

June 21, 1938.

D. W. LITTLE

2,121,706

INTERNAL COMBUSTION ENGINE OPERATED DRILL

Filed July 14, 1937

2 Sheets-Sheet 1

Fig. 1.

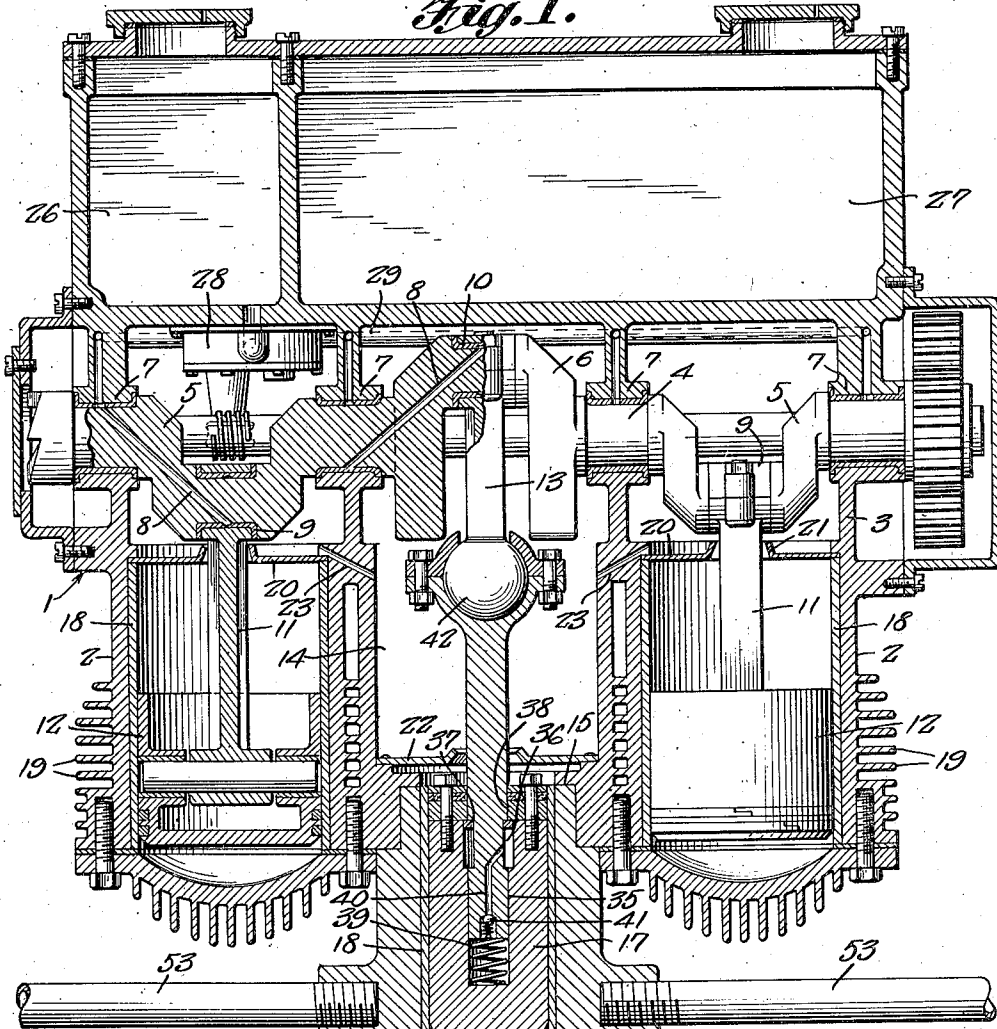
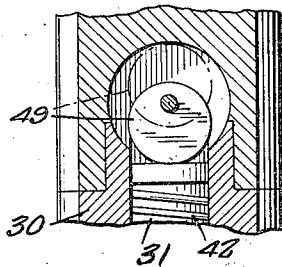
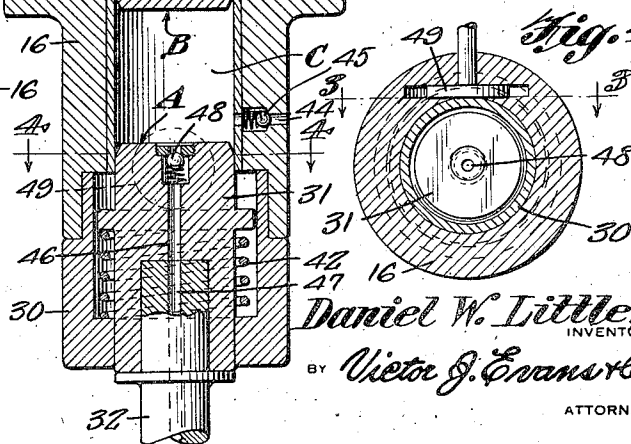


Fig. 3.



