar 148.

The web advancing means 70 is now raised to its initial position. It will be understood, of course, that when sealing bar 148 is retracted, it is retracted a distance sufficient so that when web advancing means 70 is raised, sealing bar 148 will clear the nipples 32 already sealed to the web 80. When web advancing means 70 reaches its uppermost position, another cycle is initiated.

Although the webs 58 and 80 have been described as comprising two plies of sheet material, it will be understood that the number of plies may be more or less than two. It will be noted that one of the sealing bars 88 may be moved laterally to accommodate varying widths of webs for making bags different in length. It will also be understood that the excursion of the web advancing means may be adjusted for making bags varying in width.

Referring particularly to FIG. 1 and the phantom showing in FIG. 5, web advancing means 70 is fully raised. The two-ply web 58 extends around roller 60 and then

upwardly past a germicidal lamp 246 and between plates 86 and 64. The two-ply web 80 extends around roller 82 and then horizontally past a second germicidal lamp 246 and over plate 86. Then webs 58 and 80 extend together over plate 64 and past a static eliminator 248 to roller 66. Then they extend downwardly freely between stripper bar 156 and a back-up bar (not shown) and freely between sealing bar 148 and back-up bar 134, past a second static eliminator 248.

As indicated, when web advancing means 70 is fully raised, sealing bar 148 and stripper bar 156 are in retracted positions. In addition, sealing bars 88 and hold-down bars 212 are raised. Sealing head 196 is in raised position while punch 204 is in lowered position. The plate 164 is in retracted and lowered position, i.e., the rods 184 and 168 are extended. Each of the pins 166 carried by plate 164 is engaged with an underlying nipple 32 carried by the plate 162. Sealing head 238 is raised while head 230 is retracted.

To operate the machine, the operator presses a start switch, whereupon a relay is energized. This starts a first timer, which holds the relay. When the relay operates, a circuit is closed, which causes air to be supplied to cylinder 150 for extending stripper bar 156, whereupon webs 58 and 80 are clamped against a back-up bar, mentioned hereinabove, but not shown. When a predetermined pressure is present in cylinder 150, a pressure switch operates to close a circuit, which energizes a solenoid. The solenoid operates to supply air to cylinders 138, whereupon sealing bar 148 is extended for clamping webs 58 and 80 against back-up bar 134. As sealing bar 148 approaches the back-up bar 134, a pair of micro-switches "A" carried by the bar 148 are operated. This closes a circuit, which energizes the sealing bar 148, causing it to heat up to sealing temperature.

When a predetermined pressure is present in cylinders 138, a pressure switch operates, causing a circuit to be closed and air to be supplied to cylinders 128, whereupon web advancing means 70 is lowered. When approximately two-thirds of the way down, web advancing means 70 trips a micro-switch "B." This closes a circuit and causes air to be supplied to cylinder 188 for retracting the rod 184 and pushing the plate 164 and the nipples 32 forwardly to position the leading nipple 32 under the sealing head 196. The micro-switch "B" stays closed until web advancing means 70 reaches its lowermost position.

At the same time that air is supplied to cylinders 128, air is supplied to cylinder 224, whereupon head 230 is extended to feed tape 244 to sealing head 238. As web advancing means 70 approaches its lowermost position, it closes a micro-switch "C," which starts a second timer.

Thereupon, a circuit is closed, which causes air to be supplied to cylinders 206 for lowering hold-down bars 212. The hold-down bars clamp the web 80 to the plate 86. When a predetermined pressure is present in cylinders 206, a pressure switch operates to close a circuit and to cause air to be supplied to cylinder 172 for raising the plate 164. The pins 166, of course, disengage from the nipples 32, leaving them in their advanced positions. When a predetermined pressure is present in cylinder 172, a pressure switch operates to close a circuit and to cause air to be supplied to cylinder 188 for retracting plate 164. When a predetermined pressure is present in cylinder 188, a pressure switch operates to close a circuit and to cause air to be supplied to cylinder 190 for lowering sealing head 196. When sealing head 196 is lowered, it trips a micro-switch "D." This closes a circuit, which causes air to be supplied to cylinder 198 for raising punch 204.

