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 COMPACT MATERIALS
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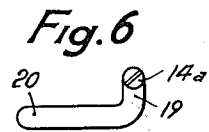
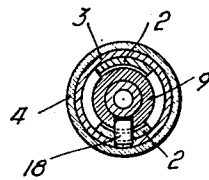
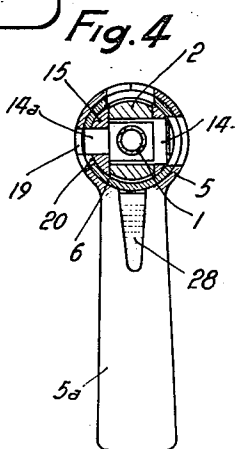
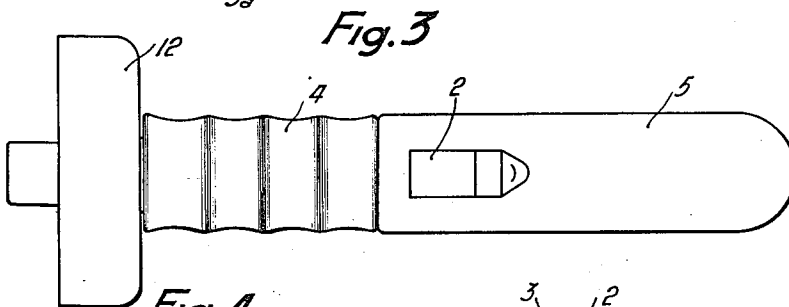
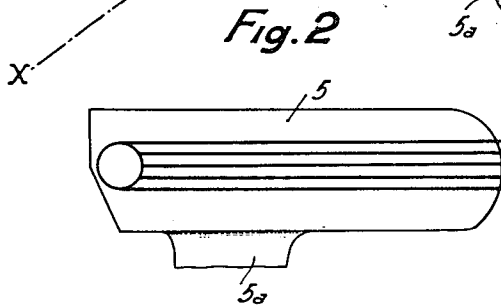
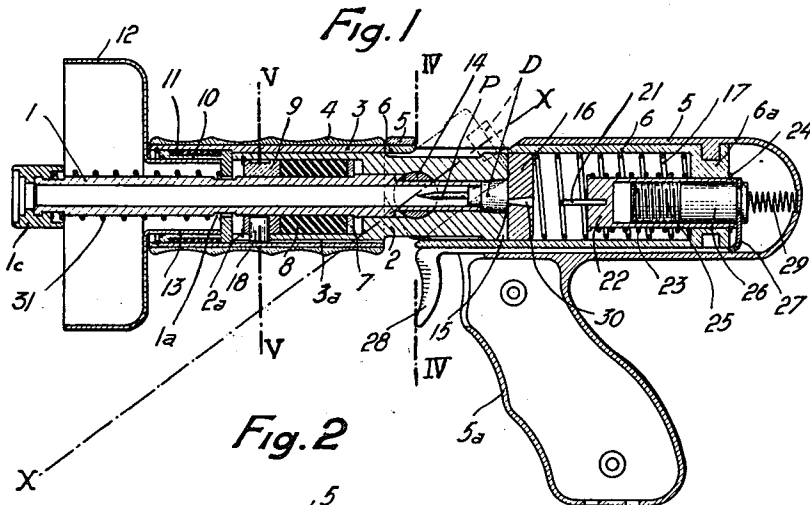


Fig. 5

Fig. 6

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1

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FIXING GUNS ADAPTED TO DRIVE NAILS AND THE LIKE, SUCH AS FOR EXAMPLE STUDS AND PLUGS IN HARD COMPACT MATERIALS

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The present invention relates to improvements in fixing guns which drive, under the effect of an explosive charge, nails and the like, such as studs and plugs, into hard compact materials. The main purpose of said improvements is to afford greater safety and greater facility in the use of this kind of device, these improvements being preferably utilized in combination, because in this way they afford maximum advantage, it being understood that they could also be used individually, without departing from the scope of the invention, in guns of different types.

A first improvement is applicable to fixing guns of the type having a breech telescopically movable over the barrel of the gun so that the firing pin can only perform its function if said breech is moved far enough axially over said barrel (the end of which is urged by the user against the surface intended to receive the nail), this improvement having for purpose to allow normal operation of the gun only when a detachable splinter guard has been placed in position on the device and being characterized in that said device comprises a ring which is stationary in the axial direction and elastically contractable toward its axis and is capable of engaging with the barrel so as to prevent the latter from sliding when said ring is in its contracted position, which ring is capable of being expanded and separated from the barrel by the action of separating means carried by the splinter guard.

