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EP 0 170 487 B1

Description

This invention relates to melt dispensers of the kind known as hot-melt guns.

Various proposals have been made to provide apparatus for melting and dispensing thermoplastic material supplied in the form of a rod. Such apparatus is usually provided with a melt body having a melt chamber in which thermoplastic material is melted, an inlet for the rod of thermoplastic material and an outlet comprising an orifice for dispensing and applying melted material, and means for heating the melt body so that thermoplastic material fed as a rod into the melt chamber may be dispensed and applied in molten condition from the orifice. Such apparatus finds use in various fields of application, commonly in the form of applicators for hot-melt adhesives and sealants and especially in hot-melt glue guns having provision for feeding a rod of adhesive, known as a glue stick, to the melt body, for example by trigger-operated means.

The present invention is concerned with hot-melt guns for melting rods of thermoplastic material and dispensing and applying the resulting hot-melt materials, and more particularly is concerned with a hand-held glue gun comprising improved feeding means adapted to feed hot-melt material in the form of a rod to the melt body.

Rod feeding means employed in hand-held glue guns often include a trigger and associated mechanism arranged to grip a rod of composition to be fed, and to advance it towards the melt chamber. Usually an inlet sleeve of resilient material is provided at the entrance to the melt chamber which is intended to assist in guiding the rod into the melt chamber and also to grip the surface of the rod as it is fed into the melt chamber to minimise flow of melted material from the melt chamber inlet. For example, a hand-held, hot-melt glue gun is described in GB patent specification 1402648 having a melt chamber and feeding means for feeding a solid rod of hot-melt material through an inlet sleeve into a melt body, the feeding means comprising clamping means including a carriage mounted for sliding movement towards and away from the melt body, and having a support portion shaped to accept a rod to be fed to the melt body and to hold it so that said rod is held with its axis parallel to the direction in which the carriage is arranged to move, and a clamp member mounted on said carriage. The clamp member is pivotally mounted on the carriage and a trigger is connected to the clamp member by connecting means and arranged to be operated by the operator to pivot the clamp member initially into engagement with the rod of hot-melt material supported by the carriage to grip the rod and, on further pressure on the trigger by the operator, to feed the rod into the melt chamber. The clamp member comprises a knife member by which the rod is engaged in the operation of the feeding means to feed the rod into the melt chamber.

Although such feeding means is acceptably effective to feed rod adhesive through the inlet sleeve and into the melt chamber, when excessive pressure is exerted on the trigger, the knife member may tend to indent or otherwise distort the rod. A problem of outflow of melted material from the melt chamber has also been recognised previously and various means have been proposed to overcome the problem. The use of an inlet sleeve of resilient material having internal lip means which are distended by passage of the rod and so grip the outer surfaces of the rod was one proposed solution. However, severe deformation of the rod surfaces renders it impossible to rely upon the inlet sleeve to provide sufficient seal on rod entering the melt chamber to exclude the possibility of melted material being forced out between the inlet sleeve and the rod.

Problems associated with distortion of the rod are especially relevant in hand guns used for prolonged industrial use and particularly those using a high melt-capacity melt body which has a particular need for rapid feeding of the rod, and also in those cases where the rod is unusually soft or unusually brittle.

Another disadvantage of available hand operated glue guns has been that a comparatively large application of effort is required to maintain the gripping of the rod whilst the carriage and clamp are moved towards the melt chamber. Not only can this accentuate the distortion of the rod, but also may give rise to control difficulties or operator fatigue in those cases where the glue gun is used for prolonged continuous periods, especially where a substantially uniform rate of rod feed is required intermittently.

Among objects of the present invention are to provide improved rod feeding means.

It is therefore an object of the present invention to provide improved rod feeding means for a hot-melt gun.

According to the present invention, a hot-melt gun comprising a melt body having a melt chamber and feeding means for feeding a solid rod of hot-melt material into said melt body, the feeding means comprising clamping means including a carriage mounted for sliding movement towards and away from the melt body and having a support portion shaped to accept a rod to be fed to the melt body and to hold it so that said rod is held with its axis parallel to the direction in which the carriage is arranged to move, and a clamp member mounted on said carriage is characterised in that said clamp member is pivotally mounted on the carriage and has a clamping arm portion disposed along the direction in which the carriage is arranged to move and a crank arm portion having an operating portion arranged to co-operate with pressure means of pivotally-mounted connecting means in response to operation of a trigger of the gun whereby upon operation of the trigger the clamp member can pivot to engage a rod supported in the carriage so as to grip the rod against said support portion, and on continued

operation of the trigger, the clamp member may be caused to move with the carriage to feed the rod towards the melt chamber, the operating portion of the crank arm having a convex surface and being so disposed that an acute angle between a plane which includes a line of contact between the convex surface and the pressure means and a plane which includes the direction in which the carriage is arranged to move is increased as the clamp member is pivoted to grip the rod whereby an increased component of force is applied in the direction in which the carriage is arranged to move i.e. in a direction parallel to the axis of the rod.

The invention further provides a hot-melt gun of the kind set out above wherein the crank arm having a convex surface is so disposed that, prior to operation of the trigger means, the line of contact between the convex portion and the pressure means lies to the rear (in the direction in which the carriage is arranged to move) of a plane P including the axis of rotation of the clamp member on the carriage and which is normal to the direction in which the carriage is arranged to move and that after the rod has been gripped, the line of contact between the convex portion and the pressure means lies before said plane in the direction in which the carriage is arranged to move (parallel to the axis of the melt chamber).

The clamp member may comprise a clamping arm portion in the form of a rack providing several knife portions arranged transversely of the direction in which the carriage is arranged to move.

Preferably, the feeding means comprises clamping means comprising a carriage mounted for sliding movement towards and away from the melt body and having a support portion shaped as a curved portion to accept a rod to be fed to the melt body and to hold it so that said rod is held with its axis parallel to the direction in which the carriage is arranged to move, and a clamp member pivotally mounted on the carriage and having a clamping arm portion disposed along the direction in which the carriage is arranged to move. The clamping arm portion may be in the form of a curved element having a rod-engaging surface. The rod-engaging surface of the illustrative gun may have several knife portions arranged transversely of the direction in which the carriage is arranged to move. The knife portions may be arranged so that two or more thereof may engage the rod to grip it against the shaped portion. The clamp member may also comprise a crank arm portion having an operating portion in the form of a cam lobe arranged to co-operate with a cam surface of a lever which provides pressure means of pivotally mounted connecting means in response to operation of a trigger of the gun. Upon operation of the trigger the clamp member is caused to pivot into engagement with a rod in the carriage to grip the rod against said shaped portion, so that the rod is held with its axis parallel to the direction of movement of the carriage, and on continued operation of the trigger the clamp member is caused to move with the carriage to feed the rod towards the melt chamber. The cam lobe of the crank arm may have a convex surface so disposed that an acute angle between a plane which includes a line of contact between the convex surface and the cam surface and a plane which includes the direction in which the carriage is arranged to move is increased as the clamp member is pivoted to grip the rod. The cam lobe may also be so disposed that, prior to operation of the trigger means, the line of contact between the convex surface and the cam surface lies to the rear (in the direction in which the carriage is arranged to move) of a plane including the axis of rotation of the clamp member on the carriage and which is normal to the direction in which the carriage is arranged to move, and, after the rod has been gripped, the line of contact between the convex portion and the pressure means lies before said plane in the direction in which the carriage is arranged to move (parallel to the axis of the melt chamber).

