Nov. 7, 1950 W. M. VENNER ET AL 2,529,433

MACHINE FOR FINISHING PISTONS

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FIG. 1.

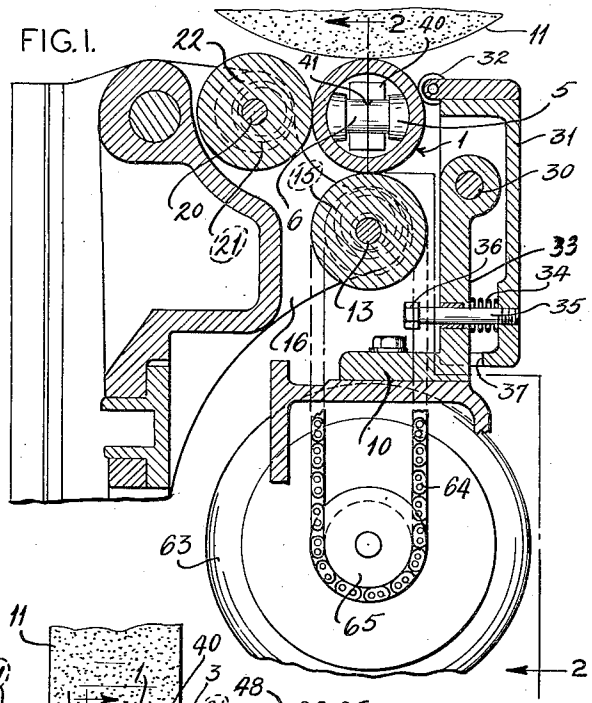


FIG. 2.

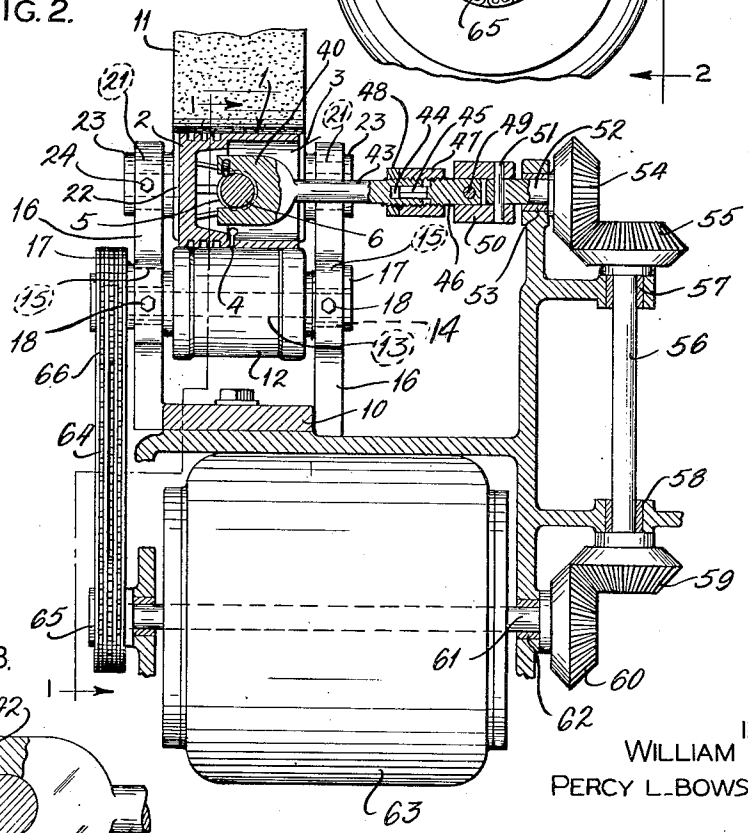
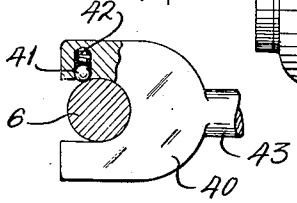


FIG. 3.



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MACHINE FOR FINISHING PISTONS

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3 Claims. (Cl. 51—103)

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This invention relates to a machine for finishing pistons, and, more particularly, pistons of the trunk-type, whose particular application is for use in internal combustion engines. In such a piston, comprising a head and a skirt, the head is finished, usually by grinding to a diameter somewhat smaller than that of the engine cylinder. The skirt may also have a varied contour, namely, it may be oval or elliptical, but, in some cases, it is ground cylindrical. The skirt also usually has a taper and this is also true of the head. The piston may be supported in a manner to obviate the use of centers, so as to be, in fact, a "centerless" grinder.

One of the objects of this invention is to provide a machine whereby the finishing of a piston may be accomplished in an efficient and economical manner.

Further objects will appear from the detail description in which will be set forth an illustrative embodiment of this invention; it is to be understood, however, that this invention is susceptible of various embodiments within the scope of the appended claims.

In accordance with an illustrative embodiment of this invention, the piston finishing means has a movable support which is adapted to present a piston to the finishing means, such as a grinder. This support has a surface corresponding to the desired surface of the piston, and mechanism is provided adapted to drive the support and the piston in synchronism. Means may be provided for adjusting the support and for adjustably positioning the piston on the support in order to adapt the machine for various size pistons. The connection of the driving mechanism to the piston may be flexible for permitting ready removal of the piston. Where the piston has a cylindrical surface the support for presenting the piston to the finishing means may be cylindrical; if, however, it is desired that the piston have an elliptical or cam surface, then the support has a cam surface, but in reverse to the desired cam surface of the piston.

