

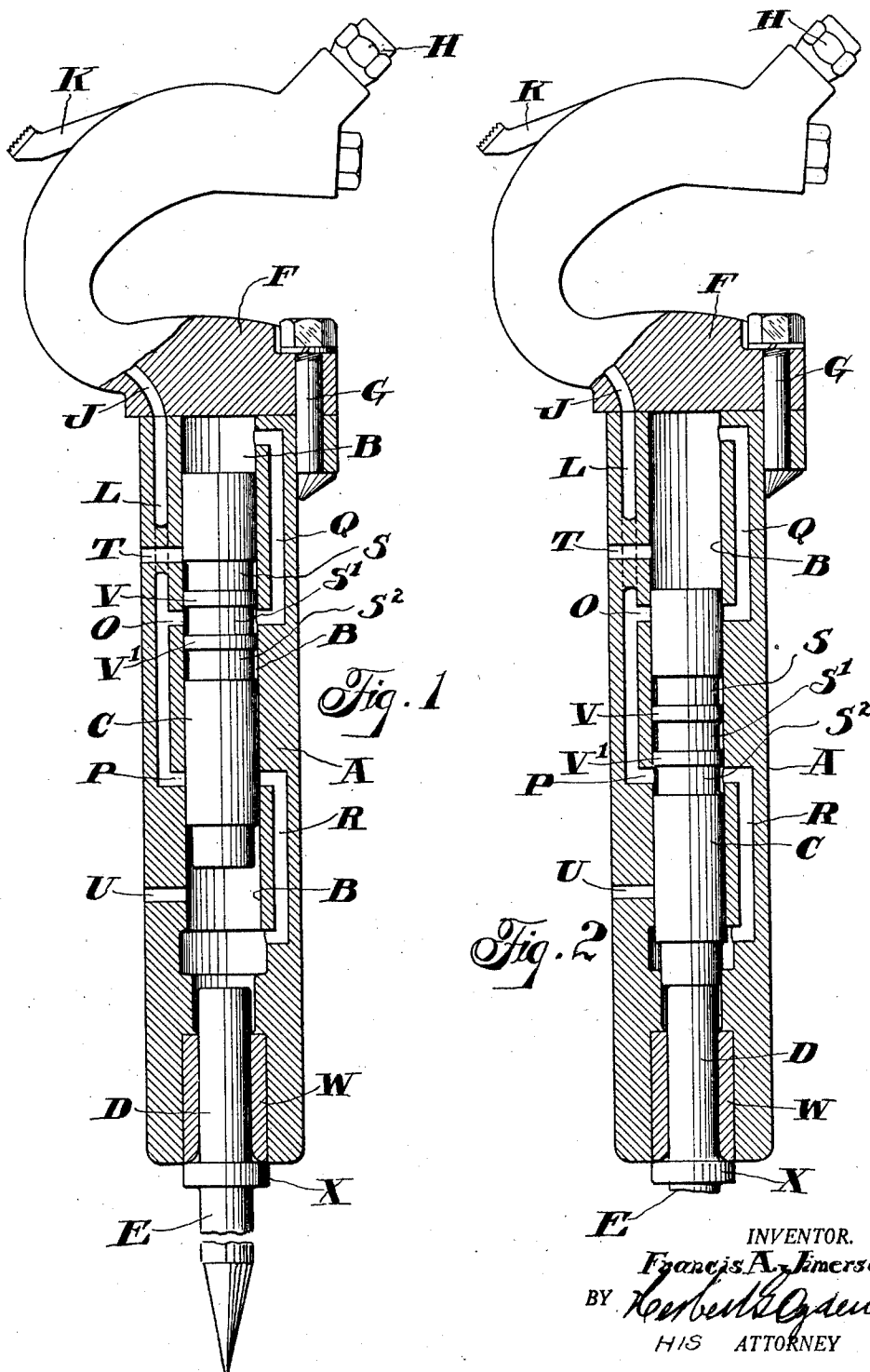
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PERCUSSIVE TOOL

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PERCUSSIVE TOOL.