When a predetermined pressure is present in cylinders 206, a pressure switch operates to close a circuit and to cause air to be supplied to cylinders 100 for lowering sealing bars 88. As the sealing bars 88 approach their lowermost position, they actuate a pair of switches "G."

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This closes a circuit, causing the sealing bars to heat up to sealing temperature. At the same time air is supplied to cylinder 232 for lowering sealing head 238.

When the sealing head 196 is lowered, it is cold, but when the punch 204 rises, pressure in the cylinder 198 operates a pressure switch which closes a circuit, causing the heads 196 and 238 to heat up to sealing temperature.

As stated hereinabove, when web advancing means 70 approaches its lowermost position, it operates the micro-switch "C." This starts the second timer and closes a circuit, which causes air to be supplied to cylinders 138 for retracting sealing bar 148. Thus the webs 58 and 80 are released. The stripper bar 156 is already in web stripping position and remains in this position until the first timer runs out. When the second timer runs out and stripper bar 148 retracts, it trips a micro-switch "E." This closes a circuit and causes air to be supplied to cylinders 128 for raising the web advancing means 70 to its initial position. As the web advancing means 70 approaches its fully raised position, it operates a switch "F," which initiates another cycle, provided that the second timer has run out.

When the second timer does run out, sealing bars 88 and hold-down bars 212 are raised to their initial positions. Sealing head 196 is raised to its initial position while punch 204 is lowered to its initial position. The plate 164 is returned to its retracted and lowered position. The sealing head 238 is raised to its initial position, and head 230 is returned to its retracted position.

Of course, when the sealing bars 88 and sealing heads 196 and 238 are raised to their initial positions, the circuits furnishing them with electrical energy are opened.

Referring particularly to FIGS. 10 and 11, the modified arrangement of the means for sealing the nipples 32 to the web 80 and of the means for punching the holes in the web 80, which holes register with the nipples 32, comprises a base plate 250 mounting a male die 252, which accommodates the punch 204. Overlying the die 252 is an asbestos pad 254, which accommodates the punch 204. Nested on the asbestos pad 254 is a ring 256 provided with depending lugs 258 accommodated by suitable recesses 260 formed in the male die 252. Connected to the lugs 258 are electric wires 261 for energizing the ring 256 and bringing it up to sealing temperature. Overlying the asbestos pad 254 and the ring 256 is a sheet of aluminum foil 262 sandwiched between sheets of Teflon coated Fiberglas 264 and 266, all secured to the male die 252, as by a clamp 268, and all centrally apertured to accommodate the punch 204. Overlying the male die 252 is a female die 270 provided with an annular flange 272 faced with rubber 274. The female die is secured to the rod 194, as at 276.

When the rod 194 is extended, the female die 270 descends and presses the flange 36 of the nipple 32 down upon the web 80. At the same time the ring 256 is energized and brought up to sealing temperature. The aluminum foil 262 serves to conduct the heat radially outwardly and inwardly from the ring 256 so that the sealing action takes place over a greater area to provide a more satisfactory seal. The sheets of Teflon coated Fiberglas 264 and 266 are employed to prevent fusing of the web material to the Nichrome wire 256.

What is claimed is:

1. In a bag making machine, the combination comprising means for arranging two continuous webs of sheet material with a section of one web overlying a section of the other web, a web grasping mechanism consisting of a single reciprocable means operable for intermittently grasping said webs and pulling them lengthwise to progressively advance the same, laterally spaced means on the upstream side of said web advancing means operable for progressively joining together longitudinally extending areas respectively of said webs by heat sealing, means mounted for movement with said web advancing means

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and operable for joining together transversely extending areas respectively of said webs by heat sealing, and for severing from said webs the sections thereof disposed on the downstream side thereof, and means for actuating said web advancing means and said heat sealing and severing means in predetermined timed relation in repeating cycles.

