

C. F. CHURCH.
HOLDING DEVICE.

APPLICATION FILED SEPT. 5, 1911.

Patented Oct. 15, 1912.

1,041,028.

3 SHEETS—SHEET 1.

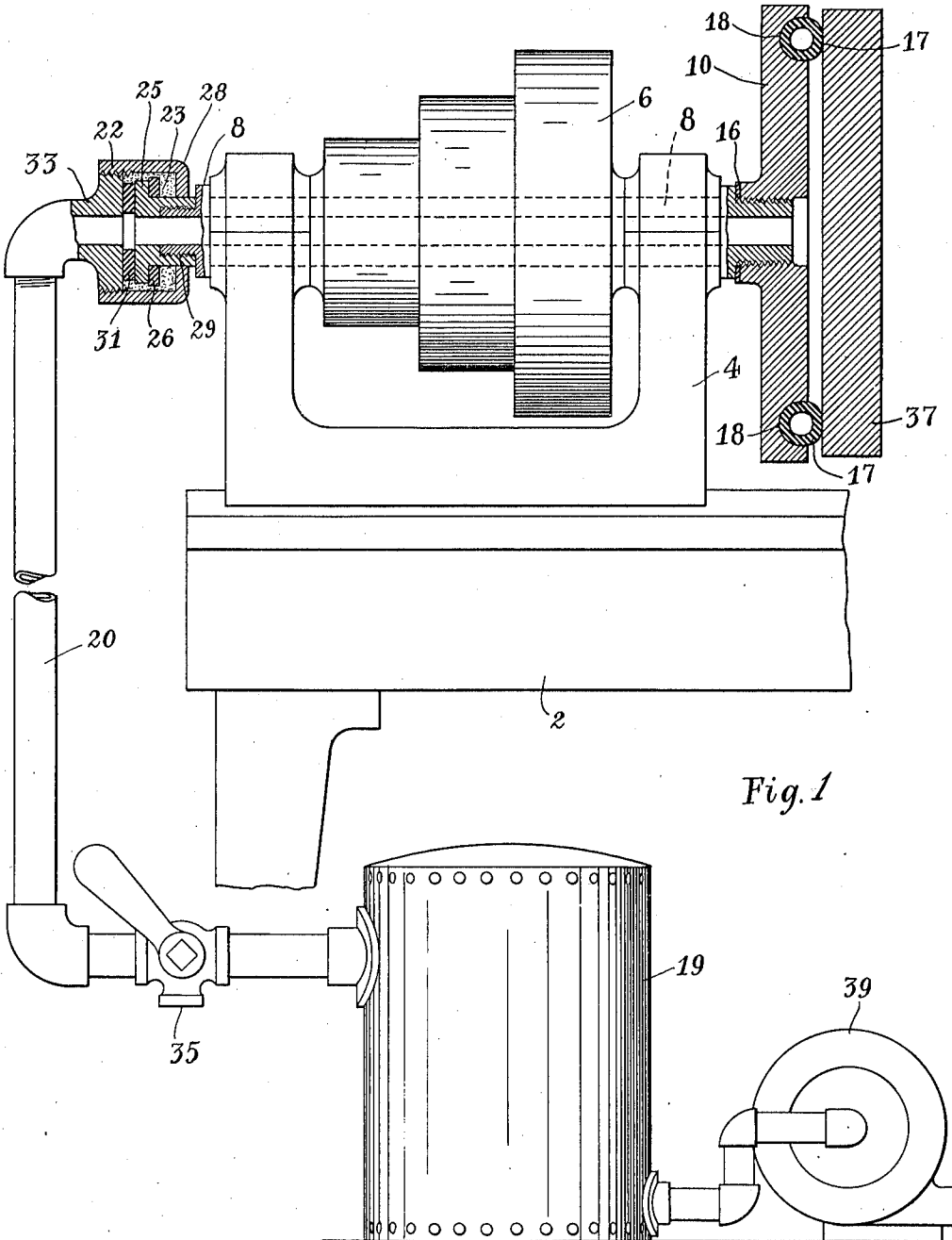


Fig. 1

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