In the accompanying drawing:

Figure 1 is a section along the line 1—1 of Figure 2;

Figure 2 is a section of the line 2—2 of Figure 1, parts being shown in elevation; and

Figure 3 is a detail of Figure 2.

Referring now to the accompanying drawing, 1 designates a piston having a head 2, provided with ring grooves, having a skirt 3 which may be partially separated from the head by circumferential slot 4, and having wrist pin bosses 5

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adapted to receive a wrist pin 6. The diameter of the head is usually smaller than the diameter of the skirt, and the skirt may be cylindrical or cam ground, as previously described.

Mounted in a frame 10 is the mechanism for presenting a piston to a finishing element, such as a grinding wheel 11. It comprises a support in the form of a roller 12, adapted to be keyed to a shaft 13 supported in bearings 14. These bearings 14 are supported through eccentrics 15 in the side members 16 of the frame, and each of the eccentrics is provided with an adjusting head 17 adapted to be fixed by set screw 18, whereby the support may be adjusted up and down with respect to the grinding wheel 11. The support 12 is provided with a surface corresponding to the desired surface of the piston, and where the piston is to be cam ground this surface is the reverse of the desired cam on the piston.

Mounted on a shaft 20, also supported in side members 16 by eccentrics 21, is a roller 22 which, in this case, may be loose on the shaft. The eccentrics also have heads 23 and clamping screws 24. The roller 22 gauges and positions the piston laterally and may be adjusted for various size pistons.

Pivoted on a shaft 30 is a lever 31 provided with a roller 32 adapted to engage to piston above its center. Interposed between the lower end of a bracket 33 and the lower end of the lever, is a spring 34 on a stud 35 passing loosely through the bracket and provided with a head 36. The lever, as a whole, is forked to take over the bracket, and has a stop 37 engaging the bracket. The lever 31 can be swung out at its upper end to allow the insertion of the piston and when released will cause the spring 34 to hold the piston above its center as it is supported by the support 12 and the roller 22.

The wrist pin of the piston has taking thereover a forked head 40 provided with plunger 41 (Figure 3) engaged by spring 42, so that when the fork is snapped over the pin the piston will be retained in the fork, the plunger passing beyond the center of the pin to hold the piston in position. The fork is on the end of a shank 43 provided with a square or angular opening 44 in which fits an angular extension 45 of a shank 46. The ends of the shanks 43 and 46 are reversely threaded to receive a sleeve 47 held by clamping nut 48. By this manner the length of the shank structure 43—46 may be adjusted by manipulation of the sleeve 47. The shank 46 is pivoted by pin 49 in a sleeve 50, which, in turn,

is pivoted by a pin 51 in a shaft 52, so as to provide a universal joint between shank 46 and shaft 52. This shaft 52 is supported in a bearing 53 and has fixed thereto a gear 54 meshing with gear 55, fixed to a shaft 56, supported in bearings 57 and 58. The lower end of the shaft has fixed thereto a gear 59 meshing with a gear 60, fixed to a shaft 61, supported in the bearing 62, and driven by a motor 63. The shaft 61 may be connected to the shaft 13 by suitable gearing, such as a "silent" chain 64 passing over wheels 65 and 66. By the mechanism described, and by the interconnection of the shaft 13 of the support and the shank 43 attached to the piston, the support 12 and the piston are driven in synchronism.

The operation of the mechanism is as follows: Assuming that the contour of the piston has been determined and that the support 12 has been formed to correspond with the desired contour of the piston; and in the case where the piston is to be cam ground, the support has been provided with a surface which is the reverse of that of the piston; the support is placed in position in its bearings where it will present the proper face to the piston. The support will be adjusted to the size of the piston and the roller 22 will also be adjusted to that size. The piston will then be positioned along the support and the roller 22 by the adjustment 47 described. The piston will now be held on and against the support 12 and the roller 22 by the roller 32. Finishing may then be proceeded with, starting the motor which then drives the support 12 and the piston in synchronism, so as to form the desired surface on the piston, whether cylindrical or cam ground. After the piston has been finished, the frame can be moved out of position, so as to clear the grinding wheel; this frame, as usual, being fed laterally of the grinding wheel. When the piston is free of the grinding wheel the shank 43 can be swung on its universal joint, so as to permit removal of the piston therefrom. The support 12 may be readily removed by slipping the shaft 13 endwise, the latter being keyed to the support.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A piston finishing machine, comprising, finishing means, a frame member movable relatively to said finishing means, a rotary support journaled on said frame member at a fixed distance from said finishing means, said support having a cross-sectional shape complementary to that to which the piston is to be finished, driving means connectible with the piston to rotate the same and axially adjustable to position the piston on said support, and means for rotating said support in constant relation to the rotation of said driving means.

2. A piston finishing machine, comprising, finishing means, a frame member movable relatively to said finishing means, a rotary support journaled on said frame member at a fixed distance from said finishing means, said support having a cross-sectional shape complementary to that to which the piston is to be finished, driving means connectible with the piston to rotate the same, means for rotating said support in constant relation to the rotation of said driving means, and means for adjusting said driving means axially without disturbing said relation.

3. A piston finishing machine, comprising, finishing means, a frame member movable relatively to said finishing means, a rotary support journaled on said frame member at a fixed distance from said finishing means, said support having a cross-sectional shape complementary to that to which the piston is to be finished, axially adjustable driving means having a snap-on connection with the piston pin, means for rotating said support in constant relation to the rotation of said driving means, and means for adjusting said driving means axially without disturbing said relation.

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