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2,598,020

SURFACE GRINDER

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2 SHEETS—SHEET 1

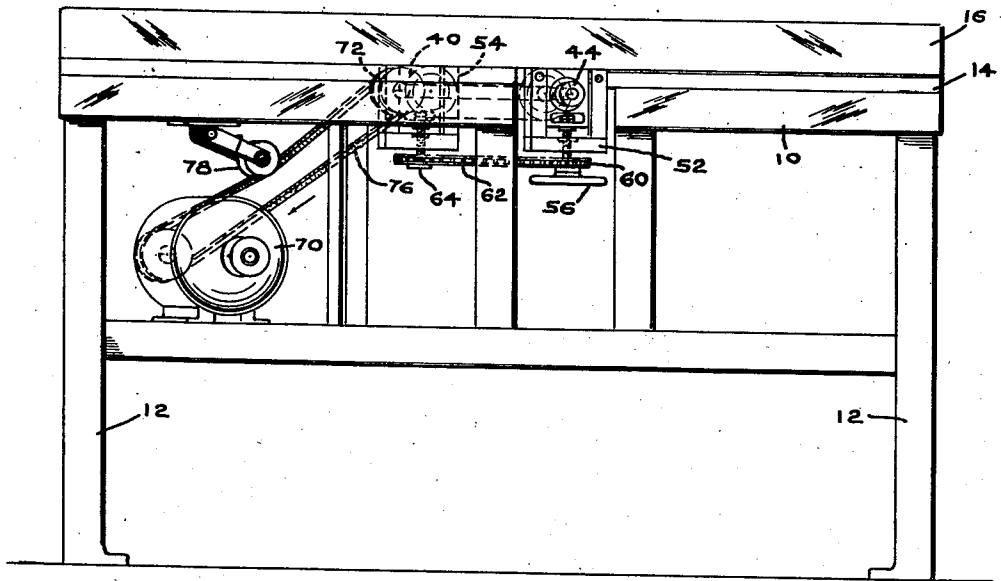
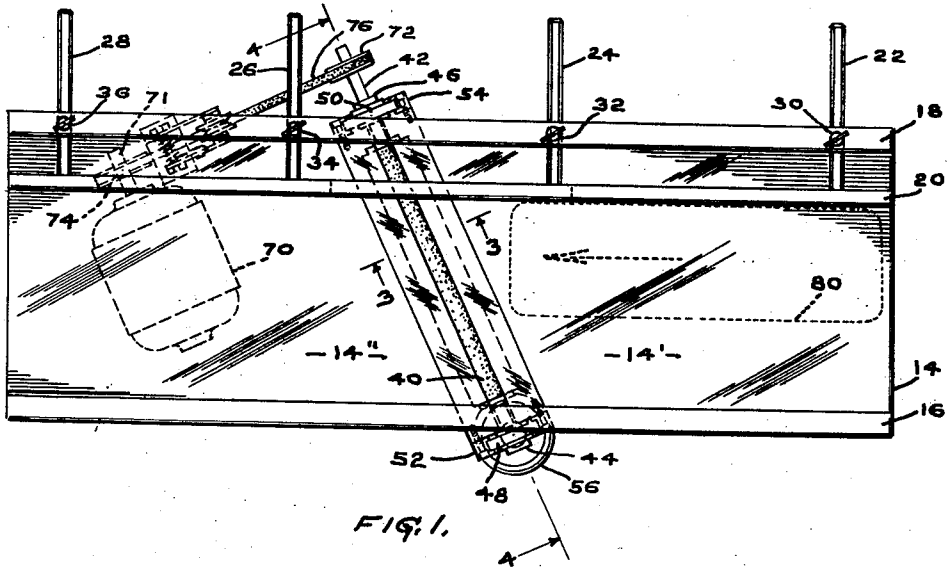


FIG. 2.

