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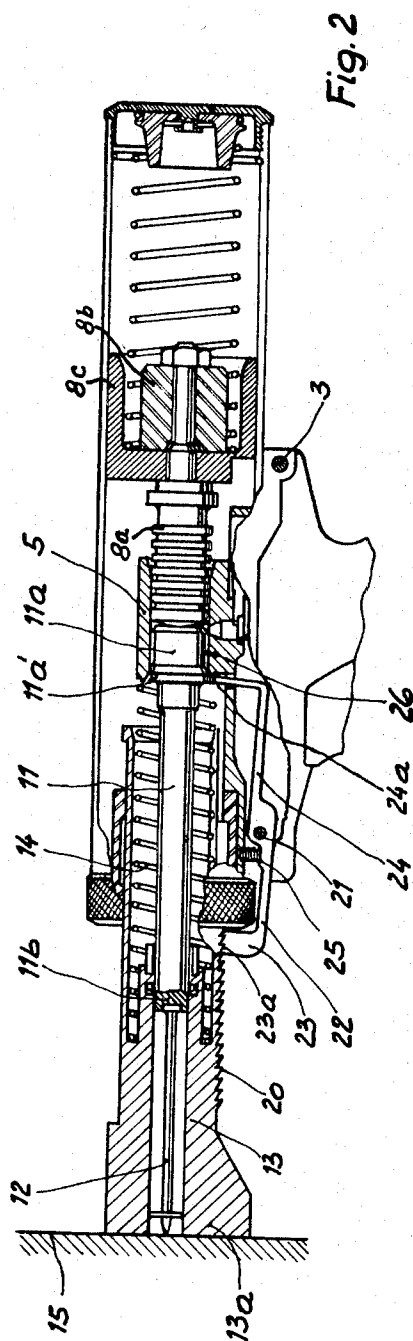
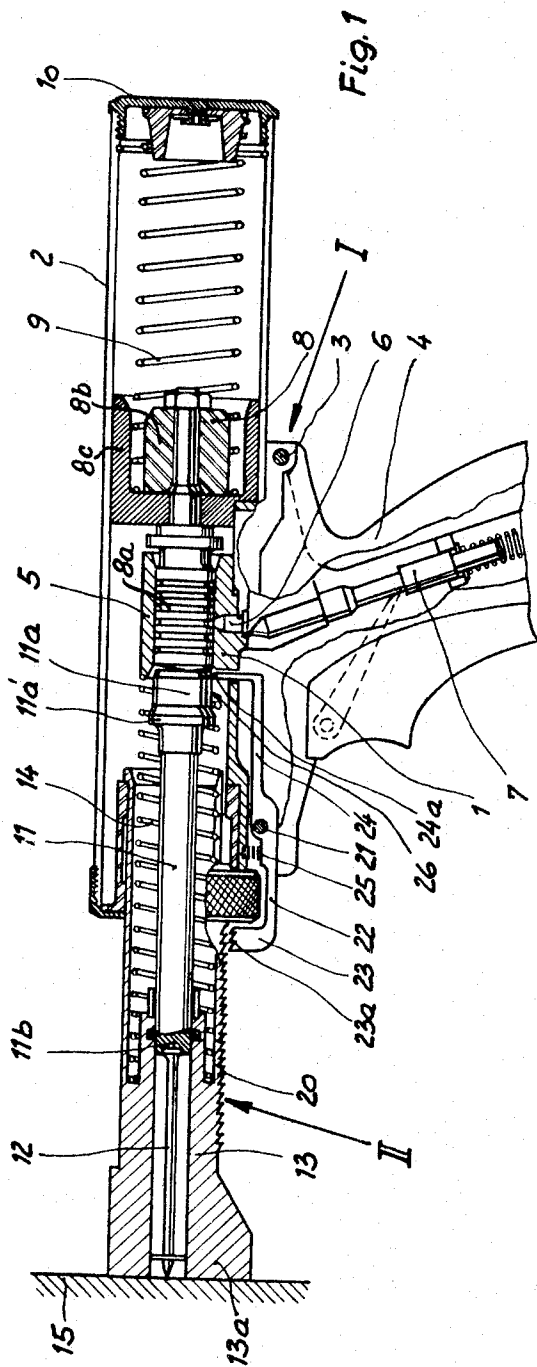
HANS-DIETER SEGHEZZI ET AL