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This invention relates to percussive tools and more particularly to fluid actuated reciprocating hammer tools of the so-called valveless type in which the hammer piston controls the admission of exhaust and motive fluid for causing reciprocation.

An object of the invention is to enable the piston of a fluid actuated percussive tool to distribute motive fluid for its operation in a simplified and efficient manner.

Other objects of the invention are to simplify the construction of the piston and cylinder of tools of the valveless type in which the piston controls the admission of exhaust of motive fluid.

The invention will be more clearly understood by reference to the drawing in which

Figure 1 shows a percussive tool constructed in accordance with the practice of the invention, the cylinder and part of the handle being shown in longitudinal section, and

Figure 2 is a longitudinal section of the percussive tool showing the piston in its forward position and indicating the distribution of motive fluid to the forward end of the cylinder.

Referring to the drawing, the tool comprises a cylinder A having a bore B of one diameter throughout its length within which a piston C is adapted to reciprocate for striking repeated blows against the shank D of a tool E extending into the bore B of the cylinder A. The bore B is closed at the rearward end by a handle F forming a back head for the cylinder A and attached thereto in any suitable manner as by means of bolts G. Motive fluid for actuating the tool is introduced through a hose (not shown) attached to a coupling H in the handle associated with a supply passage J in the handle controlled by a throttle valve (not shown) operated by the trigger lever K. The supply passage J connects with a cylinder admission passage L extending part way of the length of the cylinder bore B and connecting with the bore B at the admission ports O and P.

The admission port O enters the bore B at approximately the same point in the length of the bore at which the transfer passage Q enters the bore. The transfer passage Q leads back to the rearward end of the bore B and is adapted to convey motive fluid to the space behind the piston C for driving the piston forward.

The forward admission port P enters the

bore B at substantially the same point in the length of the bore as the forward transfer passage R which leads to the forward end of the bore B. The object of the transfer passage R is to convey motive fluid to the forward end of the bore from the admission port P for driving the piston C rearwardly on its return stroke. The piston C acts as a valve to open and close communication between the admission port O and the transfer passage Q and between the admission port P and the transfer passage R. To this end the piston C is provided with neck portions S, S¹ and S² which are adapted to pass by the admission ports O and P and the corresponding opening of the transfer passages Q and R respectively to permit communication between the respective admission ports and their corresponding transfer passages.

The exhausted motive fluid from the bore B is conducted to atmosphere through exhaust ports T and U so situated that at the desired point in the stroke of the piston C the ends of the piston uncover these exhaust ports and permit the exhaust of fluid to atmosphere from the bore B. The exhaust port T enters the bore B at a point at which it is adapted to be uncovered by the rear end of the piston C and the forward exhaust port U is located at a point in the forward end of the bore B adapted to be uncovered and covered by the forward end of the piston C as it reciprocates. Due to the closeness of the admission port O to the exhaust port T collars V and V¹ are formed on the piston C along the length of the neck portions S, S¹ and S² to avoid direct communication between the admission port O and the exhaust port T and permitting the neck portions S, S¹ and S² to pass over the exhaust port T. This permits the piston C to be made relatively short and allows the distance between the admission port O and the exhaust port T to be made shorter than the entire length of the neck portions S, S¹ and S².