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2 SHEETS—SHEET 2

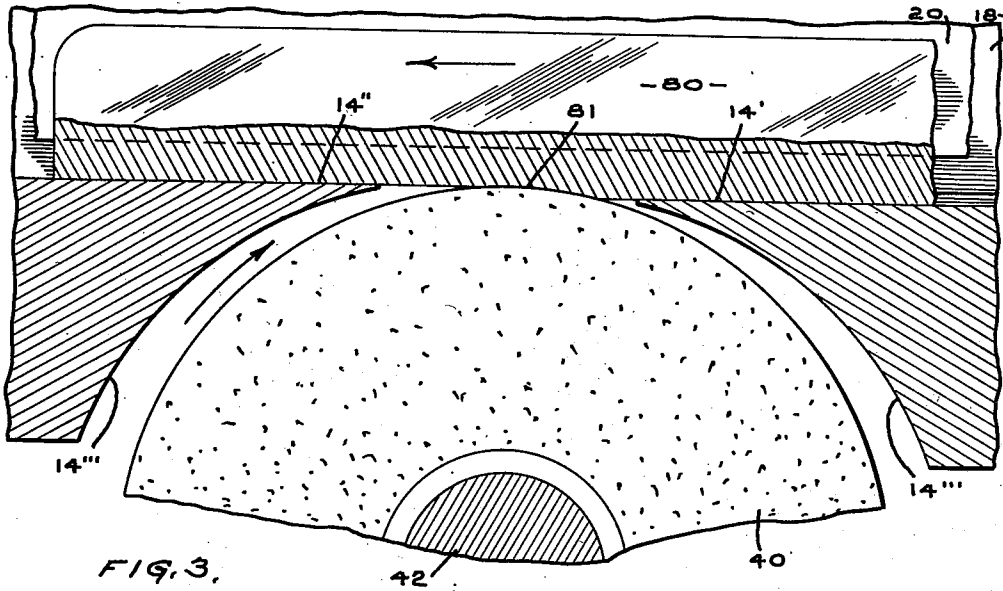


FIG. 3.

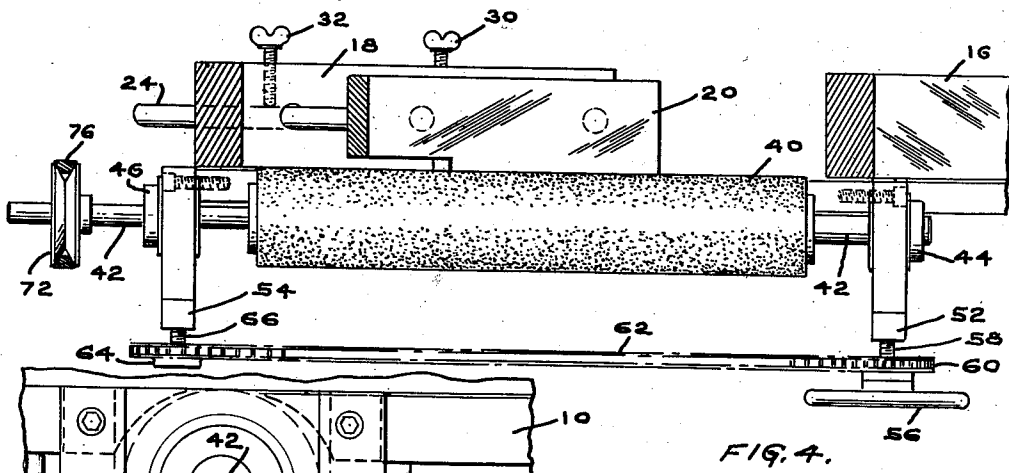


FIG. 4.

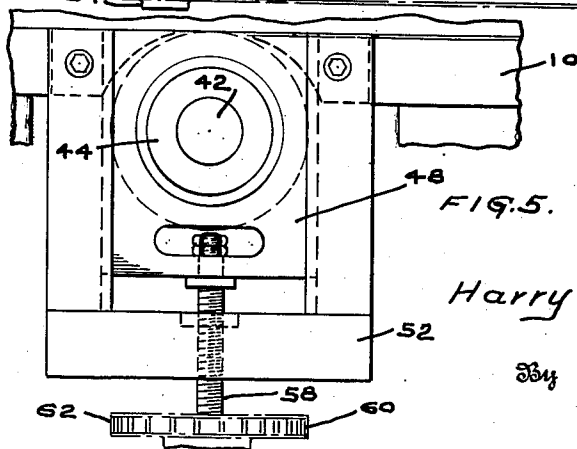


FIG. 5.

