

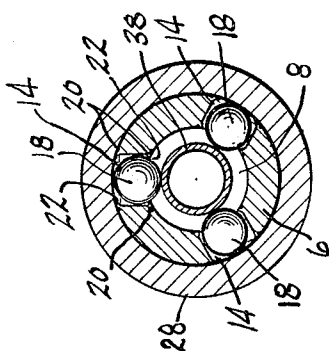
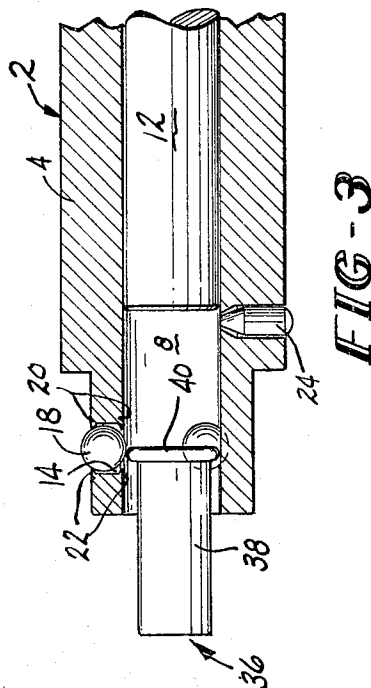
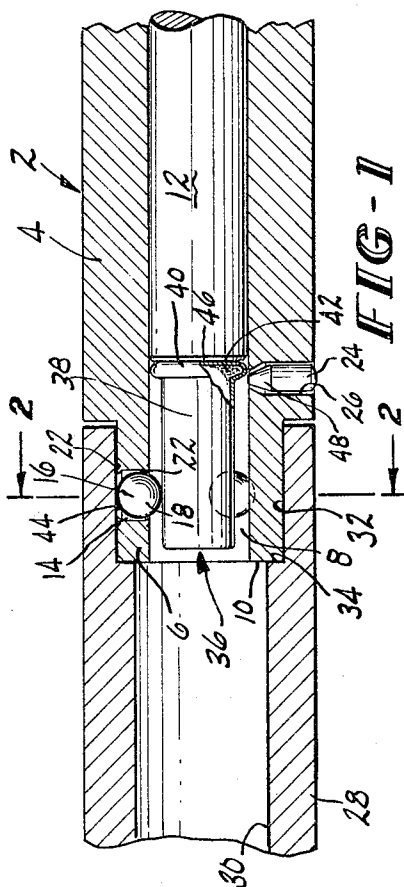
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POWER TOOL

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POWER TOOL

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This invention relates generally to power tools for driving fasteners into masonry, concrete, wood, steel, or the like, and more particularly relates to a breech structure for such tools.

In tools of the above type, the power is usually provided by a charge of explosive contained in a conventional rim-fire cartridge which has been modified so as to hold the higher charge of power needed for the particular purpose. The standard caliber rim-fire ammunition, such as .22 caliber, does not lend itself well to use in such tools when the diameter of the fastener to be driven is larger than the outer diameter of the cartridge case. In such cases, the fastener cannot be breech loaded unless the tool is provided with a removable breech plug. However, the use of a removable breech plug suffers from the disadvantage that an extra part must be handled during loading. If the plug is dropped or lost during loading, there will be considerable delay between each fastening operation.

Another approach that has been proposed is to encase the body of a cartridge with a plastic member such that the body of the cartridge has a diameter equal to the rim portion. The cartridge is then loaded headfirst into a breech member which has been separated from the barrel member. Although this type of solution has many advantages, it suffers from the fact that the expense of the fastening operation is greatly increased due to the extra cost of preparing each cartridge.

It is, therefore, an object of this invention to provide an improved breech structure for a power tool which overcomes the above-mentioned difficulties.

It is a further object of this invention to provide a power tool having a breech structure which permits the use of conventional rim-fire ammunition of a standard caliber regardless of the size of the fastener to be used.

Yet another object of this invention is to provide a power tool having a breech structure which will receive a conventional rim-fire cartridge that is inserted head-first and which will hold the body of the cartridge in proper alignment for firing.

These and other objects of the invention may be realized through the provision of a barrel member having a counterbore in one end thereof and a breech member having a reduced forward extension which is received within the counterbore. Cartridge aligning means are positioned within the reduced forward extension. Means for retaining the aligning means may also be provided. The retaining means are such that when the breech is inserted in the barrel member, the cartridge aligning means engage the body of the cartridge and hold it in proper alignment. When the breech is separated from the barrel member, the cartridge aligning means are retractable so that the rim portion of the cartridge can pass by and a new cartridge may be inserted.