3,321,122

STUD DRIVER

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2 Sheets-Sheet 1



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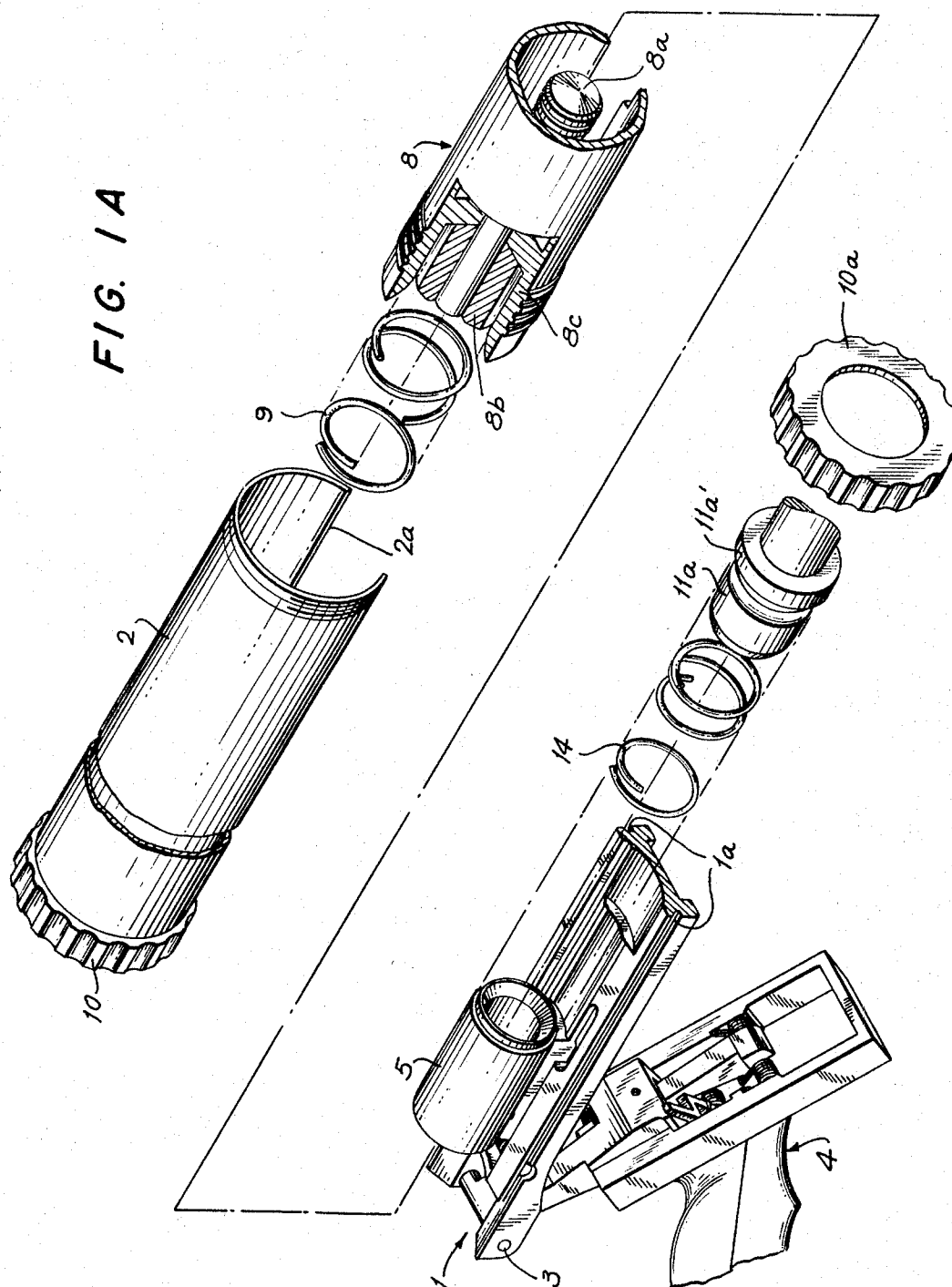
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STUD DRIVER