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# UNITED STATES PATENT OFFICE

2,598,020

## SURFACE GRINDER

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Application September 20, 1949, Serial No. 116,654

1 Claim. (Cl. 51-102)

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The present invention relates generally to grinders and in particular to what is known as surface grinders. This type grinder is especially adapted to the grinding of flat surfaces such as cylinder heads and blocks, although they are not limited to this specific use, and may be used for many other types of work requiring a smooth flat surface.

There are in the art various type surface grinders which work on a different principle. Many of these grinders leave on the surface a particular mark or unevenness known in the trade as "grain marks," etc. Much of this unevenness and marking comes from the fineness or coarseness of the wheel. However, it most generally comes from the speed of the cutting stone and the manner in which the stone or grinding wheel comes in contact with the work. Therefore, it is the desire to improve this type surface grinder that prompted the development of this apparatus.

The present trend of automotive manufacturers is to use a very thin steel sheet head gasket and the cylinder head must be substantially flat, or be within small tolerances of being flat, to prevent leakage between the head and the cylinder block with the use of these gaskets. Therefore, the regrinding of cylinder heads has become more and more a necessity. It is also of importance to have the ground surface of the head of such a character that will effect the maximum amount of bond between the head and the block when the head is fastened into place.

One object of the invention is to provide a simple and practical machine having a minimum number of moving parts and capable of finishing a flat surface within close tolerances.

Another object of the invention is to provide an apparatus of this type in which a higher speed grinding wheel may be employed.

Still another object of the invention is to provide a surface grinder upon which articles of considerable range in size may be ground.

With the above and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as shown in the accompanying drawings and described in the following specifications in which:

Figure 1 is a plan view of the machine.

Figure 2 is a side elevation of the same.

Figure 3 is an enlarged fragmentary sectional view taken along the line 3-3 of Figure 1.

Figure 4 is an enlarged sectional view taken along the line 4-4 of Figure 1.

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Figure 5 is a fragmentary detailed view of the grinding wheel bearing and its adjustment.

In the specifications like reference characters are used to designate the same and similar parts throughout the several views where practical.

The machine is normally provided with a base 10 supported upon appropriate legs or supports 12. Positioned upon the base is a table, or work support 14, which is provided an upper surface. The upper surface of the table 14 is divided into two portions 14' and 14''. These portions are in parallel planes of approximately two-thousandths of an inch difference in height, and will be more specifically described hereinafter.

Extending along each side of the upper surface of the table are side members, or work guides, 16 and 18 for reinforcing the table and serving as a guide for defining a path over which the articles being ground are passed. However, these side members, or work guides, may have in addition an adjustable work guide 20 which is carried by the side member as shown in Figures 1 and 4. The adjustment of the guide 20 is effected by the members 22, 24, 26 and 28 which are adapted to pass through appropriate apertures in the member 18 and are secured in the selected position by the set screws 30, 32, 34 and 36. The work support, or table, may be constructed by casting, or by other well-known manufacturing methods.

The table is normally of rectangular shape, but may be of any form best suited for the particular operation. The work guides, being either the members 16, 18, or the adjustable gauge 20, are adapted to designate the direction and/or the path the work is to take over the upper smooth surface of the table.

Positioned diagonally across the table is a suitable grinder, such as a cylindrical stone 40 of small diameter, which is adjustable relative to the upper surface of the table. The stone is supported upon a suitable shaft 42 and is carried in bearings 44 and 46 on each side of the table. These bearings are supported in journals 48 and 50 which in turn are adjustably supported in frames 52 and 54. The grinder is adjusted by means of the hand wheel 56, which is fixedly secured to one end of a shaft 58. The shaft 58 is threadably receivable within an aperture within the lower portion of the frame 52. The opposite end of the shaft is rotatably secured to the journal 48 and is adapted to move the journal within the frame as the shaft is rotated. Also secured to the shaft 58 is a sprocket 60 about which a chain 62 is engaged. The chain

extends to the opposite side beneath the table and engages a similar sprocket 64, which, in turn, is fixedly secured to the shaft 66. The operation and construction of the shaft 66 is substantially the same as that just described for the shaft 58 and operates the journal 50 within the frame 54 in substantially the same manner. With this arrangement, both the bearings 44 and 46 are adjusted an equal amount by operating the hand wheel 56.

