Dec. 23, 1941. F. C. C. W. ECKLER ET AL 2,267,018

APPARATUS FOR CLEANING CASTINGS AND THE LIKE

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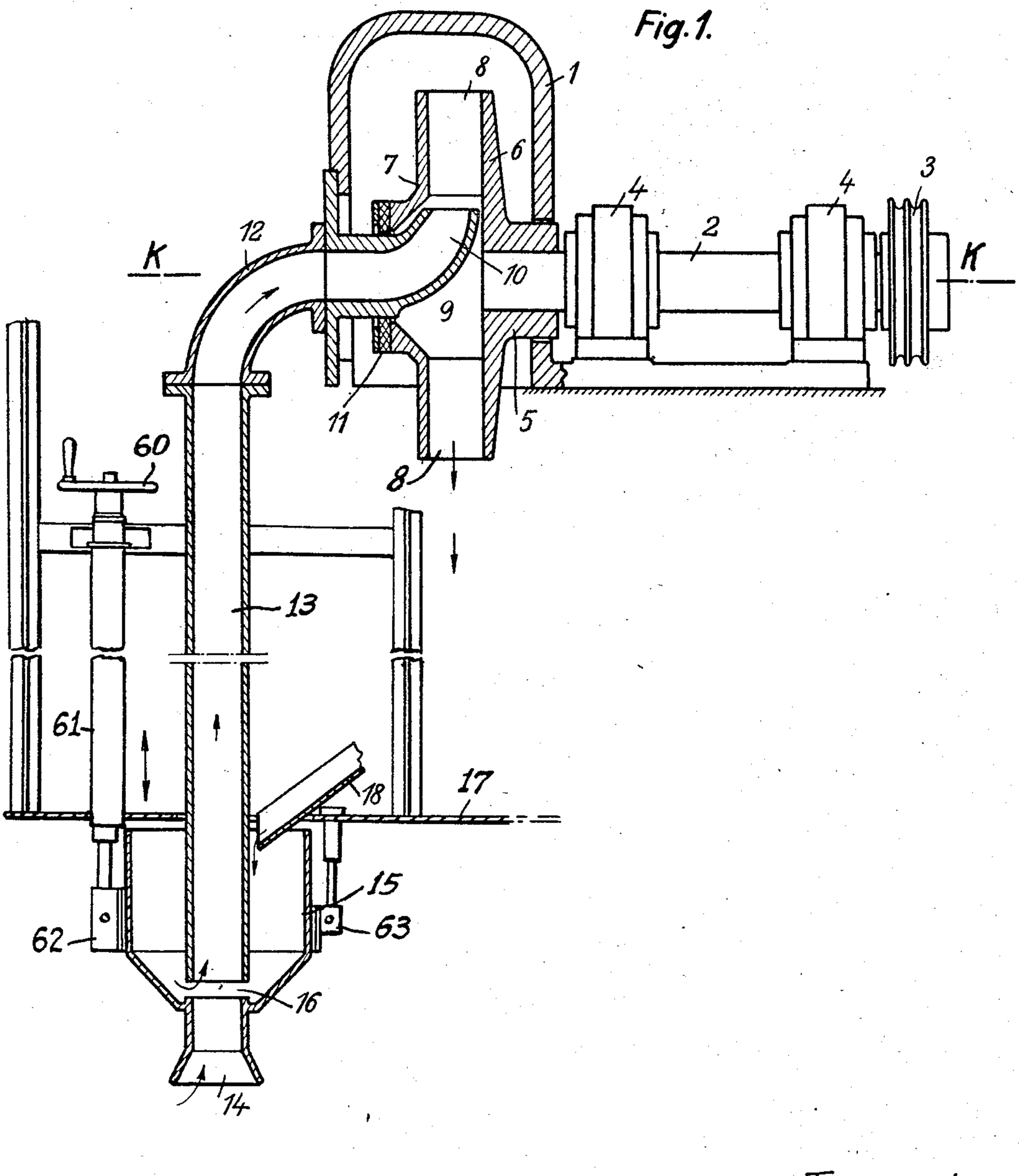
Fig. 1.