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9 Claims. (Cl. 227—10)

The present invention relates to a thrust-piston type stud driver operated by the force of an explosive powder and having a barrel for the driving of anchoring pins, and more particularly to such a driver wherein the part of the apparatus bearing the firing device is displaceable against the force of a spring resting against the thrust piston via the stud to be driven which is located against the material into which it is to be driven.

The invention thus concerns a stud driver in which, at the time of firing, the stud or nail rests against the material into which it is to be driven and is at the same time locked with the thrust piston.

To drive anchoring pins or studs of different lengths with such a tool without the necessity of effecting adjustments of the tool, the part of the tool which surrounds the anchoring pin is made displaceable with respect to the part of the tool which carries the firing device so that in all cases in the firing position of the tool, the tip of the stud and the front surface of a guide tube, or a positioning plate arranged at the end of the guide tube, lie in the same plane against the material into which the stud is to be driven.

Assurance against unintentional firing, or firing as a result of the tool being dropped, is provided in stud drivers of the type in question by designing the tool so that firing is only possible when a specific pressure is exerted on the stud whose point rests against the receiving material. Such a safety, however, has the disadvantage that the stud driver lacks steadiness because tilting of the driver about the tip of the stud is possible. Thus the stud driver tends to waver or to be held at an angle to a workpiece and, accordingly, studs are frequently driven obliquely.

It is also known, instead of providing a safety overcome by the application of pressure against the stud, to provide a safety by designing the tool so the driver can only be fired when a given pressure is exerted on a guide tube which ordinarily terminates in a positioning or bearing plate. That design has the disadvantage that it is necessary to press the driver with a relatively large force against the material into which the stud is to be driven, and also that an unintentional shot can be fired without particular difficulty by the application of a strong force pushing backward the positioning plate. Also, the tip of the stud may not always be against the workpiece.

An object of the present invention is to provide an apparatus by which the above disadvantages are avoided and which, in particular, has the advantages of a simple safety in accordance with the first-mentioned type of safety, i.e., via the tip of the stud resting against the material into which it is to be shot, without however, the necessity of tolerating wavering of the apparatus and without the necessity of a particularly high pressing pressure to avoid such wavering.

In accordance with the invention, the object is achieved in an apparatus of the aforementioned type by providing that the relative movement between the part of the tool carrying the firing device and the part of the tool holding the anchoring pin or stud can be used to control a locking device which rigidly connects those two parts of the tool, displaceable relative to each other, together in the firing position.

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Thus, the advantage is obtained that after sufficient force to overcome the safety has been applied through a stud bearing against a workpiece, the stud is retracted in the barrel or guide tube in which it is carried. The barrel or guide tube, in turn, is telescoped into the part of the tool that contains the firing device and the handle, and is automatically locked thereto in the firing position. Wavering of the tool about the tip of the retracted stud is thus not possible. By this interlocking, any tilting of the device can occur only at a point on the periphery of the barrel, or guide plate, applied against the material into which the stud is to be shot, or at a point on the periphery of a positioning plate connected to the barrel. Thus, unintentional tilting of the tool is much more likely to be noticed and corrected by the operator.

The interlocking device is preferably formed by a pivoted lever arranged on a movable part of the tool so it can be controlled by a cam developed on another part of the device, and in the firing position engages the part applied against the material into which the stud is to be driven, thus locking the two parts together.

One simple manner of locking the two parts together consists in providing a barrel for the device with teeth or ratchet into which an arm of the lever, which is also provided with teeth, engages to produce the interlock. The cam is preferably arranged on the thrust-piston itself.