In a preferred embodiment of this improvement, the ring is advantageously a ring which is split in a diametral plane, the elements of the split ring being tightened together by tightening means surrounding the ring.

The separating means for expanding the contractable ring are preferably constituted by a tube of the splinter guard, which tube is adapted to be engaged, in the forward end of the part of the gun in which the barrel is slidable, in part-cylindrical elements rigid with the ring.

When the gun comprises a safety sleeve in which the barrel is slidable, the part-cylindrical elements and the tightening means surrounding the latter are located in a recess or chamber provided at the forward end of the sleeve.

In this arrangement, when the splinter guard is withdrawn, the split ring engages with a recess in the barrel and opposes the sliding movement of the breech relative to the barrel and, in other words, prevents the gun from being fired. On the other hand, when the splinter guard is in position, its associated mounting tube maintains the split ring open so that the latter is unable to engage the recess in the barrel and the breech is free to slide, that is, telescopically move over the barrel when the latter is applied against the hard surface and permit firing the gun.

Another improvement is characterized in that the barrel is slidable in a barrel-carrying body and is urged rearwardly of the body by elastically yieldable means which bear against the barrel and the body respectively. The fact that the barrel is thus slidable affords various possibilities. One of the latter is the easy and cheap production of a light barrel by utilizing a thin-walled barrel only the rear part of which is a slide fit in a part

2

of said barrel-carrying body which has a thicker wall and is relatively short, the chamber adapted to contain the propelling charge being provided in said part at the end of the barrel.

5 The thin part of the barrel which protrudes forwardly from the thick-walled part of said body merely guides the fixing nail, the pressure of the propelling gases transversely of the barrel being borne by the thick-walled part of the barrel-carrying body up to the region where the barrel extends out of said thick-walled part. Said pressure drops to such value in the part of the thin barrel located outside the body that this part is capable of resisting this pressure.

10 In a particular and advantageous embodiment, the rear thick-walled part of said barrel-carrying body is extended forwardly beyond the part of the body from which the thin barrel protrudes by a part which has a thinner wall and forms a sleeve radially spaced away from the barrel, the elastically yieldable element interposed between the barrel and the barrel-carrying body being located in the annular space thus provided between said sleeve of the body and the barrel.

15 Another of said possibilities is the obtainment of a fixing gun in which the barrel remains well applied against the surface receiving the nail or the like, despite the recoil, until the propelled nail has fully penetrated said surface. This is obtained in so arranging the gun that the slidable barrel has its rear end exposed to the pressure of the propelling gases and thus receives from the latter a forward axial thrust so that the recoil force to which the barrel-carrying body is subjected and which displaces the latter rearwardly cannot displace the barrel before the force due to the compression of the elastically yieldable means interposed between the barrel and the barrel-carrying body and the axial forward thrust exerted by the pressure of the propelling gas on the barrel have become equal.

20 In a gun having a safety sleeve and permitting a relative axial sliding and a relative rotation between the barrel and the sleeve, the sleeve is guided axially and rotationally on said barrel-carrying body.

25 Another improvement is that the barrel-carrying body is pivoted to the breech in such manner as to be capable of pivoting with the barrel to permit loading the breech, the latter preferably having for this purpose an attached member adjacent its forward end, this member being in the form of a fork between the branches of which the barrel-carrying body is pivotable about a pivot axis which is preferably substantially orthogonal to the grip of the device.

30 It is furthermore advantageous that said pivot axis intersect the bore of the barrel, and even intersect the axis of the barrel. In this way, when the explosive charge is fired, it exerts only a very small or no pivoting moment.

35 In a particular embodiment of this improvement, the rear part of the thin barrel intersects the pivot axis of the pivotal mounting of the barrel-carrying body on the breech.

40 Preferably, in the case of guns in which the breech and barrel are brought to a firing position by a relative sliding and a driving of one of these two parts with respect to the other in opposition to the action of elastically yieldable means within the breech the barrel is pivotably mounted on an attached member capable of sliding in the breech in opposition to the action of said elastically yieldable means, so that the pivot axis of the pivotable mounting is located within the breech and the pivotable mounting is thus blocked by the latter at least in said position for firing.