Witnesses

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Fig. 2.

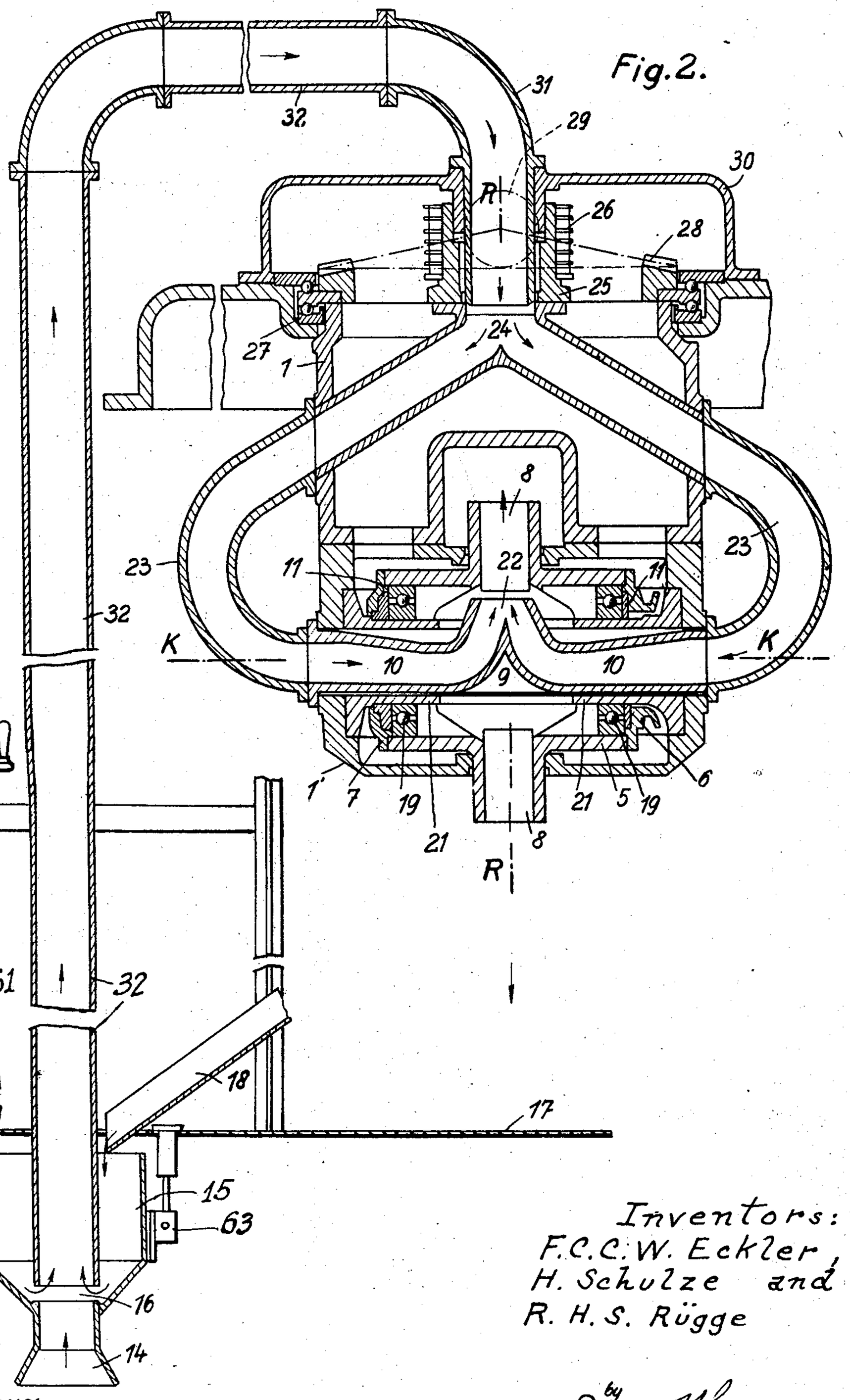

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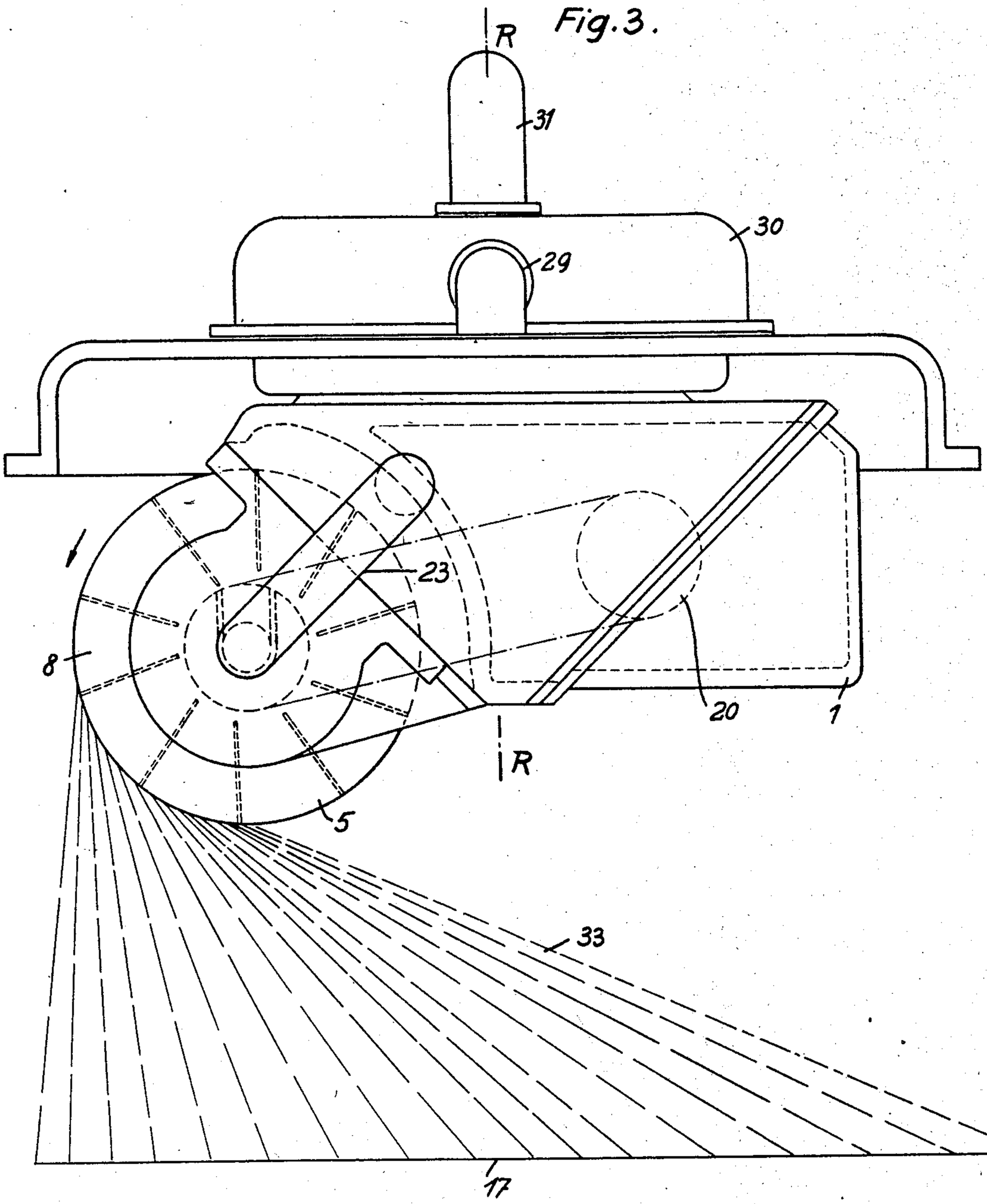
Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE

2,267,018

APPARATUS FOR CLEANING CASTINGS AND THE LIKE

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Application August 10, 1937, Serial No. 158,402
In Germany September 8, 1936

2 Claims. (Cl. 51—9)

The invention relates to the cleaning or other treatment of an article such as a fabricated article or piece of work by flinging on to it, by means of a rotating impeller, an abrasive such as sand.