The invention can be understood in further detail by referring to the illustrative embodiment thereof shown in the drawings in which:

FIGURE 1 is an elevation in section and shows a part of the device in loading position; and

FIGURE 2 is an elevation in section and shows the device of FIGURE 1 in the firing position.

Referring to FIGURES 1 and 1A, a supporting piece 1 on which a guide tube 2 serving as a housing is removably fastened carries a supporting pin 3 to which a handle, designated generally as 4, is pivoted. The tube 2 has a slot cut out of one side. The edges 2a of the slot pass slidably through grooves 1a on each side of the supporting member 1. To the supporting piece there is fastened a sleeve 5, which is preferably integral with the supporting piece, that serves as a propulsion gas explosion chamber. A bore 6 passing through the wall of the sleeve 5 at right angles to its longitudinal axis serves as a cartridge chamber for an explosive charge.

In the handle 4 is arranged a firing pin, designated generally as 7, in such a manner that in the operating position of the tool (FIGURE 2) it strikes against the bottom of a cartridge in the bore 6 upon release of the pin effected by known means, e.g., pulling a trigger.

As can be seen in FIGURES 1 and 1A, the propellant gas chamber 5 is penetrated in the position of rest of the tool (FIGURE 1) by a recoil damping mass 8 having one end developed in the form of a piston 8a, and another end 8b against which rests one end of a damping spring 9 whose other end rests against a closure cover 10 of the housing tube 2. The outer wall 8c of the recoil damping mass 8 has a slot 8d cut out of it enabling the damping mass to pass slidably over the gas chamber sleeve 5 on the supporting member 1.

In addition to the recoil damping mass 8, a thrust piston 11 is also supported in the tube 2 so that it can enter the propellant gas chamber 5. In the condition of rest of the device, the rear end 11a of the thrust piston lies outside the entrance to the propellant gas chamber 5. The other end 11b of the thrust piston is received in a barrel 13 in which is placed the anchoring pin or stud 12. The barrel 13 ends in a positioning plate 13a which may be rigidly secured to the barrel 13 (as shown) or mounted slidably with respect to it against the action of a spring. The barrel 13 is displaceable in the tube 2 of the apparatus against

a spring 14 which presses the barrel outward (leftward in the drawings) in the position of rest of the tool and bears against the sleeve 5 of the supporting piece 1.

Summarizing, it is clear that the driver described has essentially two parts which are displaceable with respect to each other. One part of the device, designated as I, comprises the supporting piece 1 with the handle 4, the firing device 7, the sleeve 5 and the tube 2. The other part of the device, II, comprises the barrel 13 with the anchoring pin 12 and the thrust piston 11. The two parts I and II are operatively connected with each other by means of the two springs 9 and 14, the spring 9 serving, among other things, as a safety since it pushes the thrust piston 11 out of the propellant gas chamber 5 so that the force of the spring 9 must be overcome to place the tool in the firing position shown in FIGURE 2.

It will be noted from the drawings that the barrel 13 has teeth 20 which are preferably formed as a ratchet as part of the barrel. Furthermore, on the supporting piece 1 there is provided a pivot pin 21 around which there is pivotally mounted a lever 22 having two arms 23 and 24. The arm 23 is provided with teeth 23a adapted to engage the ratchet 20. The arm 24 has an end 24a which serves as follower, moving along a cam 26 which, as shown in the drawings, may suitably be arranged as the side face of end 11a of the thrust piston 11 which has a flare 11a'. A compression spring 25 inserted between the arm 23 and the housing 2 assures continuous contact between the follower 24a and the cam 26. The cam is so calculated that the lever 22 remains, during most of the pressing of the tool into the firing position, in the position shown in FIGURE 1. At the final phase of the pressing, the lever 22 is swung into the position shown in FIGURE 2, by the cam 26 acting against arm 24, in such a manner that the teeth 23a of the arm 23 engage with the ratchet 20 on the barrel 13 to interlock the parts I and II of the tool.