The clamp member may comprise stabiliser pins located to co-operate with guideways or recesses in portions of the carriage located in front of the pivotal mounting of the clamp member (in the direction in which the carriage is arranged to move) as the carriage is moved towards the melt chamber, and to limit the extent of pivotal movement of the clamp member.

The trigger may be slidably mounted in body portions of the gun and arranged to operate the connecting lever to move the clamp member to grip and feed a rod against the action of a spring. The connecting lever carries a roll trapped in a curved slot, so that the pressure exerted to rotate the connecting lever is varied with increased feeding movement of the trigger.

A resilient tube may be mounted at the entrance to the melt chamber and arranged to be distended by a rod as it is fed into the melt chamber.

A resilient mouthpiece may be mounted on body portions of the gun through which rod may be supplied to the feeding means.

By imparting curvature to the rod-engaging surface of the clamping arm portion of a gun according to the invention, it is possible to grip satisfactorily rods of various dimensions, and by arranging that two or more knife portions on the rod-engaging surface of the clamping arm portion may engage the rod during gripping, distortion of the rod is minimised. Thus the risk that the seal between a flexible inlet tube to the melt chamber and the rod may be rendered ineffective is reduced and thus blowback of melted material from the melt chamber under pressure of advancing rod is prevented. Also, due to the shape of a cam surface of the crank arm portion, and its disposition with respect to the direction in which the carriage is arranged to move and with respect to the axis about which the clamp member is arranged to pivot, the effort applied to the trigger during a feeding stroke of the carriage is applied (after initial gripping has been accomplished)

primarily in the direction in which the carriage is arranged to move (i.e. parallel to the axes of the melt chamber and of the rod). Preferably the axis about which the clamp member is arranged to pivot is also arranged sufficiently close to the surface of the rod to be fed that the power transfer occurs in such a way that the clamping force for the rod is not directly effected by pressure on the trigger but rather by self clamping i.e. increased self clamping with increasing trigger force. In this way, excessive distortion of the rod is avoided, and the effort required to effect feeding of the rod is applied principally to movement of the carriage and the rod supported thereon, with the consequent improvement of operation and trigger control.

Thus, a gun, having feeding means according to the invention, can be used with advantage to feed rods of thermoplastic material to a melting chamber of high capacity in a rapid and reliable manner without severely distorting the surface of the rod. This is of considerable importance in relation to hand-held glue-guns where the strength of triggering is variable from operator to operator, (and may be extremely large), and in relation to hot-melt guns which are required to accept rods of various hardnesses and sizes.

One preferred embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 is a side view of a glue gun according to the invention, part in section, part broken away,

Figure 2 is a view of a carriage of clamping means of the gun according to the invention showing a clamp member in chain dotted lines in position prior to a feed stroke of the clamping means;

Figure 3 is a view of the carriage and clamp member of the gun taken in the direction of the arrow III on Figure 2;

Figure 4 is a part-broken view of feeding means of the exemplified gun showing parts in positions occupied prior to a feeding stroke to feed a rod of thermoplastic material to a melt chamber of the gun; and

Figures 5 and 6 are views of the feeding means similar to Figure 4, but showing parts in positions occupied partway through a feeding stroke and at the end of a feeding stroke respectively.

The exemplified gun is intended for use with solid rods of thermoplastic composition of circular cross-section and comprises a gun body having two parts 10, 12; the part 12 of the body being broken away in Figure 1 to show feeding means 14 and other parts of the illustrative apparatus. As well as the feeding means, the glue gun has a melt body 16 containing a melt chamber 17, electrically operated heating means for heating the melt body, and a nozzle 18 through which molten thermoplastic material is expelled from the melt chamber.

A preferred construction of melt body and melt chamber is described in detail in our copending European patent application No. 85 305 257.9 (publication 0170488).

The melt body comprises three housings for electrically operated heating means in the form of cylindrical self regulating heaters 45 (Figure 1) comprising three PTC resistors distributed symmetrically about the chamber. The heaters 45 are of a kind substantially as described in GB patent specification 15404812 and are constructed and arranged so that the melt body may be heated to a maximum temperature of about 225°C. Suitable uniform distribution of the heaters is achieved in the melt body shown together with desirable slim characteristics of the melt body. Webs 41 formed between pairs of the housings serve to strengthen the melt body.

The melt body has a threaded bore (not shown) coaxial with the melt chamber into which the nozzle 18 is threaded. The nozzle member contains a spring loaded ball valve (not shown) which is arranged to be opened by pressure of melted material when a rod of thermoplastic material is fed into the melt chamber.

An outer surface of the melt body at the inlet is formed to provide a tube 25 onto which a flexible inlet tube 22 is secured (Figure 1). The inlet tube 22 is formed from resilient heat resistant material and has a flange 28 at its forward end and is maintained in place on the tube by a bell shaped sleeve 26. The inlet tube 22 has an inlet passage coaxial with the melt chamber in the melt body through which a rod 54 of hot-melt (thermoplastic) material, for example an adhesive or sealant, may be introduced into the inlet end of the melt chamber. The inlet tube 22 is of circular cross section and is formed with an inner lip portion 32, so that as well as guiding the rod of hot-melt material into the melt chamber, the tube forms a seal with the surface of the rod, thus limiting escape of molten hot-melt material from the inlet when the rod is fed into the chamber.

A locating ring 19 of resilient heat resistant material encircles a portion of the melt body adjacent the nozzle and is received in co-operating recesses formed in the body portions 10 and 12. The sleeve 26 is formed with a locating ring 27 which is received in co-operating grooves formed in the body portions 10 and 12. The melt body is thus mounted in the body portions 10 and 12 at its outlet and inlet ends by means of the rings 19 and 27 and at a mid-portion by means of the bosses 55.

A resilient mouthpiece in the form of a guide collar 30 is mounted in the body of the gun at the rear and has a guide opening therethrough coaxial with the melt chamber to guide a solid rod of hot-melt material and maintain the rod in alignment with the melt chamber as it is supplied to the feeding means. The inlet tube 22, guide collar 30 and ring 19 are conveniently made of silicone rubber.

The parts 10, 12 of the gun body are moulded of tough, reinforced plastics material. The two parts 10, 12 of the body are secured together by fastenings included screws (not shown).

The feeding means 14 of the exemplified gun comprises clamping means including a carriage

42, mounted for sliding movement, towards and away from the melt body 16, by means of flanges 44 which engage in slideways 46 moulded in the gun body parts 10, 12 parallel with the axis of the melt chamber. The carriage is thus arranged to move in a direction M, defined by the flanges 44 and slideways 46, parallel to the axis of the melt chamber. The feeding means 14 further comprises a clamp member 48, pivotally mounted on the carriage 42, and a trigger 50 for actuating the clamp member 48 via a lever 52.

The carriage 42 comprises an upstanding part 110 having a guide aperture 58 through which the rod 54 passes with a small clearance, as it is fed to the melt chamber. The rod is thus supported by the upstanding part 110. The rod is held against the carriage with its axis parallel to direction M, the axis of the melt chamber.