45 Another improvement is that the ammunition is driven or forced into the loading chamber of the gun by com-

ing into contact with the closing member for this chamber in opposition to the action of elastically yieldable means adapted to ensure the extraction or release of the ammunition cartridge in the course of opening the gun.

In the particular case in which the last-mentioned improvement is utilized in a gun having a barrel which is slidable relative to the loading chamber, the arrangement is such that the insertion of the ammunition by the action thereon of said closing member results in a slight axial sliding of the barrel relative to the barrel-carrying body and a consequential compression of the elastically yieldable means interposed between the barrel and the barrel-carrying body, which means thenceforth perform the function of elastically yieldable means for extracting the ammunition.

Said closing member for the loading chamber is advantageously constituted by a face of the member to which the barrel is pivoted, for example the bottom or transverse wall of the last-mentioned member when it is in the form of a fork, the rear face of the loading chamber being flush with said closing face in the closed position of the gun, that is, when the axis of the barrel is substantially in alignment with the axis of the breech.

A further improvement, also applicable when the gun comprises a system of safety and arming slots usually provided in the breech (and, if desired, in a member surrounding the breech), is that a pin or lug slidable in these slots is constituted by one end of the pivot pin of the barrel, which end extends beyond the outer face of the member in which said pivot pin is journaled.

Further features and advantages of the invention will be apparent from the ensuing description of one embodiment of a gun for driving nails and the like incorporating the aforementioned improvements, with reference to the accompanying drawing, to which the invention is in no way restricted.

In the drawing:

FIG. 1 is a partial longitudinal sectional view of the loaded gun in its inoperative position;

FIG. 2 is an elevational view of the breech;

FIG. 3 is a plan view of the gun in its inoperative position;

FIGS. 4 and 5 are sectional views taken along lines IV—IV and V—V of FIG. 1, and

FIG. 6 is an elevational view showing the safety slot system provided in the breech and the protruding pivot pin of the pivotal mounting between the barrel-carrying body and the fork, which pin cooperates with said grooves.

In the embodiment shown in the figures, the barrel 1 of the gun is slidably mounted in a barrel-carrying body 2 which latter is slidable in a safety sleeve 3 which is connected to a holding grip 4 which normally bears against the frame 5 which carries the breech 6 and is rigid with the butt 5a.

Bearing against a shoulder on the barrel 1, is a ring 7 which acts as a support for one end of an elastically yieldable sleeve or tube 8 which is composed of, for example, rubber and whose other end bears against an abutment ring 9 held stationary in the body 2. The barrel 1 is thus biased rearwardly in the body 2. Owing to this arrangement, the cartridge D (containing the propelling charge) of the nail P, which cartridge is conical and is introduced in the body 2 (when the latter has been pivoted to the position shown in dot-dash line in FIG. 1) is suitably urged against the rear end of the barrel which constitutes a shoulder when the barrel is brought to the closed position shown in full line, in which position the rear end of the cartridge D is subjected to an axial pressure exerted by a closing member to be described hereinafter.

In the forward part of the sleeve 3 and abutting the forward end of the body 2, is a split ring 10 whose two portions, divided along a diametral plane, are subjected to

a centripetal clamping or tightening action by an elastically yieldable sleeve 11. When nothing opposes this clamping action, this ring 10 engages in an annular recess 1a in the barrel 1 and holds the latter axially in position. The safety sleeve 3 (together with the grip 4) is held (against the frame 5) in the position shown in FIG. 1 by means of a spring 31 surrounding the forward portion of the barrel and abutting, at one end, a barrel muzzle nut 1c and, at the other end, the split ring 10.

The splinter guard 12, which is constituted by a pressed sheet of metal, comprises at its rear part a mounting tube 13 adapted to be engaged in the split ring 10 and to open the latter in opposition to the action of the clamping effect of the sleeve 11. Thus, when the splinter guard is placed in position, the barrel 1 and the elements associated therewith are slidable axially relative to the elements 3-4-5-6.

The rear part of the barrel-carrying body 2 is connected by pivot pin 14 to a fork 15 whose branches are integral with a closing member 16. The assembly 15-16 (with the elements associated therewith, that is, the body 2 and the barrel 1) is slidable in the breech 6 which incloses a safety spring 17, one end of which bears against the transverse end wall 6a of the breech whereas the other exerts a thrust in the forward direction on the closing member 16, that is, on the assembly 1-2-3-14-15-16, which can also effect a movement of rotation about the longitudinal axis of the gun relative to the assembly 5-6, when the gun is in its closed position (the barrel being disposed on the axis of the gun).