Operation of the device described is as follows: after the device has been loaded in known manner with a new cartridge, e.g., after swinging the handle 4 around the pin 3 and then locking the handle 4 to the supporting piece 1 and to the sleeve 2, and an anchoring pin or stud 12 has been inserted into the barrel 13, the tool is placed against the material into which the stud is to be driven and is pushed forward with the handle 4 toward the material into which the stud is to be driven until, as can be seen in FIGURE 1, the stud 12 tip resting against said material lies in the same plane as the front wall of the guide piece 13. The guide piece 13 is displaced against the force of the spring 14 with respect to part I of the tool. After completion of this phase of the pressing or cocking movement, i.e., as soon as the stud rests against the material into which it is to be shot and at the same time rests against the front end of the thrust piston 11, the part I of the tool which carries the firing device is pushed towards the left relative to the part II of the driver by further pressing of the tool, as a result of which after a displacement path dependent upon the length of the stud, the gas pressure chamber sleeve 5 is pushed over the end 11a of the thrust piston 11. At the same time, the pin 21a of the tool on the part I travels to the left and carries the pivoted lever 22 along with it so that the follower 24a of the lever arm 24 moves along the cam 26 on the end 11a of the thrust piston. As soon as the protruding part 11a' of the cam 11a has reached the follower 24a, the latter and the swinging lever 22 are turned clockwise by it so that the arm 23, provided with teeth 23a, comes into engagement with the ratchet 20 on the barrel 13. Movement of the thrust piston 11 is limited by the flare 11a' striking against the end surface of the gas propulsion

chamber sleeve 5. In this way, the result is obtained that the parts I and II of the driver, which were previously displaceable with respect to each other, are rigidly connected with each other via the pivoted lever 22 and a tilting movement of the tool against the material into which the stud is to be driven can take place only at a point on the periphery of the end surface of the barrel 13 or of the positioning plate 13a connected with it.

We claim:

1. In a gas-operated stud driving tool having a supporting member, a barrel for receiving a stud to be driven telescopically mounted on said supporting member and adapted to be telescoped thereon to a firing position, a thrust piston extending into said barrel to drive a stud therein and adapted to be moved to a firing position and firing means on said supporting member to drive said thrust piston when said piston and said barrel are in their firing positions, the improvement which comprises interlocking means between said barrel and said supporting member to lock said barrel in said firing position, and actuating means adapted to actuate said interlocking means by the movement of said piston to its firing position.
2. An improvement as defined in claim 1 wherein said actuating means comprises a cam on said thrust piston and a lever pivotally mounted on said supporting member having an arm following said cam.
3. An improvement as defined in claim 1 wherein said interlocking means comprises a lever pivotally mounted on said supporting member having an arm engaging said barrel and means on said barrel for receiving said arm.
4. An improvement as defined in claim 3 wherein said means for receiving said arm is a ratchet.
5. A gas-operated stud driving tool comprising: a first barrel part and a second firing part; said first barrel part being telescopically mounted on said second firing part for movement to a firing position thereon, and adapted to receive a thrust piston and a stud to be driven into a workpiece; said second part being adapted to receive a thrust piston in a firing position, and having firing means for driving said thrust piston; a thrust piston, to drive a stud in said first part, slidably mounted in said first part and in said second part, and being adapted for movement to a firing position; and interlocking means between said first and said second parts to interlock said parts in said firing position, said interlocking means being actuated by movement of said thrust piston to its firing position.
6. A gas-operated stud driving device according to claim 5 further comprising biasing means for projecting said first barrel part from said second firing part and biasing means for biasing said thrust piston from its said firing position.
7. A gas-operated stud driving device according to claim 5 wherein said thrust piston has a cam thereon to actuate said interlocking means.
8. A gas-operated stud driving device according to claim 5 wherein said interlocking means has a lever pivotally mounted on said second firing part having a first portion to engage said thrust piston to actuate said interlocking means and a second portion to engage and interlock said first barrel part.
9. A gas-operated stud driving device according to claim 8 wherein said second portion and said first barrel part each have teeth means adapted to interengage when said first part is telescoped on said second part to its firing position and said lever is pivoted by movement of said thrust piston to its firing position.

No references cited.

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