

Jan. 9, 1945.

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2,366,935

VACUUM WORK HOLDER

Filed July 24, 1943

2 Sheets-Sheet 1

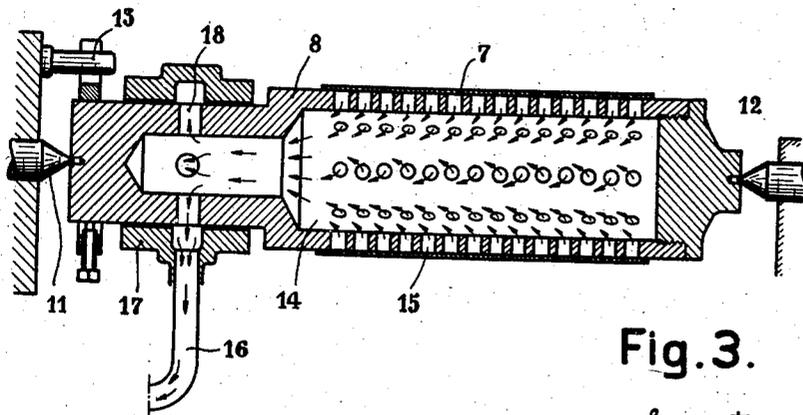
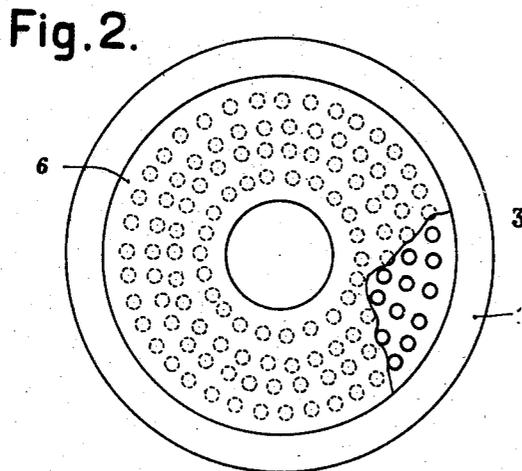
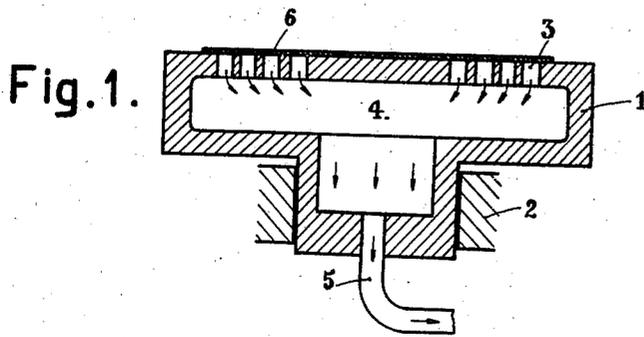


Fig. 3.