The stone is adapted to be rotated at a relatively high speed, which is possible because of its small diameter. The grinder is driven in any suitable manner. The preferred driving means consists of a motor 70 which is set at an angle to the table and supported upon the frame of the machine so that its driving shaft 71 is parallel with the stone shaft 42. On the shafts 42 and 71 are V-pulleys 72 and 74 over which is carried a V-belt 76. On the slack side of the belt is an idler 78. The length of the belt is such as to allow for adjusting the grinding stone up and down relative to the upper surface of the table, the idler 78 taking up the slack.

There is provided across the table a narrow diagonal opening through which the stone is projected slightly above the upper surface of the table. This opening is very narrow as the height of the stone above the table amounts to only a few thousandths of an inch. The edges 14'' of the table are arcuated about the grinding stone as shown in Figure 3 in order to keep the opening in the table at a minimum width.

Referring in particular to Figure 3, the table, or work support 14 consists of two portions 14' and 14''. The portion 14' is that portion of the table on the feed side of the grinding wheel, and the portion 14'' is that portion of the table beyond the wheel in the direction of the feed. The work passes over the table as indicated by the arrow from the lower portion of the table, or bed 14' to the higher portion 14''. This difference in height, or step, in the table after the cut of the grinding wheel on the work is very important. The stone is turned at a very high speed and is normally set to cut approximately two-thousandths of an inch from the work as it passes along and over the table. The portion 14'' of the table is of substantially the same height above the table portion 14' as the uppermost portion of the grinding stone (approximately two-thousandths of an inch) in order that the work will slide along the higher surface of the table after the cut has been made and be supported thereby; otherwise, the work would rock about the stone as it progressed along the table.

As stated, the stone is positioned diagonally across the table and at an angle of approximately thirty to thirty-five degrees with a perpendicular line to the path of the work. In operation, the stone is first dressed in order that it will have a cutting surface parallel with the upper surface of the table. The stone is then moved by its adjusting means to a point where its highest cutting line will be substantially in a plane with the upper portion 14'' of the table. The stone is then rotated in the direction of the arrow as shown in Figure 3. When the stone is rotating at its proper speed, the work 80 (in

the form of a cylinder head) is moved in the direction of the arrow over the low table portion 14' against the grinding stone 40, as shown at 81, where a predetermined amount of its surface will be removed, that is, the difference in the heights of the two table portions 14' and 14''. As the work is moved over the stone, the ground portion of the work will be of such height as to slidably rest upon the portion 14'' and prevent the work from dropping down behind the stone.

While the invention has been described in a specific form, it is not intended to be a limitation of the broad application thereof as the scope of the invention is best defined in the following claim.

I claim:

In a machine for grinding engine heads and the like, the combination of an elongated table having an upper surface and a narrow diagonal opening extending therethrough, the upper surface of the table being formed in an upper and lower portion extending outwardly from each side of the diagonal opening and fixedly secured in two horizontally spaced parallel planes, the difference in height of the upper surfaces of the two portions being not greater than .002 of an inch, a single high speed cylindrical grinding element of relatively small diameter mounted within the diagonal opening of the table having its axis parallel with the upper surface thereof and adapted to have its upper portion rotated in the direction of the lower portion of the table, the grinding element having a supporting shaft extending entirely throughout the cylindrical axis of the grinding element, a bearing at each end of the diagonal slot to receive the said shaft, vertically fixed guideways extending downwardly from the table for slidably receiving the bearings, means located beneath the table and extending between the bearings for simultaneously adjusting both the bearing relatively to their respective guideways and means mounted on the said shaft for rotating the said grinding element, all substantially as shown and described.

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