According to the invention, the impeller itself is made to act as a conveyor for the abrasive after the fashion of a centrifugal blower, so that the abrasive is not only thrown off by the impeller but also sucked up by it. For this purpose the inlet or eye of the impeller may be connected in a substantially air-tight manner to a pipe through which the abrasive is supplied to it. In the preferred form of apparatus according to the invention, the feed pipe for the abrasive is connected to a container into which the abrasive drops or is conveyed after it has acted on the article so that the abrasive is constantly in circulation under the action of the suction effect or centrifugal force or is conveyed by its own weight. The lower end of the feed pipe preferably communicates with the atmosphere and by an adjustable aperture to a container for collecting the abrasive.

The impeller conveniently moves with respect to the article being treated in addition to rotating about its own axis. Thus the impeller may be made to reciprocate or the support for the article may be moved with respect to the impeller, or the impeller or the support or both may execute a swinging or pivoting movement. In one form of apparatus in accordance with the invention, the impeller is moved, in addition to rotating about its own axis, against the directional force of the impeller body, e. g., it can be so rotated that the gyroscopic axis carries out a rotation about the centre of gravity, for instance, so that the ejected abrasive describes a solid of revolution, for example, a cone, the height of which in the direction of the rotary axis runs through the centre of gravity of the gyroscope at right angles to the gyro axis. The impeller may for this purpose, for example, be accommodated in a casing which is rotatable about a vertical axis, while the axis of rotation of the impeller is horizontal.

The impeller may be driven by means of an electric motor to which current may be conveyed by means of slip rings which are arranged on a rotary structure in which the impeller is supported and conveniently surrounds the connection between the structure and the pipe by way of which abrasive is supplied to the impeller.

The invention will now be described with reference to the accompanying drawings which illustrate two examples of apparatus made in accordance with it. In these drawings:

Fig. 1 is a vertical section through one form;

Fig. 2 is a vertical section taken on the line R—R of Fig. 3 of another form, in which the impeller executes a rotary movement about each of two axes at right angles to one another, and

Fig. 3 is a side elevation of the form of Fig. 2.

Referring first to the example illustrated in Fig. 1, an impeller 5 arranged in a casing 1 is carried on a shaft 2 which is provided with a groove pulley 3 and is mounted in bearings 4. The impeller 5 has two side walls 6 and 7. At the external periphery of the impeller 5 between the side walls 6 and 7 are provided delivery branches 8 which owing to the fact that they are subject to considerable wear are conveniently made so as to be replaceable. An admission branch or bend 10 for the sand or other abrasive projects centrally into the central part 9 or eye of the impeller 5. This admission branch or bend is preferably capable of pivoting or of being adjusted and is sealed in a substantially air-tight manner with respect to the rotating part of the side wall 7 by a stuffing box 11 or other suitable packing.

A bend 12 is connected to the bend 10 and to the bend 12 is connected the feed pipe 13 for the abrasive, which pipe is connected at the bottom to the atmosphere by way of the aperture 14 and enters a collecting container 15 for the abrasive. The aperture 14 is conveniently in the form of a nozzle so that an injector action is obtained. An opening or slot 16, the cross section of which is preferably adjustable, is provided between the pipe 13 and the container 15. A turn-table or other support 17, for the article to be treated, is arranged under the surface sprayed by the abrasive beneath the impeller 5. The abrasive falls, conveniently by its own weight, into the container 15 by way of a chute 18.