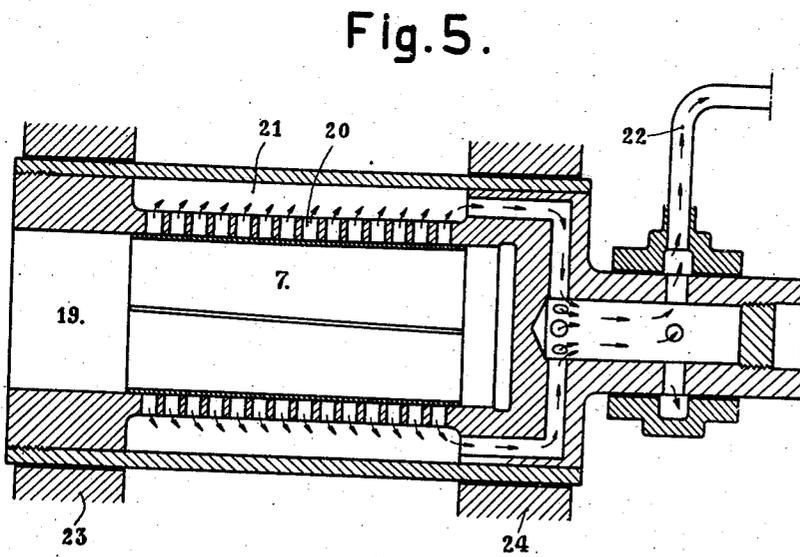
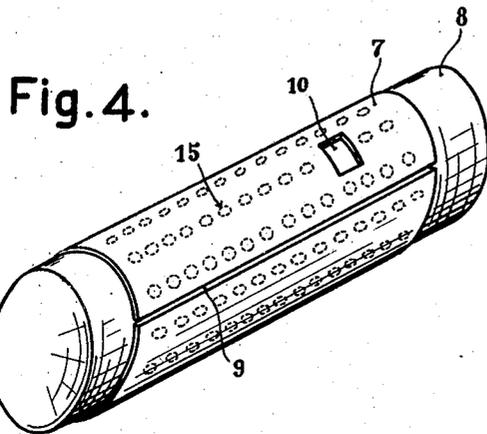
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# UNITED STATES PATENT OFFICE

2,366,935

## VACUUM WORK HOLDER

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Application July 24, 1943, Serial No. 496,070

In Switzerland June 26, 1942

2 Claims. (Cl. 51—235)

The invention consists of a process of attaching objects to be worked, more particularly those whose weight is small in comparison with their dimensions, and of a device for the execution of this process.

Difficulties can, in certain circumstances, arise in attaching pieces to be worked, and more particularly pieces to be ground. When, for example, the weight of these pieces is small in comparison with their dimensions, that is to say when they are thin, there is a danger of deforming the piece through such methods of attaching them as are so far known, and thus making the grinding senseless.

The only method known so far of maintaining a piece in place without it being under strain of tension, flexion or pressure, is the magnetic block. This is applicable in certain conditions only, i. e. the piece to be worked must not be paramagnetic and it must offer a sufficient passage to the magnetic flux, which is not the case for pieces of small weight in comparison with their dimensions.

The difference between the present invention and the procedures hitherto known, is the use of atmospheric pressure for attaching the piece to be worked to its support by artificially creating a vacuum on the surface of the said piece in contact with the said support.

The device used according to the present invention for the execution of this procedure consists therefore of a support so shaped as to fit the piece to be worked and perforated by a certain number of holes, these holes being connected with means allowing suction.

The annexed drawings show three embodiments of the above mentioned device, given by way of example.

Fig. 1 is a view of the device according to the first embodiment, showing it in axial cross-section. It serves to attach very thin disks.

Fig. 2 is a corresponding plane view.

Fig. 3 is a view of a device, according to the second embodiment, seen in longitudinal cross-section and usable for attaching cylindrical thin walled objects, split lengthways and to be ground exteriorly. Such objects would be, for instance, the operating sleeve of sleeve valve type internal combustion engines.

Fig. 4 shows in perspective such a sleeve in place on its cylindrical support.

Fig. 5 is a view of a device according to the third embodiment, seen in longitudinal section and applicable to the interior grinding of internal combustion engine sleeves.

The device according to the first embodiment of Figs. 1 and 2, consists of a circular rotary table 1, revolving in a bearing 2. This table is hollow, its upper face perforated with holes 3 and its cavity 4 communicate by an axial opening with conduit 5.

The piece to be ground is a very thin round washer 6. The drawings show it in Fig. 2 with a piece partially torn off, in order to show holes 3 of table 1.

This table being firstly ground, the washer is placed on it and by conduit 5, all or some of the air contained in cavity 4 is drawn off. From then on, atmospheric pressure will ensure the adherence of the washer to the table, which, revolving opposite to a grindstone not shown here, allows grinding of washer 6 without the attaching of this latter causing it the slightest distortion in the course of work.