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WITNESS

Fig. 4.



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June 21, 1938.

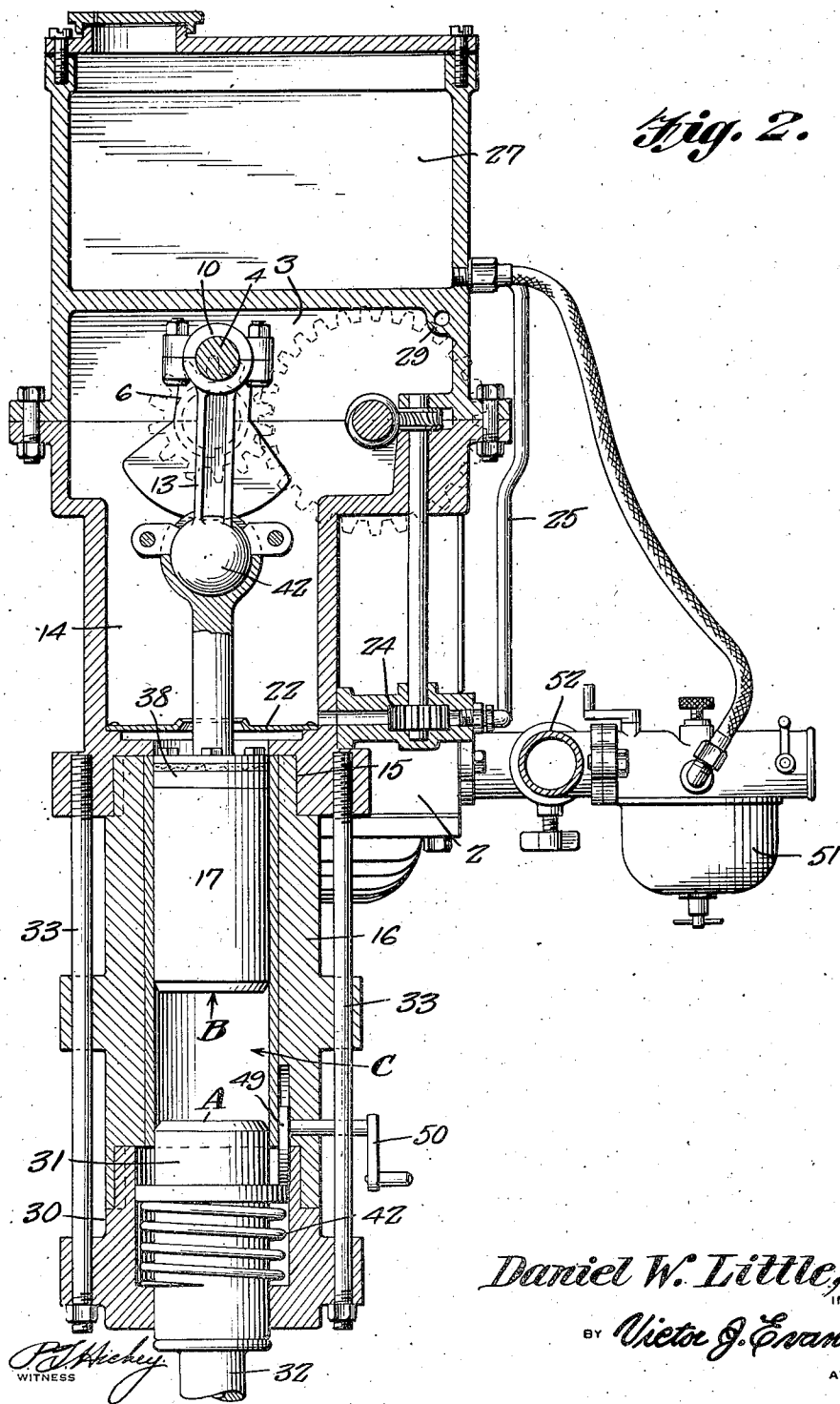
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,121,706

INTERNAL COMBUSTION ENGINE OPERATED DRILL

Daniel W. Little, Chicago, Ill.