The operation of the tool is as follows:

Assuming that the piston C starts from the position as shown in Figure 1 motive fluid enters the transfer passage Q through the admission port O and around the neck portion S¹ at the piston C to fill the bore B behind the piston thereby driving it forward to the position as for instance shown in Figure 2. The rear edge of the piston C having passed the exhaust port T, the exhausted motive fluid is

permitted to escape to atmosphere through the exhaust port T and the pressure is dropped to atmospheric pressure. Motive fluid has ceased to flow from the admission port O to the transfer passage Q as the rear edge of the neck portion S of the piston C has closed communication therebetween. Slightly before reaching the position as shown in Figure 2, the neck portion S² of the piston C has reached the admission port P and has permitted motive fluid to flow to the transfer passage R and thence to the forward end of the bore B to drive the piston C rearwardly. As the piston C returns to the position shown in Figure 2, the exhaust port U is uncovered permitting the used motive fluid to exhaust to atmosphere. It will be noted that the period of admission of motive fluid to the rearward end of the bore B is of greater duration than the corresponding period of admission to the front end of the bore B. This provides that the forward stroke of the piston C will be more powerful. This is a desirable condition since there can be no great advantage in providing a very powerful rearward blow to the piston C.

The front end of the cylinder may be of any desired type of construction. As here shown, the front end of the cylinder A is provided with a bushing W called a nozzle which, in conjunction with the smooth cylindrical shaft D of the tool E, is adapted to prevent the escape of motive fluid. Preferably tools to be inserted in the bushing W are provided with a collar X to prevent the shank D from extending too far into the bore B.

Thus by the above construction are accomplished, among others, the objects hereinbefore referred to.

40 I claim:

1. A fluid actuated percussive tool having a cylinder adapted to receive the shank of a tool, and a solid piston adapted to reciprocate within the bore of said cylinder and strike repeated blows against said shank, said cylinder having an admission passage provided with admission ports entering the bore of said cylinder and transfer passages entering said bore at points corresponding to said admission ports and adapted to conduct motive fluid to the ends of said cylinder, and said piston being provided with a plurality of neck portions between the admission ports and said transfer ports, said neck portions being relatively far placed from the ends of said piston, and exhaust ports in said cylinder bore controlled by said piston, the total length of said neck portions of said piston being longer than the distance between one of said admission ports and one of said exhaust ports and provided with a plurality of collars to prevent direct communication therebetween.

2. A fluid actuated percussive tool having a cylinder adapted to receive the shank of a tool, and a solid piston adapted to reciprocate within the bore of said cylinder and strike repeated blows against said shank, said cylinder having an admission passage provided with admission ports entering the bore of said cylinder and transfer passages entering said bore at points corresponding to said admission ports and adapted to conduct motive fluid to the ends of the cylinder, and said piston being provided with a plurality of neck portions between the admission ports and said transfer ports, said neck portions being relatively far placed from the ends of said piston, and exhaust ports in said cylinder bore controlled by said piston, the total length of said neck portions of said piston being longer than the distance between one of said admission ports and one of said exhaust ports and provided with a plurality of relatively narrow collars to permit communication between one of said admission ports and a transfer port while the neck portion of said piston overruns a corresponding exhaust port, and to prevent direct communication between said admission port and exhaust port.

3. A fluid actuated percussive tool having a cylinder adapted to receive the shank of a tool, and a solid piston adapted to reciprocate within the bore of said cylinder and strike repeated blows against said shank, said cylinder having an admission passage provided with admission ports entering the bore of said cylinder and transfer passages entering said bore at points corresponding to said admission ports and adapted to conduct motive fluid to the ends of the cylinder, and said piston being provided with a plurality of neck portions between the admission ports and said transfer ports, said neck portions being relatively far placed from the ends of said piston, but farther from the striking end of said piston than from the opposite end thereby permitting a greater amount of pressure fluid to enter the rearward end of said cylinder than is normally permitted to enter the forward end of said cylinder, exhaust ports in said cylinder bore controlled by said piston, the total length of said neck portions of said piston being longer than the distance between one of said admission ports and one of said exhaust ports and provided with a plurality of relatively narrow collars to permit communication between one of said admission ports and a transfer port while the neck portion of said piston overruns a corresponding exhaust port, and to prevent direct communication between said admission port and exhaust port.

In testimony whereof I have signed this specification.

FRANCIS A. JIMERSON.