The clamp member 48 has a clamping arm portion 71, extending generally in the direction of rod feed, by which the rod may be engaged in the operation of the feeding means to feed the rod into the melt chamber 16. In order that the clamp member may grip the rod adequately without unduly distorting the rod, even under repeated triggering, and despite variations in diameter of the rod, and thus to minimise the risk that the seal between the flexible inlet sleeve 22 and the rod 54 may be rendered ineffective in preventing blow back of melted material from the melt chamber under pressure of advancing rod, a rod engaging surface of the clamping arm portion has a somewhat arcuate configuration. The surface is serrated in order to enhance gripping of the rod, the serrations taking the form of several knife portions 72 disposed transversely of the direction of rod feed. These are arranged so that one or more, and preferably not less than two, may engage the rod during feeding. The rod-engaging surface is located so that, on operation of the trigger, at least two of its knife portions are swung into contact with the rod, even though the rod may be under-or oversized compared with standard diameter rod.

The clamp member 48 is provided by a casting having trunnion pins 60, by which the clamp member is pivotally mounted in the carriage 42, and stabiliser pins 61 located for movement heightwise in guideways 63 in the carriage to an extent limited by slot surfaces of the guideways. The trunnion pins are located at an upper, rearward portion of the clamp member 48. The clamp member 48 has a crank arm 70 with an operating portion in the form of a cam lobe 49 having a convex curved surface 64 located below the trunnion pins as viewed in Figures 1, 2, 4, 5 and 6, and disposed so that when the feed mechanism is in its rest position as shown in Figure 1, the curved surface 64 is rearward (considered in the direction of rod feed) of a plane P normal to the direction of rod feed and extending through centre lines of the trunnion pins.

The lever 52 is mounted on a peg 53, formed in the part 10 of the gun body, for pivotal movement about the peg. An upper end portion of the lever is formed as a cylindrical cam surface 202 arranged to provide pressure means 207 to co-operate with the cam lobe 49. A lower end portion of the lever is provided with a roller bearing 206 received in a curved slot 208 formed in a rearward portion of the trigger 50 arranged so that pressure exerted to rotate the connecting lever 52 is varied with increased travel of the trigger during a feeding movement. In the rest position shown in Figure 1, an angle A between a plane Q which includes the line of contact 200 between the curved surface 64 and the cam surface 202, and a plane which includes the direction M in which the carriage is arranged to move, is acute as can be seen from Figure 1.

The trigger 50 is formed with flanges 210 received in slideways 212 formed in the body parts 10, 12. The trigger and lever are so arranged as to facilitate entry of the roller bearing 206 into the open end of the slot 208 during assembly without risk of disassembly when the apparatus is in use. The trigger 50 is moulded of a hard tough plastics material. The trigger 50 has a pressure plate 98 arranged to be contacted by the finger of an operator to operate the trigger 50. The extent of movement of the trigger is restricted by engagement of the pressure plate 98 with the gun body and by engagement of a stop member 100 also moulded integrally with the trigger 50, with the parts 10, 12 of the gun body.

The trigger 50 is arranged to be operated by the operator to pivot the clamp member 48 about the trunnion pins 60 to bring knife portions 72 into engagement with the rod 54 of solid hot-melt material supported by the carriage 42, inlet sleeve 22, and guide collar 30 to grip the rod 54 and, on further pressure on the trigger 50, to feed the rod 54 into the melt chamber.

Viewing Figure 1, when the trigger is moved rearwardly, the lever 52 is caused to rotate in a counter clockwise direction about the peg 53. The cam surface 202 is thus caused to move in an arc towards the melt body and to press upon the cam lobe 49. Initial pressure causes the clamp member to rotate clockwise about the axis of the trunnion pins 60, to an extent limited by engagement of knife portions 72 against the rod. Continued pressure causes the rod to become gripped between the knife portions and the upstanding part 110, being held with its axis parallel to direction M. During clockwise rotation of the clamp member, the disposition of the cam lobe 49 is altered, not only in relation to the cam surface 202, but also in relation to the plane P inasmuch as the cam surface 202 engages a portion of the curved surface higher than initially and also the curved surface 64 is moved to a location forward of the plane P (Figure 4). Also, the angle A becomes less acute, i.e. is increased. Further movement of the cam surface 202 causes the clamp member to act on the carriage 42 to move it towards the melt body, with the rod gripped between the knife portions and the upstanding part. During this movement the cam surface rides up the cam lobe into a region where the angle A

has become obtuse (see Figures 5 and 6) and pressure is exerted primarily in a direction to move the carriage forward in the direction of rod feed. By virtue of the disposition of the pivots and the clamping arm and of the shaping of the cam lobe, a locking of the clamp member to the rod is brought about which is beneficial in reducing the effort needed for gripping the rod.

The feeding means 14 comprises a spring 56 extending between an elongate slot in the clamp member 48 and the peg 53, by which the clamp member 48 is biased in a counter clockwise direction as viewed in Figure 1 and the carriage 42 is biased away from the melt body 16. At the end of a feeding stroke, as the trigger is released, the spring acts to swing the clamp member about the pins 60 to lower the clamping arm from the rod and return the clamp member, carriage and lever 52 to their initial positions, as shown in Figure 1, ready for the next feed stroke.

The feeding means 14 comprising the carriage 42, clamp member 48, lever 52, trigger 50, and spring 56 are designed and constructed to fit together and into parts 10, 12 of the glue gun body without further equipment or fastening means. The feeding means 14 has a minimum of parts and can be assembled reliably and simply in such a way that, when the parts 10, 12 of the gun body are secured together, the feeding means remains securely assembled. Each of the trunnion pins 60 has two arcuate coaxial bearing portions 62 and two parallel flat faces 79 at opposite sides of the pin 60 (Figure 3). The pivot pins 60 are arranged to be received in coaxial bearing openings 66 at opposite sides of the carriage 42, (Figure 3) the bearing openings 66 being defined by circular bearing surfaces 68 against which the bearing portions 62 of the pins 60 are supported. Each of the bearing surfaces 68 has an assembly opening 80 extending around a minor arc in the surface remote from the rod 54 of hot-melt supported by the carriage 42, the assembly openings 80 being sufficiently wide for the pivot pins 60 to pass through the assembly openings 80 when the flat faces 79 of the pins 60 are suitably oriented relative to the assembly opening 80 (with the flat faces 79 generally parallel to a radius of the bearing openings 66 bisecting the assembly openings 80), but when assembled in the gun, the arc of pivotal movement of the knife member 48 being restricted so that the pivot pins 60 cannot reach an orientation where the flat faces 79 are sufficiently aligned with the assembly opening 80 to permit the pins 60 to be withdrawn, or escape, through the assembly opening 80.