To remove the washer, it suffices to allow air to enter cavity 4.

In the embodiment of a device according to the present invention shown by Figs. 3 and 4, the same principle as described before is applied to a cylindrical piece 7 put on a ground muff 8. The said piece has thin walls, it is slit its whole length in 9 and possesses moreover an opening 10 (see Fig. 4).

The muff 8 being attached between point 11 and counterpoint 12 of a grinding machine, it is set in motion by a driver 13.

The muff being hollow, cavity 14 communicates with the exterior by a large number of radial holes 15, through its wall. It is also in communication with a fixed conduit 16 by means of a circular inside grooved ring 17, of which the groove coincides with the path followed by the exit orifices of radial canals 18. These parts are not shown in Fig. 4 which has been intentionally simplified.

It is obvious that once cylinder 7 is put over muff 8, it will suffice to rarify the air in cavity 14 by extracting the air through conduit 16 to ensure the perfect application of the cylinder to the muff. A rotary movement of the whole allows exterior grinding of the cylinder.

As Fig. 4 shows, the perforations of muff 8 must naturally be adapted in shape and size to the form of the cylinder to be worked, that is: there must be no perforations opposite opening 10 as for instance there were none opposite to central hole of washer 6 in Figs. 1 and 2.

If necessary, it would be possible to conceive supports, muffs, etc. with completely perforated surfaces, like a sieve, and which, if desired could

be tapped in order to allow the introduction of small screws with countersunk heads, in view to obturate at will some of said perforations.

The embodiment of the device according to present invention, as shown by Fig. 5, serves for interior grinding of the thin cylinder exteriorly ground by means of the device according to Figs. 3 and 4. The principle is the same. A muff 19, hollow inside to allow for introduction of cylinder 7, has radial openings 20 communicating its central opening with a ring-shaped cavity 21 itself communicating, as has already been explained, with a conduit 22. The muff revolves in bearings 23 and 24, its rotation allows interior grinding of cylinder 7, after being attached by rarifying the air in cavity 21.

It is obvious that the process of fixing peculiar to this invention, as also the device for its execution, can be used for attaching light weight pieces in comparison with their dimensions, on no matter what machine tool, for example a lathe or a milling machine.

What I claim is:

1. A device for holding thin split sleeves, whose weight is small in comparison with their dimensions, while being ground to exact size, comprising an elongated, rotatable muff having a continuous cylindrical interior, work-receiving surface accessible through one end of the muff, said muff having a hollow space between said interior work-receiving surface and the exterior of the muff and having perforations extending from said work-receiving surface to said hollow space, and means for applying suction to the hollow space of the muff and to a thin sleeve in place against the work-receiving surface to cause it to be held against such surface, said work-receiving surface having an imperforate area extending in a

straight line opposite which the split in the sleeve may be located, the perforations extending from said interior work-receiving surface to the hollow space of the muff being of sufficiently small size and spaced sufficiently close to one another, that very thin sleeves placed on the work-receiving surface, over the perforations, will not be deformed by the suction applied to the space within the muff.

2. A device for holding thin split sleeves, whose weight is small in comparison with their dimensions, while being ground to exact size, comprising an elongated, hollow, rotatable muff, said muff having a continuous, cylindrical, work-receiving surface having perforations extending therethrough to the space within the muff, an annular member extending around a hollow portion of the muff beyond the work-receiving surface thereof, and means connected to said annular member for applying suction thereto, the portion of the muff surrounded by said annular member having at least one opening extending therethrough, so that suction applied to the annular member will be transmitted to the hollow interior of the muff and to a thin sleeve in place against the work-receiving surface to cause it to be held against such surface, said work-receiving surface having an imperforate area extending in a straight line opposite which the split in the sleeve may be located, the perforations in said cylindrical work-receiving surface being of sufficiently small size and spaced sufficiently close to one another that very thin sleeves placed on said surface over the perforations will not be deformed by the suction applied to the interior of the muff.

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