In order to put the apparatus into operation the opening 16 is closed, the container 15 filled with abrasive, and the impeller 5 set into rotation. A stream of air is sucked, in the manner of a centrifugal blower, through the aperture 14, the piping 13, 12 and 10, into the part 9 and is ejected from the exit 8 by centrifugal force. If the opening 16 is now opened abrasive is carried with the air from the container and flung on to the article. The flung-off abrasive falls back into the container 15 and is automatically kept in circulation until the apparatus is stopped. By adjusting the cross section of the opening 16,

the opening 14 and the speed of rotation of the impeller 5, the quantity of abrasive ejected and its kinetic energy may be regulated within wide limits. The apparatus according to the invention is not only simple and reliable in operation, but it is also efficient because the abrasive impinges upon the surface of the article not only with the velocity imparted to it by centrifugal force but also with an additional inherent velocity resulting from the suction effect. It is therefore a question to some extent of a combined blast and centrifugal action.

In the example of Figs. 2 and 3 the impeller 5 rotates not only about the axis K—K but also about the axis R—R. In this form of construction also the impeller 5 has side walls 6 and 7 between which replaceable discharge branches 8 are arranged. The impeller 5 is mounted on ball bearings 19, is accommodated in a casing 1', and is rotated by means of a motor 20 (Fig. 3) about stub pipes 21. Two conveyor bends 10 project through these pipes 21 and into the central chamber 9 of the impeller 5. The exit openings of these bends are combined into a single exit opening 22, as shown in Fig. 2. The impeller 5 is sealed by the packing 11. In the example illustrated the bends 10 are connected by two curved pipes 23 to a Y-shaped piece 24 arranged on the vertical axis R—R, to which piece 24 is connected a branch 25 which is provided with slip rings 26 for receiving the current for the motor 20. The casing 1 itself runs on ball bearings 27 and is provided at its upper part with a bevel wheel 28 which is driven by a bevel wheel 29 or in some other suitable manner. The drive can be enclosed by a cover 30 through which a branch 31 passes into the inside of the branch 25 of the abrasive pipe in such a manner that it is properly sealed and the casing 1 with the devices accommodated within it is able to rotate freely about the branch 31. Piping 32 for the abrasive runs from the branch 31 into a container 15 and to an aperture 14 communicating with the atmosphere in the manner already described with reference to Fig. 1.

The abrasive which is injected from the discharge branches 8 and impinges upon the surfaces of the article upon a support 17 is in this case also conveyed back into the container 15 by a chute 18 and is thus kept in constant circulation in the device. Here also the same advantages are obtained as with the apparatus of Fig. 1, with the difference that the cone of abrasive 33 (Fig. 3) which is ejected rotates continuously about the axis R—R so that it describes a solid of revolution and the surface of the article is struck by the ejected abrasive on all sides.

The apparatus according to the invention is suitable not only for the cleaning of pieces of work but also for all other purposes for which sand blasting has hitherto been employed, for example for the frosting, matting or drilling of glass, for surface ornamentation or the like. Granular abrasives other than sand, such for example as corundum or the like, may be employed.

We claim:

1. Apparatus for subjecting an article to the action of an abrasive by flinging the abrasive against said article comprising a rotary impeller above the supply of abrasive, means for vertically supplying abrasive to said impeller so that said abrasive is sucked in against gravity by said impeller admixed with air, a rotary structure supporting said impeller, an electric motor driving said impeller, slip rings on said structure, and electrical connections between said slip rings and said motor.

2. Apparatus for subjecting an article to the action of an abrasive by flinging the abrasive against said article comprising a rotary impeller above the supply of abrasive, means for vertically supplying abrasive to said impeller so that said abrasive is sucked in against gravity by said impeller admixed with air, a rotary structure supporting said impeller, a supply pipe for the abrasive, a connection between said supply pipe and part of said structure, an electric motor driving said impeller, slip rings on said structure surrounding said connection, and electrical connections between said slip rings and said motor.

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