The feeding means 14 can be assembled simply: the trigger 50 is assembled with the lever 52, and assembled to the body part 10. The clamp member 48 is assembled with the carriage 42 by introduction of the pivot pins 60 into the bearing openings 66, and the carriage is mounted with slide 44 in the slideways 46 of the body part 10. The spring 56 is assembled with the clamp member and the peg 53. When the feeding means 14 is assembled, the carriage 42 is urged by the spring 56 to a rear-most position along the slideway 46 and the clamp member is urged in a counter-clockwise direction, so that the knife portions 72 are lowered with respect to the carriage and the trigger in turn is urged to an outward position. The stop member 100 then engages part 10 of the body, preventing further clock-wise movement of the lever (Figure 1): the orientation of the knife member 48, relative to carriage 42, is such that the pins 60 are unable to escape from the bearing opening 66 through the assembly opening 80 and likewise the lever 52 is unable to reach an orientation which would allow the bearing, 206 to escape from the slot 208. When the feeding means 14 and the other parts of the glue gun, including the melt body 16, inlet sleeve 22, guide collar 30, electric leads and heater element, are properly assembled in the part 10 of the gun body, the part 12 of the body is aligned with the part 10 and the two parts secured together.

When the trigger is moved rearwardly of the gun by pressure on the pressure plate 98, the lever 52 is caused to pivot about peg 53 and to bring about pivotal movement of the clamp member on the carriage and sliding movement of the carriage as described above. Maximum depression of the trigger is limited by contact of the pressure plate 98 with body parts 10, 12, in which condition the upstanding part 110 of the carriage 42 is adjacent an inlet end of the inlet tube 22. When the trigger 50 is released, the knife portions are disengaged from the rod and the rod is released from the rod from the upstanding part 110 of the carriage 42. The rod 54 is restrained against rearward movement by the collar 30 and inlet tube 22. The carriage 42 slides rearwardly under the pressure of the spring 56 to an extent determined by engagement of the stop member 100 with body part 10, 12, the carriage sliding relative to the rod 54 so that on a subsequent operation of the trigger 50 a fresh part of the rod 54 is gripped by the knife portions 72 and upstanding part 110 of the carriage 42. As the rod 54 is urged into the melt chamber by the feeding means 14, heat supplied to the melt body 16 by the heating element melts the material of the rod 54 and the molten material is dispensed through the nozzle 18 under pressure applied by the feeding means 14 to the rod 54. Relaxation of pressure on the trigger 50 stops the feeding of rod 54 into the melt chamber and no further molten material is dispensed through nozzle 18.

The exemplified apparatus includes electrical leads (not shown) for connecting the heaters to an electricity supply.

When it is desired to use the exemplified apparatus, it is connected to an electrical power supply, and a rod 54 of hot-melt adhesive of circular section is pushed into the apparatus through the guide collar 30, between the upstanding part 110 and the clamp member 48, into the inlet tube 22, where it is gripped by the distended lip 32 of the inlet tube 22, and into the inlet of the melt chamber. Operation of the trigger when material in the melt chamber is melted brings

about feeding of the rod as described above aforesaid. As a rod is fed into the melt chamber, its leading end and outer surface are first softened and melted, leaving a substantially cone-like solid residue which during continued feeding is forced into the melt chamber where heat is transferred to the rod.

As more rod is fed progressively into the melt chamber, it serves to force heat softened or melted material before it through the chamber and ultimately from the nozzle.

Claims

1. A hot-melt gun comprising a melt body (16) having a melt chamber (17) and feeding means for feeding a solid rod of hot-melt material into said melt body, the feeding means comprising clamping means including a carriage (42) mounted for sliding movement towards and away from the melt body and having a support portion (110) shaped to accept a rod (54) to be fed to the melt body and to hold it so that said rod is held with its axis parallel to the direction in which the carriage (42) is arranged to move, and a clamp member (48) mounted on said carriage, characterised in that said clamp member (48) is pivotally mounted on the carriage and has a clamping arm portion (71) disposed along the direction in which the carriage (42) is arranged to move and a crank arm portion (70) having an operating portion (49) arranged to co-operate with pressure means (207) of pivotally-mounted connecting means (52) in response to operation of a trigger of the gun, whereby, upon operation of the trigger, the clamp member can pivot to engage a rod supported in the carriage so as to grip the rod against said support portion, and on continued operation of the trigger, the clamp member may be caused to move with the carriage to feed the rod towards the melt chamber (17), the operating portion (49) of the crank arm (70) having a convex surface (64) and being so disposed that an acute angle between a plane which includes a line of contact between the convex surface and the pressure means and a plane which includes the direction in which the carriage is arranged to move is increased as the clamp member is pivoted to grip the rod whereby an increased component of force is applied in the direction in which the carriage is arranged to move.

2. A hot-melt gun of the kind set out in claim 1, wherein the crank arm (70) having a convex surface (64) is so disposed that, prior to operation of the trigger means, the line of contact between the convex portion and the pressure means lies to the rear (in the direction in which the carriage is arranged to move) of a plane P including the axis of rotation of the clamp member on the carriage (42) and which is normal to the direction in which the carriage is arranged to move, and that after the rod has been gripped, the line of contact between the convex portion and the pressure means lies before said plane in the direction in which the carriage is arranged to move.

3. A hot-melt gun according to claim 1 or 2, wherein the clamp member (48) comprises a clamping arm portion (71) in the form of a rack providing several knife portions (72) arranged transversely of the direction in which the carriage is arranged to move.

4. A hot-melt gun according to any one of the preceding claims, wherein the clamping arm portion (71) is in the form of an arcuate rack having a plurality of knife portions (72) extending transversely of the direction in which the carriage is moved and arranged so that two or more thereof may engage the rod to grip it against the shaped portion.

5. A hot-melt gun according to any one of the preceding claims, wherein the clamp member (48) comprises stabiliser pins (61) located to co-operate with guideways (63) in portions of the carriage located in front of the pivotal mounting of the clamp member (in the direction in which the carriage is arranged to move) as the carriage is moved towards the melt chamber.

6. A hot-melt gun according to any one of the perceding claims, wherein the trigger (50) is slidably mounted in body portions of the gun and arranged to operate the connecting means (52) to move the clamp member (48) to feed a rod to the melt chamber against the action of a spring (56).

7. A hot-melt gun according to claim 1 or 2, wherein the connecting means (52) comprises a lever pivotally mounted on body portions of the gun and formed with a can surface (202) providing said pressure means (207).

8. A hot-melt gun according to any one of the preceding claims comprising a resilient tube (22) arranged to be distended by the rod (54) as it is fed into the melt chamber.

9. A hot-melt gun according to any one of the preceding claims comprising a resilient mouthpiece (30) through which rod (54) may be supplied to the feeding means.