The aforementioned rotational movement can be controlled by the grip 4 which is connected to the sleeve 3, the latter having, to this end, a longitudinal recess 3a, in which is slidable a pin 13 which is rigid with the abutment ring 9 and extends into a longitudinal opening 2a formed in the forward end of the body 2.

The amplitude of the rotational and longitudinal movements of the assembly 1-2-3-14-15-16 relative to the assembly 5-6 is determined by an arrangement of safety slots carried by the assembly 5-6 and shown in FIG. 6.

This arrangement comprises a transverse slot 19 communicating with a longitudinal slot 20. Movable in said two slots is a pin 14a constituting an extension of the pivot pin 14 (interconnecting the elements 2 and 15). The slot 20 has such length that, when the grip 4 has caused rotation of the assembly 1-2-3-14-15-16 through such an angle that the pin 14a moves from its position shown in FIG. 6 to a position in which it is in alignment with the slot 20, it is possible in firmly applying the forward end of the barrel 1 against the surface which is to receive the nail P, to drive forward the breech 6 until the splinter guard 12 comes into contact with said surface whereupon the gun is ready to be fired, the breech having, at the same time, been sufficiently moved forwardly with respect to the ammunition cartridge D and the assembly 1-2-3-14-15-16, in order that said cartridge is encountered by the firing pin 21 whose mechanism will now be described.

The firing pin 21 is carried by a bronze skirt 22 which is freely slidable in the rear part 6a of the breech 6 and which a spring 23 biases forwardly. A yielding ring (circular clip) 24, constituting an abutment, retains the skirt 22 in its forward position. Fixed in the skirt 22, for example by a screw-thread arrangement, is an armature 25, for example of mild steel. Slidable at the rear of said armature in the skirt 22, which acts as a guide therefor, is a permanent magnet 26 rigid with the rear end of a rod 27 which is mounted for sliding movement outside the breech and has a forward end in the form of a trigger 28. A spring 29 ordinarily urges the magnet 26 against the armature 25. When the user depresses the trigger 28, the latter moves rearwardly with the permanent magnet 26 which latter draws back the armature 25 and the attached skirt 22 (which compresses the spring 23) and the firing pin 21. This rearward movement continues until the

force of the spring 23 overcomes the force of attraction of the magnet 26. At this moment the armature 25 is forced from the magnet 26 and the assembly 21-22-25 is thrown forwardly by the force exerted by the percussion spring 23.

When the trigger 28 is released, the magnet 26 is urged forwardly by the return spring 29 and once more comes into contact with the armature 25.

This particular embodiment of the firing device is, moreover, applicable to firearms in general.

It will be observed that the skirt 22 and the firing pin 21 are slightly eccentric relative to the axis of the barrel 1, and the closing member 16 has for the passage of the firing pin an aperture 30 which is eccentric to the same extent. In order that the firing pin be capable of passing through the aperture 30, these two elements must occupy the same angular position relative to the longitudinal axis of the gun. As the angular position of the firing pin is fixed, alignment between the firing pin and the aperture 30 is achieved when the assembly 1-2-3-14-15-16 is rotated by the grip 4 for permitting the rearward movement of this assembly.

The gun improved in the manner described hereinbefore operates in the following manner:

To load the gun, the barrel 1 and its associated elements are swung to the position indicated by the axis X-X. In this position, the loading chamber formed in the rear of the barrel-carrying body 2 is accessible and the ammunition can be engaged therein (the nail P and the cartridge D). The cartridge D protrudes slightly out of the body 2, since it is urged rearwardly by the end transverse face of the barrel 1, which latter is subjected to the action of the elastically yieldable sleeve 8.

When the gun is once more closed, the rear face of the cartridge D comes into contact with the forward face of the closing member 16 which thereupon forces the ammunition fully into the loading chamber. While the ammunition is being forced into the latter, the barrel 1 moves slightly forward and compresses the elastically yieldable sleeve 8 and the gun is suitably maintained in the preparatory firing position.