Application July 14, 1937, Serial No. 153,615

2 Claims. (Cl. 123-7)

This invention relates to an internal combustion engine operated drill for drilling rock, ores and the like and is especially adapted for use where other power actuated drills such as electrically and pneumatically driven ones are impractical for use and has for the primary object the provision of a portable and efficient device of this character which may be conveniently manipulated by a person both during the drilling operation or when being moved from one place to another and which will be inexpensive to manufacture and maintain in operation.

With these and other objects in view, this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which

Figure 1 is a vertical sectional view illustrating an internal combustion engine operated drill constructed in accordance with my invention.

Figure 2 is a transverse sectional view illustrating the same.

Figure 3 is a sectional view taken on the line 3-3 of Figure 4.

Figure 4 is a sectional view taken on the line 4-4 of Figure 1.

Referring in detail to the drawings, the numeral 1 indicates a two cylinder internal combustion engine preferably of the two cycle type and may be equipped with any conventional type of ignition system. The cylinders are indicated by the character 2, the engine base by the character 3 in which is journaled a crank shaft 4 having a crank 5 for each cylinder and a crank 6 for the actuation of a drill. It is preferable that the crank shaft be counter balanced and supported by at least four main bearings as indicated by the character 7. The crank shaft is also drilled to form lubricant passages 8 so that lubricant can get to the bearings 7 as well as to the connecting rod bearings 9 and 10. The connecting rod bearings 9 form part of connecting rods 11 and the latter are connected by wrist pins to pistons 12 operable in the cylinders 2. The connecting rod bearing 10 forms a part of the connecting rod 13 employed in the actuation of the drill. The cylinders 2 are spaced to form a chamber 14 in which the connecting rod 13 operates and a portion thereof is shaped to form a seat 15 to receive a cylinder 16 in which is slidably mounted the hammer 17. Liners 18 are provided for the cylinders 2 and 16. The cylinders 2 are preferably

air cooled and are equipped with fins 19 and between said cylinders 2 and the crank case or base in which the crank shaft operates are plates 20 having openings through which connecting rods 11 operate and surrounding said openings are upstanding flanges 21. A plate 22 similar to the plates 20 is secured on the seat 15 of the chamber 14 and the opening thereof has the connecting rod 13 extending therethrough. The purpose of the plates 20 and 22 is to prevent an excessive amount of lubricant from entering the cylinders 2 and 16. Lubricant passages 23 are formed in the cylinders and extend from the base or crank case above the plates 20 to a point within the chamber 14 which has direct communication with the crank case or base and also has communication with a pump 24 and the latter is driven by a well known construction from the crank shaft and the outlet thereof is connected to a pipe 25 leading to an oil reservoir 26. The oil reservoir forms an integral part of the crank case or base and also an integral part of a gasoline reservoir 27. The pump 24 removes from the chamber 14 the excessive amount of lubricant and returns the same to the reservoir. The lubricant is taken from the reservoir 26 by a pump 28 located within the base and connected with the lubricant passages by a main feed pipe 29 so that the bearings of the crank shaft and connecting rods are positively lubricated and the lubricant passing from said bearings will gravitate onto the plates 20 and 22, a certain amount of which will enter the cylinders 2 and 16 for the lubrication of the pistons 12 and the hammer 17.

Fitted in one end of the cylinder 16 is a cylinder 30 for supporting an anvil 31 shaped to receive a drill bit 32 of any well known construction.

The cylinders 30 and 16 are held assembled by tie bolts 33 and also the cylinder 16 is held in engagement with the seat 15 by said tie bolts.

The hammer 17 has formed therein a chamber 35 to receive one end of the connecting rod 13. A portion of said chamber is of an increased diameter, as shown at 36, in which operates a split key 37. The connecting rod 13 is shouldered to be engaged by the split key and also said split key engages with a removable head 38 on the hammer 17 and through which the connecting rod extends. Thus it will be seen that the connecting rod is secured to the hammer 17 whereby the latter may have a limited sliding movement relative to the connecting rod so that a cushion chamber is provided between the end of the connecting rod and the inner wall of the chamber 35

to receive a cushion liquid and also a cushion spring 39. The portion of the chamber 35 which is of an increased diameter has communication with the cushion chamber by a passage 40 controlled by a spring pressed check valve 41. The passage will admit liquid into the cushion chamber but will check liquid returning from the cushion chamber to the chamber 35 or the portion thereof which is of an enlarged diameter, as shown at 36. The head 38 is composed of several plates and a packing strip and when it is desired to detach the hammer from the connecting rod 13 the head is removed. The connecting rod 13 is constructed of sections connected by a ball and socket joint indicated by the character 42. The crank 6 to which the connecting rod 13 is connected is positioned slightly in advance of the cranks 5 so that the hammer will complete its driving stroke before the completion of the power strokes of the pistons 12 in the cylinder 2.