Patentansprüche

1. Heißschmelz-Klebepistole mit einem Schmelzkörper (16), der eine Schmelzkammer (17) und Zuführeinrichtungen aufweist, um einen festen Stab aus Heißschmelz-Material in den Schmelzkörper einzuführen, wobei die Zuführeinrichtungen eine Klemmeinrichtung aufweisen, die einen Schlitten (42) aufweist, welcher zur Gleitbewegung in Richtung auf und weg von dem Schmelzkörper befestigt ist und einen Halteteil (110) hat, der so gestaltet ist, daß er einen Stab (54) aufnimmt, der dem Schmelzkörper zuzuführen ist, und ihn so hält, daß der Stab mit seiner Achse parallel zu der Richtung gehalten wird, in welcher der Schlitten (42) zur Bewegung angeordnet ist, und ein Klemmelement (48), das auf dem Schlitten befestigt ist, dadurch gekennzeichnet, daß das Klemmelement (48) an dem Schlitten angelenkt ist und einen Klemmarmteil (71) aufweist, der längs der Richtung angeordnet ist, in welcher der Schlitten (42) zur Bewegung angeordnet ist und einen Kurbelblatteil (70), der einen

Arbeitsteil (49) hat, welcher so angeordnet ist, daß er mit einer Druckeinrichtung (207) einer angelenkten Verbindungseinrichtung (52) in Reaktion auf den Betrieb eines Pistolenauslösers zusammenarbeitet, wobei bei dem Betrieb des Auslösers das Klemmelement schwenken kann, um in einen in dem Schlitten getragenen Stab einzugreifen, um den Stab gegen den Halteteil zu klemmen, und bei fortgesetztem Betrieb des Auslösers kann das Klemmelement veranlaßt werden, sich mit dem Schlitten zu bewegen, um den Stab zur Schmelzkammer (17) zu führen, wobei der Arbeitsteil (49) des Kurbelblattes (70) eine konvexe Oberfläche (64) hat und so angeordnet ist, daß ein spitzer Winkel zwischen einer Ebene, welche eine Berührungslinie zwischen der konvexen Oberfläche und der Druckeinrichtung einschließt, und einer Ebene, welche die Richtung einschließt, in welcher der Schlitten zur Bewegung angeordnet ist, anwächst, wenn das Klemmelement geschwenkt wird, um den Stab zu klemmen, wobei eine erhöhte Kraftkomponente in der Richtung angelegt wird, in der der Schlitten zur Bewegung angeordnet ist.

2. Heißschmelz-Klebepistole der im Anspruch 1 genannten Art, wobei das Kurbelblatt (70) mit der konvexen Oberfläche (64) so angeordnet ist, daß vor dem Betrieb der Auslösereinrichtung die Berührungslinie zwischen dem konvexen Teil und der Druckeinrichtung im hinteren Teil (in der Richtung, in welcher der Schlitten zur Bewegung angeordnet ist) einer Ebene P liegt, welche die Drehachse des Klemmelementes auf dem Schlitten (42) einschließt und welche senkrecht auf der Richtung steht, in welcher der Schlitten zur Bewegung angeordnet ist, und daß, nachdem der Stab geklemmt wurde, die Berührungslinie zwischen dem konvexen Teil und der Druckeinrichtung vor der Ebene in der Richtung liegt, in welcher der Schlitten zur Bewegung angeordnet ist.

3. Heißschmelz-Klebepistole nach Anspruch 1 oder 2, wobei das Klemmelement (48) einen Klemmarmteil (71) in Form einer Zahnstange aufweist, die einige Messerteile (72) aufweist, welche quer zu der Richtung angeordnet sind, in welcher der Schlitten zur Bewegung angeordnet ist.

4. Heißschmelz-Klebepistole nach einem der vorhergehenden Ansprüche, wobei der Klemmarmteil (71) die Form einer gekrümmten Zahnstange mit einer Vielzahl von Messerteilen (72) hat, die sich quer zu der Richtung erstrecken, in welcher der Schlitten bewegt wird, und welche so angeordnet sind, daß zwei oder mehr von Ihnen in den Stab eingreifen, um ihn gegen den geformten Teil zu klemmen.

5. Heißschmelz-Klebepistole nach einem der vorhergehenden Ansprüche, wobei das Klemmelement (48) Stabilisierungszapfen (61) aufweist, die so angeordnet sind, daß sie mit Führungsbahnen (63) in Teilen des Schlittens zusammenarbeiten, welche gegenüber dem Schwenkgelenk des Klemmelementes angeordnet sind (in der Richtung, in welcher der Schlitten zur Bewegung angeordnet ist), wenn der Schlitten zu der Schmelzkammer bewegt wird.

6. Heißschmelz-Klebepistole nach einem der vorhergehenden Ansprüche, wobei der Auslöser (50) gleitfähig in Körperteilen der Klebepistole befestigt ist und so angeordnet ist, daß er die Verbindungseinrichtung (52) so bedient, daß das Klemmelement (48) bewegt wird, um einen Stab in die Schmelzkammer gegen die Wirkung einer Feder (56) einzuführen.

7. Heißschmelz-Klebepistole nach Anspruch 1 oder 2, wobei die Verbindungseinrichtung (52) einen Hebel aufweist, der an Körperteilen der Klebepistole angelenkt ist und mit einer Nockenfläche (202) gebildet ist, welche die Druckeinrichtung (207) darstellt.

8. Heißschmelz-Klebepistole nach einem der vorhergehenden Ansprüche mit einem elastischen Rohr (22), das so angeordnet ist, daß es von dem Stab (54) gedehnt wird, wenn er in die Schmelzkammer eingeführt wird.

9. Heißschmelz-Klebepistole nach einem der vorhergehenden Ansprüche mit einem elastischen Mundstück (30), durch welches der Stab (54) der Zuführeinrichtung zugeführt werden kann.

Revendications

1. Pistolet pour matière thermofusible, comprenant un corps de fusion (16), comportant une chambre de fusion (17) et des moyens d'avancement permettant de faire avancer une tige pleine de matière thermofusible dans ce corps de fusion, ces moyens d'avancement comportant des moyens de serrage comprenant un coulisseau (42) monté de façon à pouvoir se rapprocher et s'éloigner de manière coulissante du corps de fusion et offrant une partie de soutien (110) conformée, de façon à recevoir une tige (54) à faire avancer vers le corps de fusion et de façon à la maintenir de manière que cette tige soit maintenue avec son axe parallèle à la direction dans laquelle le coulisseau (42) est agencé pour se déplacer, et une pièce de serrage (48) montée pivotante sur ce coulisseau, caractérisé en ce que cette pièce de serrage (48) est montée de manière pivotante sur le coulisseau et offre une partie formant bras de serrage (71) disposée suivant la direction dans laquelle le coulisseau (42) est agencé pour se déplacer et une partie formant bras coudé (70) offrant une partie de manoeuvre (49) agencée de façon à coopérer, sous l'effet de la manoeuvre d'une détente (50) du pistolet, avec des moyens de pression (207) faisant partie de moyens de liaison (52) montés de façon pivotante, de sorte que, d'une part, lors d'une manoeuvre de cette détente, cette pièce de serrage peut pivoter de façon à venir au contact d'une tige soutenue dans le coulisseau de manière à assurer une prise sur cette tige en l'appliquant contre ladite partie de soutien, et que, d'autre part, la poursuite de la manoeuvre de la détente peut faire se déplacer la pièce de serrage avec le coulisseau de façon à faire avan-

cer la tige en direction de la chambre de fusion (17), la partie de manoeuvre (49) du bras coudé (70) offrant une surface convexe (64) et étant disposée de façon qu'un angle aigu, défini par un plan qui contient une ligne de contact située entre la surface convexe et les moyens de pression et par un plan qui contient la direction dans laquelle le coulisseau est agencé pour se déplacer, croît au fur-et-à-mesure que la pièce de serrage fait l'objet d'un pivotement en vue d'assurer une prise sur la tige, grâce à quoi une composante de force accrue est appliquée suivant la direction dans laquelle le coulisseau est agencé pour se déplacer.