The above objects will be more readily understood by reference to the following description of a particular embodiment of the invention and the accompanying drawings in which:

FIGURE 1 is a partial cross sectional view of a barrel member and breech member of a power tool embodying the present invention;

FIGURE 2 is a sectional view taken in the direction of the arrows along line 2—2 of FIGURE 1; and

FIGURE 3 is a cross sectional view of the breech member of FIGURE 1 separated from the barrel member and showing a cartridge in the process of being inserted therein.

In the drawings, FIGURE 1 shows a portion of a power actuated tool including a breech member 2 having an enlarged hollow cylindrical portion 4 and a reduced hollow cylindrical portion 6. The internal surface of both cylindrical portions 4 and 6 are of the same diameter.

A cartridge-receiving chamber 8 extends into the breech member 2 from the forward end face 10 of the reduced cylindrical portion 6. The bottom of the chamber is formed by a flat-faced ejector pin 12. As shown in FIGURE 1, the cartridge-receiving chamber 8 extends into the breech member 2 a sufficient distance so that it extends partially into the enlarged portion 4 of the breech member 2.

A plurality of circumferentially spaced apertures 14 extend through the wall of the reduced cylindrical portion 6 of the breech member 2. As shown in FIGURE 3, the described embodiment includes three such apertures, each being spaced about the circumference of the reduced portion 6 of the breech member 2 approximately 120° from each other. Mounted within each of these apertures is a cartridge aligning means indicated generally by 16.

In the preferred embodiment of the invention, the cartridge aligning member may take the form of ball members 18 which have a diameter greater than the thickness of the wall of the reduced cylindrical portion 6. The internal and external surfaces of the reduced cylindrical portion 6 immediately surrounding the apertures 14 may be pinched with a suitable tool as indicated generally by 20 to form lips 22 extending slightly into the apertures 14. The lips 22 prevent the ball members 18 from becoming separated from the breech member 2.

A firing pin 24 is movably mounted in a transverse bore 26 in the enlarged portion of the breech structure. The firing pin 24 may be actuated by any suitable mechanism to fire the cartridge.

The tool may also include a barrel member 28 having a longitudinal bore 30. The breech end of the barrel member includes a counterbore 32 having a bottom face 34. In the firing position of the tool, the reduced cylindrical portion 6 of the breech member 2 is received within the counterbore 32. The end face 10 of the reduced cylindrical portion 6 of the breech member is in abutment with the bottom face 34 of the counterbore 32 in the barrel member 28 to provide a proper seal.

The breech structure of the power tool is adapted to facilitate the use of a conventional rim-fire cartridge 36 which has had its power charge modified to suit the particular operation the tool is to perform. As shown in FIGURE 1, the cartridge 36 includes an elongated body portion 38 and an enlarged rim portion 40. The primer material 42 is located about the internal periphery of the rim portion 40.

The cartridge 36 is held in proper alignment for firing by virtue of the fact that the internal surface 44 of the counterbore 32 in the barrel member 28 positions the balls 18 against the elongated body portion 38 of the cartridge 36.

The provision of three ball members 18 ensures that the cartridge 36 will be centered properly in the cartridge receiving chamber 8 with the axis of the cartridge 36 and the axis of the cartridge receiving chamber 8 lying along the same line, and the base 46 of the cartridge 36 being flat against the flat-faced ejector pin 12.

The cartridge is actuated by the tapered portion 48 of the firing pin 24 pinching the primer material 42 between the front of the rim 40 and the base 46 of the cartridge 36. After the cartridge is fired, the breech member 2 is separated from the barrel member 28, and the spent car-

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tridge ejected. A new cartridge 36 may then be inserted. As shown in FIGURE 3, as the new cartridge 36 is inserted, the ball members 18 move outwardly to permit the enlarged rim portion 40 of the cartridge 36 to pass by. When the breech member 2 is then inserted into the barrel member 28, the balls 18 will be forced inwardly into engagement with the body portion 38 of the cartridge 36 and the base 46 of the cartridge 36 will be flat against the ejector pin 12 in proper position for firing.