The anvil 31 has a striking face A to be engaged by the striking face B of the hammer 17 and the hammer 17 being driven by the crank shaft in a reciprocatory manner will deliver hammer blows on the anvil which in turn transmits said blows on the drill bit 32. A coiled spring 42 acts on the anvil to drive the drill bit 32 in the direction opposite from the direction driven by the hammer 17. The hammer 17 when in its uppermost position is spaced a distance from the anvil defining a chamber C between the anvil and the hammer. The cylinder 16 has a port 44 open to the atmosphere and to the chamber C and operating therein is a spring actuated check valve 45 which will admit air to the chamber C and will close the chamber C to the atmosphere when the pressure therein exceeds atmospheric pressure so that during the non-working stroke of the hammer 17 air will be drawn in the chamber C and forced therefrom through a passage 46 in the anvil and through a passage 47 usually found in a drill bit of a conventional construction. The air being driven through the drill bit is for the purpose of cleaning away cuttings at the cutting end of the drill bit. A spring pressed check valve 48 is arranged in the passage 46 to prevent cuttings from being drawn into the chamber C during the non-driving stroke of the hammer by way of the passages 47 and 46.

A cam 49 operated by a crank handle 50 is employed for checking the movement of the anvil by the influence of the spring 42 holding the drill bit in a fully extended position so that the hammer will fail to strike the anvil and thereby render the drill in-operative permitting the engine to continue to run. By reversing the position of the cam 49 the anvil will be free to assume a position to be struck a hammer blow by the hammer 17.

A carbureter 51 is connected to the fuel reservoir 27 and to the cylinders 2 in any well known manner. The connection between the carbureter and the cylinders is preferably provided with a universal joint indicated generally by the character 52, so that the carbureter may be kept in an upright position regardless of the slanting posi-

tions which the cylinders and other parts of the device may assume during the drilling operation.

Handles 53 are secured to the cylinders 16 so that the operator can conveniently manipulate the device and may also be employed for supporting the device on a rack when not in use. If desired, other handles may be provided on the device and which are not shown.

From the foregoing description taken in connection with the accompanying drawings it will be seen that a portable device is provided wherein a drill bit of a conventional construction may be successfully operated by an internal combustion engine construction and also whereby the cuttings at the cutting end of the drill bit may be removed by air pressure developed through the movement of the hammer employed for the actuation of the drill bit and driven by the engine construction. A device of this character is economical to operate and may be successfully operated in localities where electricity cannot be had or if it is inconvenient to employ pneumatically actuated drills.

What is claimed is:

1. A device of the character set forth comprising an engine base, a crank shaft operating in said base, cylinders connected to said base, pistons operating in said cylinders and connected to the crank shaft, an auxiliary crank formed on the crank shaft, a hammer cylinder carried by the first named cylinders, a hammer reciprocally mounted in the hammer cylinder, means connecting the hammer to the auxiliary crank, an anvil cylinder supported by the hammer cylinder, an anvil operable in the anvil cylinder and having a drill bit connected thereto and adapted to receive hammer blows by said hammer, means for lubricating the pistons and the hammer and the crank shaft and including a lubricant supply means, and pumps driven by the crank shaft for forcing lubricant to the pistons and hammer and crank shaft and returning said lubricant to the lubricant supply means.

2. A device of the character set forth comprising an engine base, a crank shaft operating in said base, cylinders connected to said base, pistons operating in said cylinders and connected to the crank shaft, an auxiliary crank formed on the crank shaft, a hammer cylinder carried by the first named cylinders, a hammer reciprocally mounted in the hammer cylinder, means connecting the hammer to the auxiliary crank, an anvil cylinder supported by the hammer cylinder, an anvil operable in the anvil cylinder and having a drill bit connected thereto and adapted to receive hammer blows by said hammer, means for lubricating the pistons and the hammer and the crank shaft and including a lubricant supply means, pumps driven by the crank shaft for forcing lubricant to the pistons and hammer and crank shaft and returning said lubricant to the lubricant supply means, and a fuel supply means for said cylinders carried by the base and having the lubricant supply means as an integral part thereof, and handles secured on the hammer cylinder.

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