2. Pistolet pour matière thermofusible suivant la revendication 1, dans lequel le bras coudé (70) offrant une surface convexe (64) est disposé de façon que, d'une part, avant une manoeuvre des moyens formant détente, la ligne de contact entre la partie convexe et les moyens de pression se trouve située à l'arrière (dans la direction suivant laquelle le coulisseau est agencé pour se déplacer) d'un plan P contenant l'axe de rotation de la pièce de serrage sur le coulisseau (42) et qui est normal à la direction suivant laquelle le coulisseau est agencé pour se déplacer et que, d'autre part, une fois que la tige a été saisie, cette ligne de contact entre la partie convexe et les moyens de pression se trouve située on avant dudit plan suivant la direction dans laquelle le coulisseau est agencé pour se déplacer.

3. Pistolet pour matière thermofusible suivant la revendication 1 ou 2, dans lequel la pièce de serrage (48) comprend une partie formant bras de serrage (71) se présentant sous la forme d'une crémaillère offrant plusieurs parties en couteau (72) disposées transversalement à la direction suivant laquelle le coulisseau est agencé pour se déplacer.

4. Pistolet pour matière thermofusible suivant l'une quelconque des revendications précédentes, dans lequel la partie formant bras de serrage (71) se présente sous la forme d'une crémaillère en arc de cercle offrant plusieurs parties en couteau (72) s'étendant transversalement à la direction suivant laquelle le coulisseau se déplace et agencées de façon que deux d'entre elles ou plus puissent venir au contact de la tige afin d'assurer sur elle une prise l'appliquant contre la partie conformée.

5. Pistolet pour matière thermofusible suivant l'une quelconque des revendications précédentes, dans lequel la pièce de serrage (48) comprend des doigts de stabilisation (61) disposés de façon à coopérer avec des glissières ou évidements (63) ménagés dans des parties du coulisseau qui sont situées en avant du montage pivotant de la pièce de serrage (dans la direction suivant laquelle le coulisseau est agencé pour se déplacer) lorsque ce coulisseau se déplace en direction de la chambre de fusion.

6. Pistolet pour matière thermofusible suivant l'une quelconque des revendications précédentes, dans lequel la détente (50) est montée de manière coulissante dans des parties du corps du pistolet et agencée de façon à actionner les moyens de liaison (52) en vue de déplacer la pièce de serrage (48) pour qu'elle fasse avancer une tige vers la chambre de fusion à l'encontre de l'action d'un ressort (56).

7. Pistolet pour matière thermofusible suivant la revendication 1 ou 2, dans lequel les moyens de liaison (52) comprennent un levier monté de manière pivotante sur des parties de boîtier du pistolet et sur lequel est ménagée une surface de came (202) fournissant lesdits moyens de pression (207).

8. Pistolet pour matière thermofusible suivant l'une quelconque des revendications précédentes, comprenant un tube élastique (22) agencé de façon à être dilaté par la tige (54) lorsqu'elle fait l'objet d'un avancement dans la chambre de fusion.

9. Pistolet pour matière thermofusible suivant l'une quelconque des revendications précédentes, comprenant une embouchure élastique (30) à travers laquelle une tige (54) peut être amenée aux moyens d'avancement.

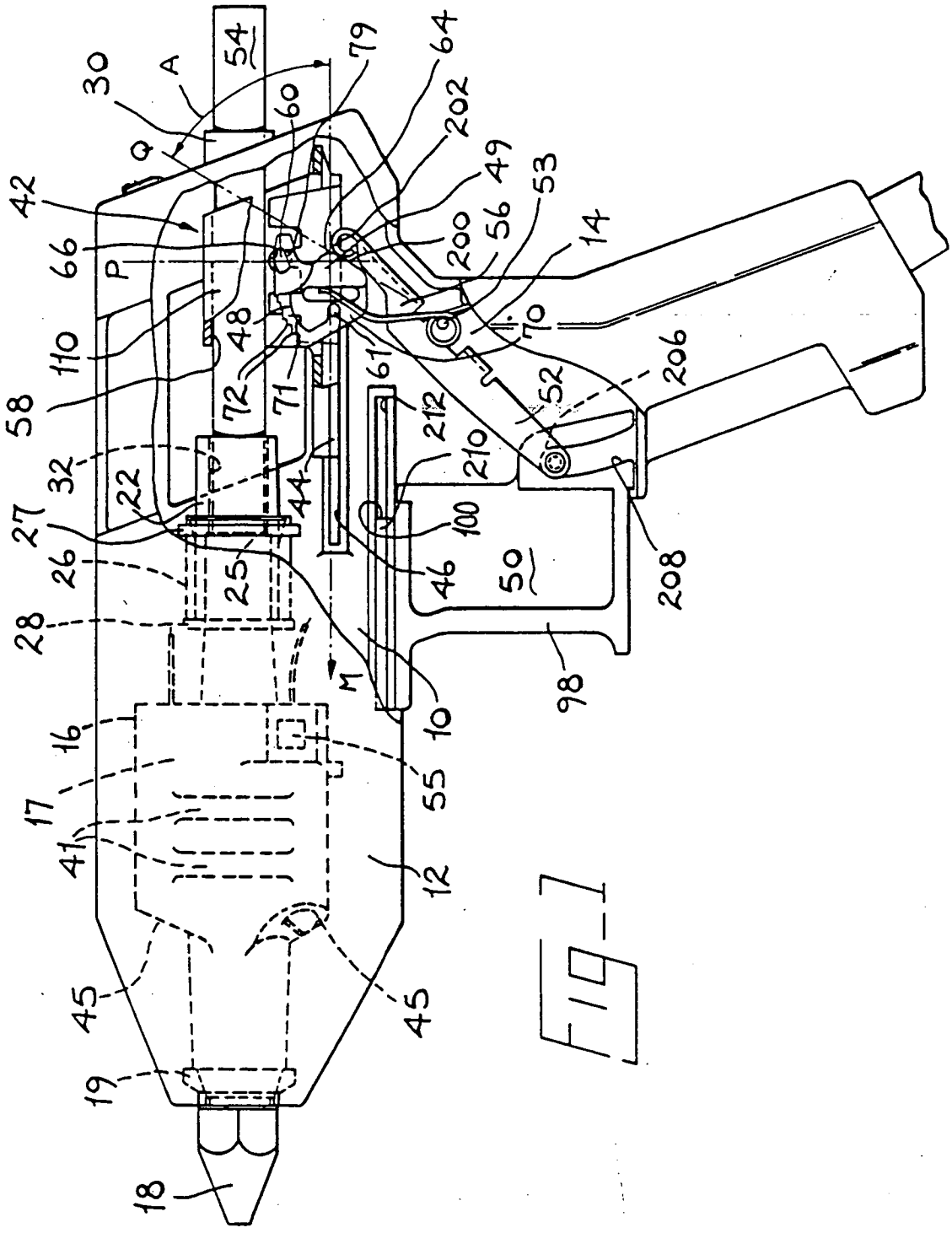
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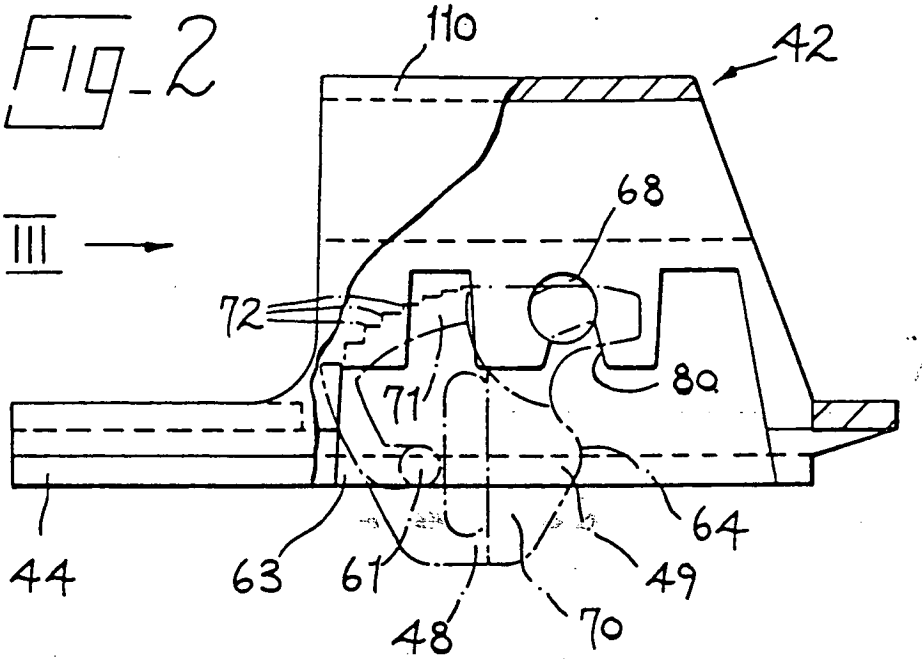
FIG_1