When firing the gun, the forward end of the barrel 1 is firmly applied against the surface intended to receive the nail P until the splinter guard 12 encounters said surface, the grip 4 having been previously rotated which alone permits the forward movement of the breech with respect to the barrel (with the elements connected thereto), the pin 14a sliding along the longitudinal slot 20.

At the end of this forward movement of the breech, the ammunition is sufficiently near the firing pin to be struck by the latter. It will be recalled that, owing to the rotation of the grip 4, the firing pin 21 is brought in alignment with the aperture 30.

When the trigger is depressed, the firing pin is first urged rearwardly and then suddenly projected forwardly (when the armature leaves the magnet) and causes the ammunition to be fired.

As soon as the nail P has been fired, it is merely necessary to once more swing the barrel 1 open to easily withdraw the cartridge D which has been slightly forced out of its housing in the body 2 by the barrel which has moved rearwardly in the body 2 under the effect of the elastically yieldable sleeve 8.

It can be seen that the improved gun incorporates a great number of safety measures, namely it is impossible to fire the gun if, for example, the splinter guard is not in position or if the user has not both rotated the grip 4 and applied the barrel against the surface receiving the nail.

It is obvious that embodiment of the improvements described hereinbefore and shown in the accompanying drawing have been given merely by way of example, it being understood that the invention is not limited thereto and any modification of details therein can be made without departing from the scope of the invention as defined in the appended claims.

What I claim is:

1. Fixing gun for driving under the effect of an explosive charge articles of the type consisting of plugs, nails and studs, in hard compact materials, comprising: a breech; a barrel-carrying body; a barrel disposed in said body; a fork rotatable relative to the breech; a pivot pin interconnecting said body and the fork; said fork comprising a closing member and having an aperture eccentric relative to the axis of the barrel; a firing pin disposed in the breech so as to be eccentric relative to the axis of the barrel and engageable in said aperture in the closing member only when the assembly comprising the barrel, said block and the fork is turned through a suitable angle relative to the breech.

2. Fixing gun for driving under the effect of an explosive charge articles of the type consisting of plugs, nails and studs, in hard compact materials, comprising: a breech provided with safety slots; a grip connected to the breech; a fork slidable and rotatable in the breech; a barrel-carrying body having a rear part pivotable in the fork; a pivot pin interconnecting said body and the fork, said pin comprising an extension portion which extends into said slots; a barrel supported by said body and slidable in the latter; spring means interposed between the barrel and said body for urging the barrel in said body toward the breech; elastically yieldable means disposed in the breech for urging the fork forwardly; striker means disposed in the breech; a trigger for actuating said striker means; a safety sleeve surrounding the forward part of said body extending out of the breech; and second elastically yieldable means interposed between the barrel and the safety sleeve for urging the safety sleeve against the breech.

3. A fixing gun for driving under the effect of an explosive charge articles of the type consisting of plugs, nails and studs, in hard compact materials, comprising a breech, a safety sleeve, a barrel-carrying body provided in said safety sleeve, said safety sleeve being disposed forward of said breech on said body so as to be axially slidable relative to said body, a barrel axially slidable in said body, and spring means interposed between the barrel and said body for urging the barrel toward the breech relative to said body, said body having in its part adjacent the breech a thick wall and in another part beyond the point where the barrel protrudes from said body, a thin cylindrical wall constituting a sleeve radially spaced away from the barrel so as to provide between said sleeve and the barrel an annular space in which said spring means are disposed.

4. A fixing gun for driving, under the effect of an explosive charge, articles of the type consisting of plugs, nails and studs, in hard compact materials, comprising: a breech, striker means disposed in said breech, a fork having two branches, said fork sliding axially in said breech, a safety spring engaging against said fork and exerting thereon a forwardly directed force normally separating said striking means, a barrel carrying body carried by said fork and pivoted about an axis perpendicular to the longitudinal axis of the fixing gun, and a loading chamber for receiving a cartridge, said loading chamber being arranged in said barrel carrying body and being closable at its backward end by said fork when said barrel carrying body is in alignment with the longitudinal axis of the fixing gun, a barrel disposed slidably in said barrel carrying body, the inner end thereof engaging the forward end of said loading chamber, and spring means bearing against the barrel and the barrel carrying body, respectively, thereby urging the barrel slidably backward and bringing it into engagement with the loading chamber, said loading chamber thus having a variable length as a result of the longitudinal position of the barrel in the barrel carrying body.

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