2. In a bag making machine, the combination comprising means for arranging two continuous webs of sheet material with a section of one web overlying a section of the other web, reciprocable means operable for intermittently grasping said webs and pulling them lengthwise to progressively advance the same, laterally spaced means on the upstream side of said web advancing means operable for progressively joining together longitudinally extending areas respectively of said webs by heat sealing, means mounted for movement with said web advancing means and operable for joining together transversely extending areas respectively of said webs by heat sealing, severing from said webs the sections thereof disposed on the downstream side thereof, and stripping said webs from the last mentioned means, and means for actuating said web advancing means and said heat sealing and severing and stripping means in predetermined timed relation in repeating cycles.

3. The combination defined in claim 2 wherein the means for stripping the webs comprises a bar disposed in close proximity to the means for joining together transversely extending areas of the webs.

4. In a bag making machine, the combination comprising means for arranging two continuous webs of sheet material with a section of one web overlying a section of the other web, reciprocable means operable for intermittently grasping said webs and pulling them lengthwise to progressively advance the same, laterally spaced means on the upstream side of said web advancing means operable for progressively joining together longitudinally extending areas respectively of said webs by heat sealing, means disposed before said means for joining together longitudinally extending web areas and operable for successively feeding nipples to one of said webs, means associated with said nipple feeding means and operable for joining said nipples to said one web by heat sealing the same, means mounted for movement with said web advancing means and operable for joining together transversely extending areas respectively of said webs by heat sealing, and for severing from said webs the sections thereof disposed on the downstream side thereof, and means for actuating said web advancing means and said heat sealing and severing and nipple feeding means in predetermined timed relation in repeating cycles.

5. In a bag making machine, the combination comprising means for arranging two continuous webs of sheet material with a section of one web overlying a section of the other web, reciprocable means operable for intermittently grasping said webs and pulling them lengthwise to progressively advance the same, laterally spaced means on the upstream side of said web advancing means operable for progressively joining together longitudinally extending areas respectively of said webs by heat sealing, means disposed before said means for joining together longitudinally extending web areas and coaxing with said web advancing means for feeding nipples successively to longitudinally spaced sections of one of said webs, means associated with said nipple feeding means and operable for joining corresponding ends of said nipples to said one web by heat sealing, means associated with the last mentioned means and operable for punching openings in said one web respectively registering with said nipples, means mounted for movement with said web advancing means and operable for joining together transversely extending areas respectively of said webs by heat sealing, and for severing from said webs the sections thereof disposed on the downstream side thereof, and means for actuating said web advancing means and said heat sealing

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and severing and nipple feeding and web punching means in predetermined timed relation in repeating cycles.

6. In a bag making machine, the combination comprising means for arranging two continuous webs of sheet material with a section of one web overlying a section of the other web, reciprocable means operable for intermittently grasping said webs and pulling them lengthwise to progressively advance the same, laterally spaced means on the upstream side of said web advancing means operable for progressively joining together longitudinally extending areas respectively of said webs by heat sealing, means disposed before said means for joining together longitudinally extending web areas and coating with said web advancing means for feeding nipples successively to longitudinally spaced sections of one of said webs, means associated with said nipple feeding means and operable for joining corresponding ends of said nipples to said one web by heat sealing, means disposed after the last mentioned means and operable for closing the open ends of said nipples by heat sealing, means mounted for move-

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ment with said web advancing means and operable for joining together transversely extending areas respectively of said webs by heat sealing, and for severing from said webs the sections thereof disposed on the downstream side thereof, and means for actuating said web advancing means and said heat sealing and severing and nipple feeding means in predetermined timed relation in repeating cycles.

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