Fig_2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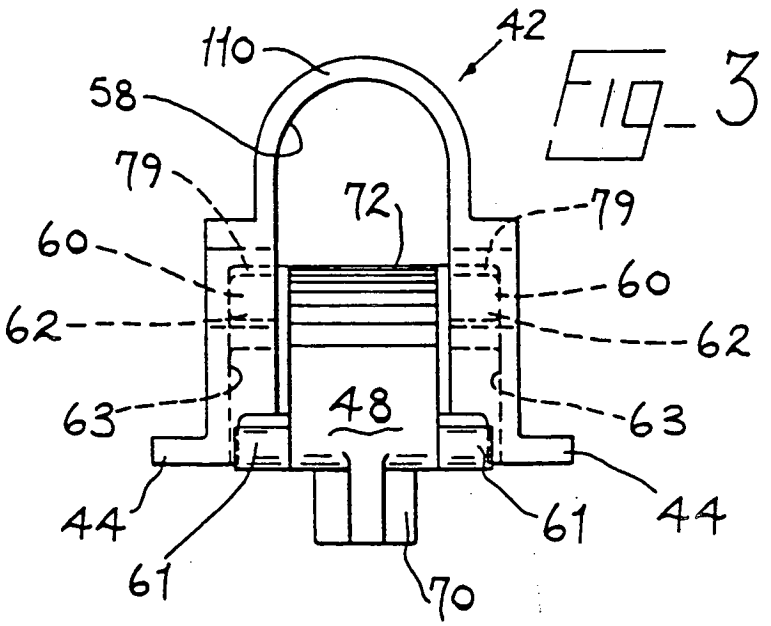
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Fig_3

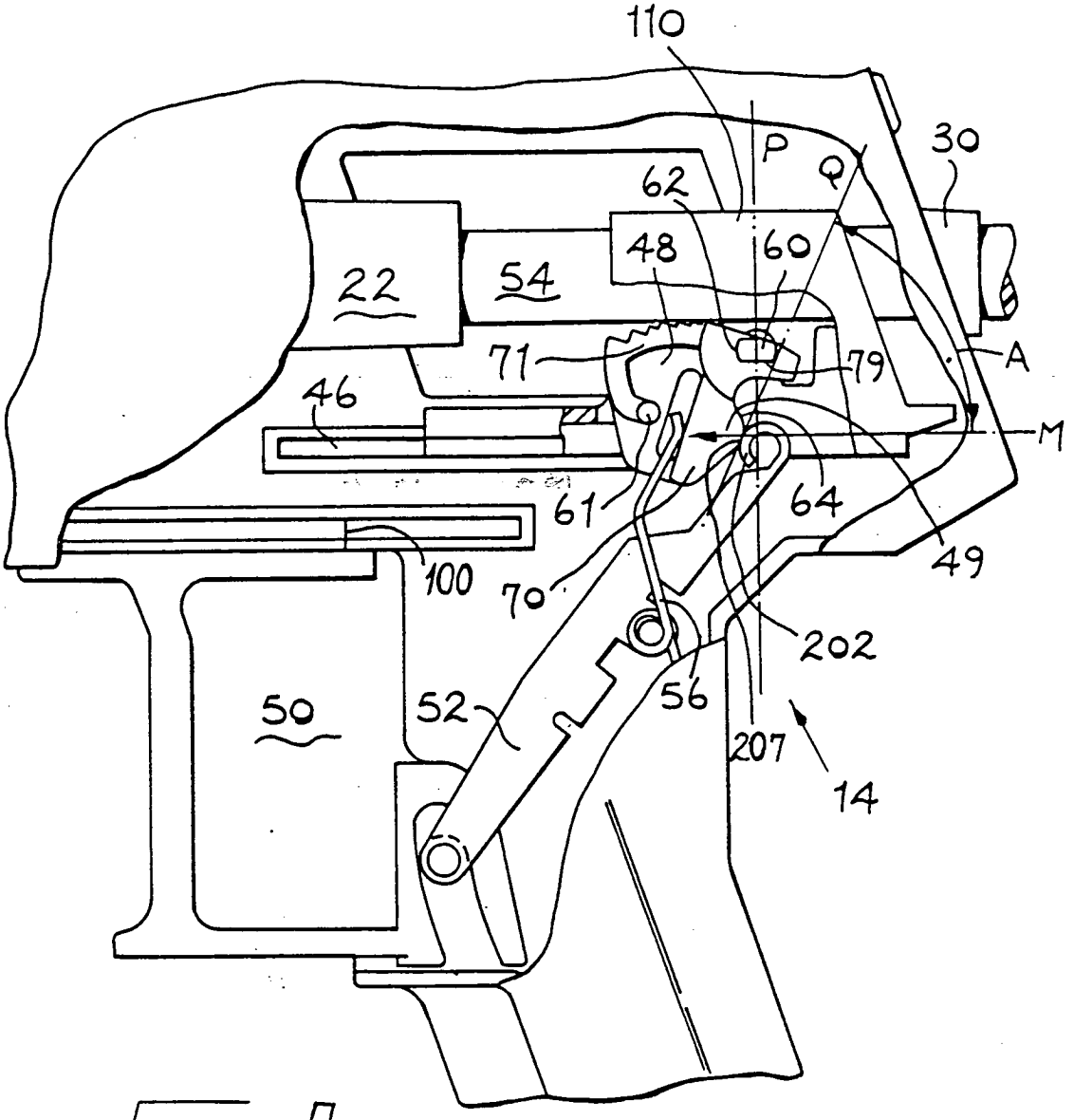
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Fig_4