It will be apparent that the above-described breech structure includes many advantages. Among these is the ability of the breech member 2 to receive a standard caliber rim-fire cartridge inserted headfirst and to hold the cartridge in proper alignment for firing.

Since the cartridge 36 may be inserted headfirst, the firing pin can be located in the enlarged portion 4 of the breech member 2 rather than having to be positioned near the end face 10 of the reduced portion 6 which would require a portion of the actuating mechanism to be positioned in the barrel member 28.

The particular breech member eliminates the need for the use of a removable breech plug, yet permits the use of a given caliber of cartridge with a barrel having a bore of any diameter. As shown in FIGURE 1, the barrel 28 has a bore 30 of a diameter larger than the diameter of the cartridge-receiving chamber 8. Thus, it is possible to breech load fasteners having a diameter larger than the diameter of the cartridge.

Although reference was made above to a preferred embodiment of the invention, it is to be understood that various alterations and modifications may be resorted to without departing from the broader scope of the invention as defined by the following claims.

I claim:

1. In a tool powered by a cartridge having a rim portion and a body portion of reduced diameter, said tool including a breech member and a barrel, said barrel and said breech member being movable from a firing position wherein a portion of said breech member is engaged with the barrel to a loading position wherein the breech member and the barrel are disengaged, a chamber in said breech member open at an end extending toward said barrel, said chamber having a diameter substantially equal to the diameter of said rim to receive said cartridge rim first, cartridge supporting means movably mounted in said breech member, said cartridge supporting means being engageable with said body portion and said barrel in said firing position to support said cartridge aligned in said chamber, said cartridge supporting means being movable out of engagement with said cartridge in said loading position to allow the cartridge rim to move past the supporting means.

2. The tool of claim 1 in which said breech member has a portion telescopically engaged in one end of said barrel in said firing position.

3. The tool of claim 2 in which said cartridge supporting means comprise a plurality of spherical members circumferentially disposed in the portion of said breech member telescopically engaging said barrel and having a diameter greater than the wall thickness of said chamber.

4. The tool of claim 3 in which there are three circumferentially spaced apertures separated from each other by 120° in the portion of said breech member telescopically

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engaging said barrel, each of said apertures having a spherical member positioned therein.

5. In a tool powered by a cartridge having a rim portion and a body portion of reduced diameter, said tool including a barrel member and a breech member, said barrel member and said breech member being movable from a firing position wherein a portion of said breech member is engaged with said barrel member to a loading position wherein said breech member and barrel member are disengaged, a chamber in said breech member open at an end extending toward said barrel member, cartridge aligning means movably mounted in said breech member, said cartridge aligning means being movable from a first position extending into said chamber and engaging the body of a cartridge to a second position retracted from said chamber whereby the rim of said cartridge may pass past said aligning means, said barrel member holding said cartridge aligning means in said first position when said breech member and said barrel are in said firing position.

6. In a tool powered by a cartridge having a rim portion and a body portion of reduced diameter, said tool including a breech member and a barrel member, said breech member and said barrel member being movable from a firing position wherein a portion of said breech member is telescopically received in one end of said barrel member to a loading position wherein the breech member and barrel are disengaged, a chamber in said breech member open at an end extending toward said barrel member, said chamber having a diameter substantially equal to the diameter of said rim to receive said cartridge rim first, cartridge supporting means movably mounted in said breech member, each of said cartridge supporting means having a portion engageable by said barrel member to move said means into a position extending into said chamber and in engagement with the body of a cartridge, and each of said cartridge receiving means being retractable from said chamber in said loading position to allow the cartridge rim to move past the supporting means.

7. A power operated tool actuated by a cartridge having an elongated body portion and an enlarged rim portion, said tool comprising a barrel member including a longitudinal bore and a counterbore, a breech member having an enlarged portion and a reduced extension portion terminating in an end face, a cylindrical cartridge receiving chamber extending inwardly from said end face and being defined by wall means, a plurality of circumferentially spaced apertures in said extension portion communicating with said cartridge receiving chamber, said extension portion being releasably positioned within said counterbore with said apertures being covered by said barrel member, ball means positioned within each of said apertures, said ball means having a diameter greater than the thickness of the wall means whereby said ball means extend into said cartridge receiving chamber when said extension is positioned within said counterbore, and a firing pin positioned within said enlarged portion of said breech member having movement in a transverse direction with respect to the axis of the cartridge receiving chamber and operative to actuate a cartridge in said chamber.

No references cited.

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