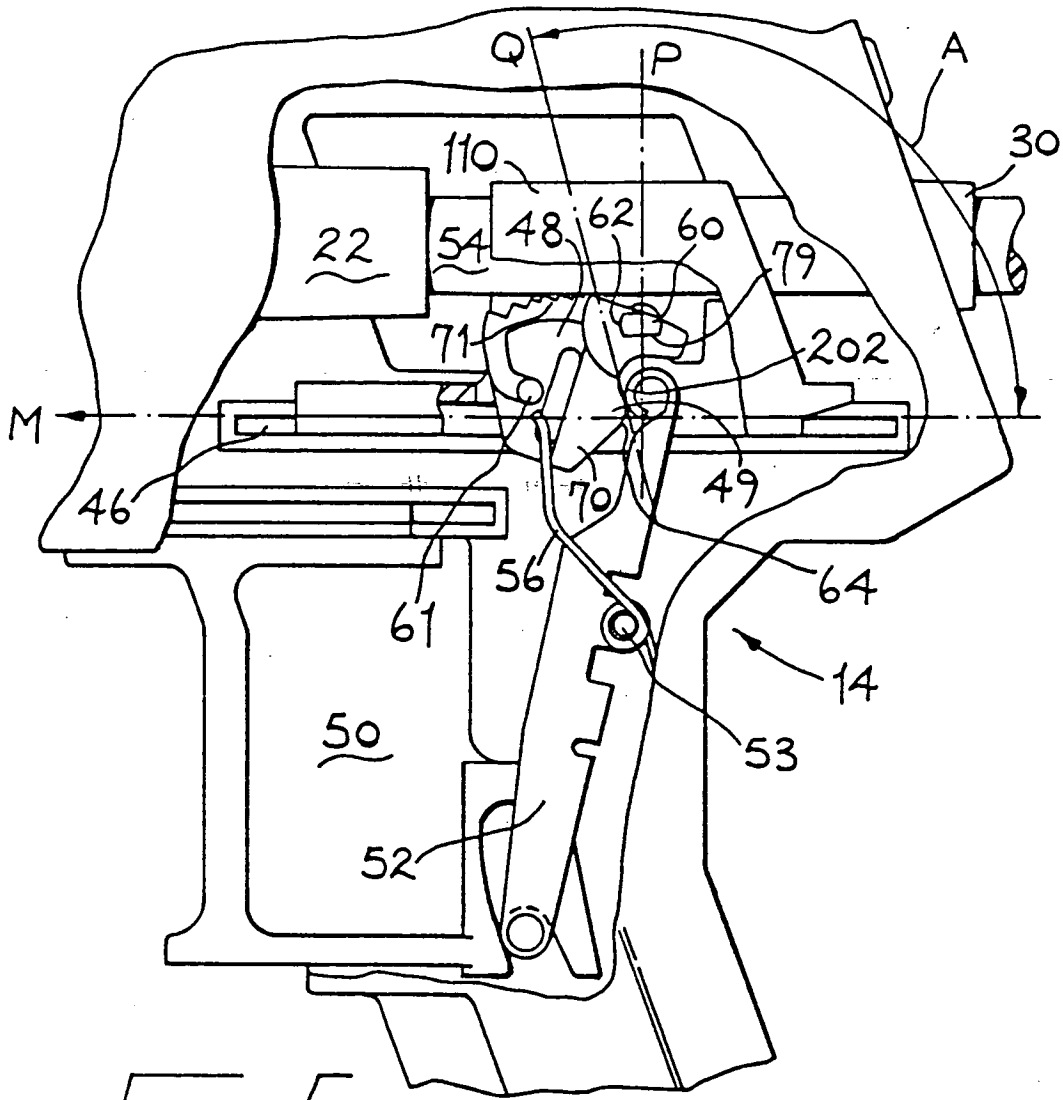

Fig_5

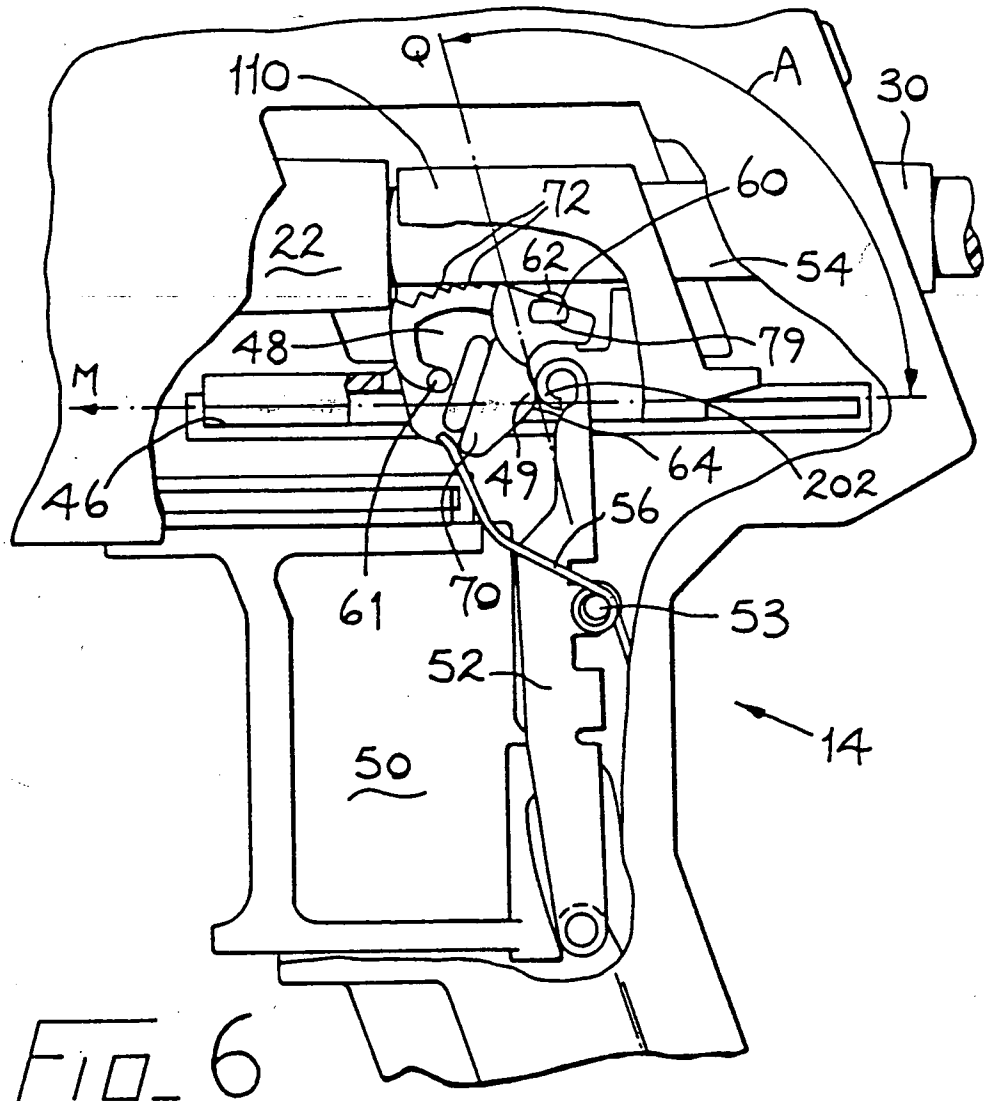

Fig. 6

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