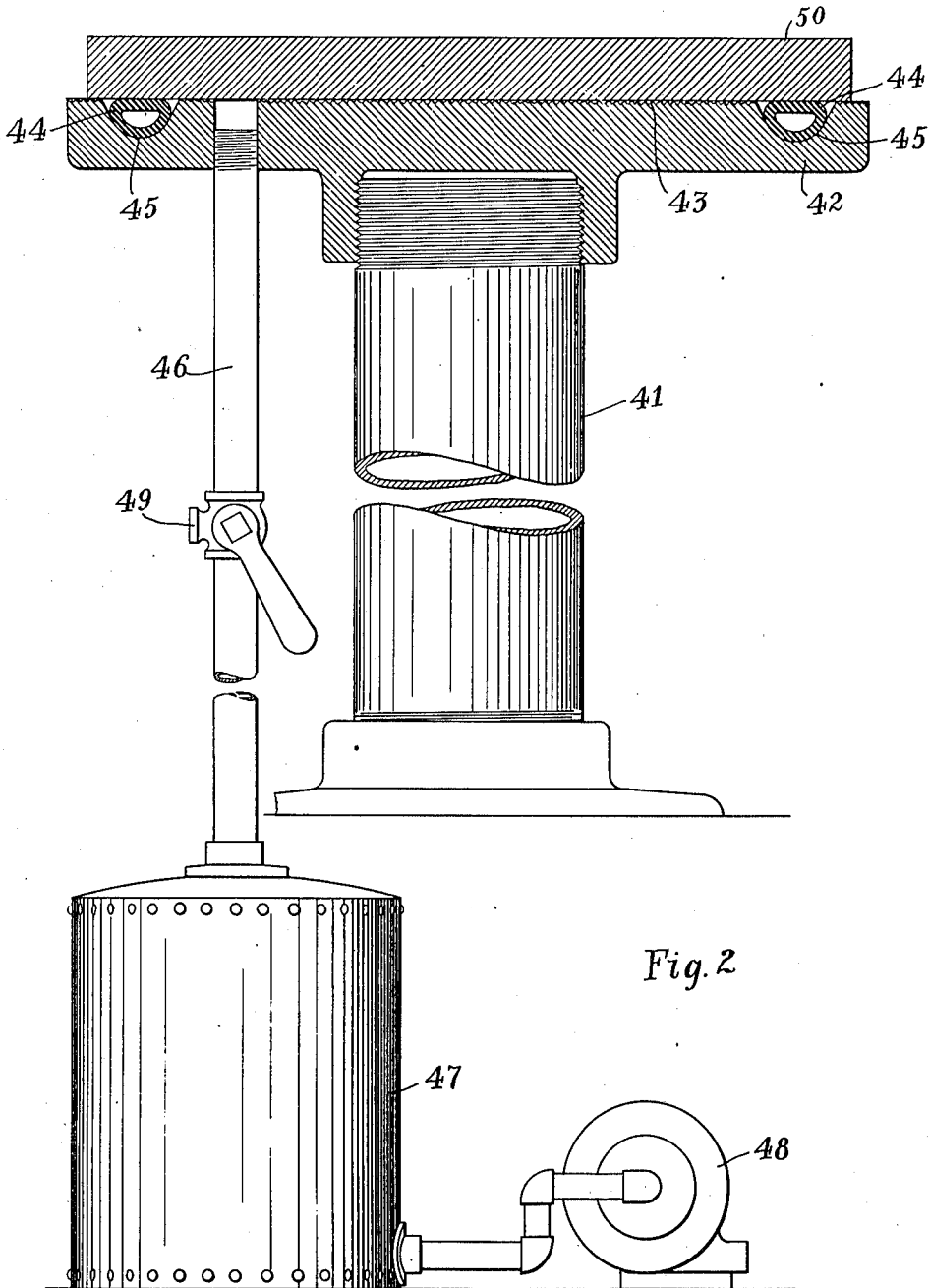
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3 SHEETS—SHEET 2.



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3 SHEETS-SHEET 3.

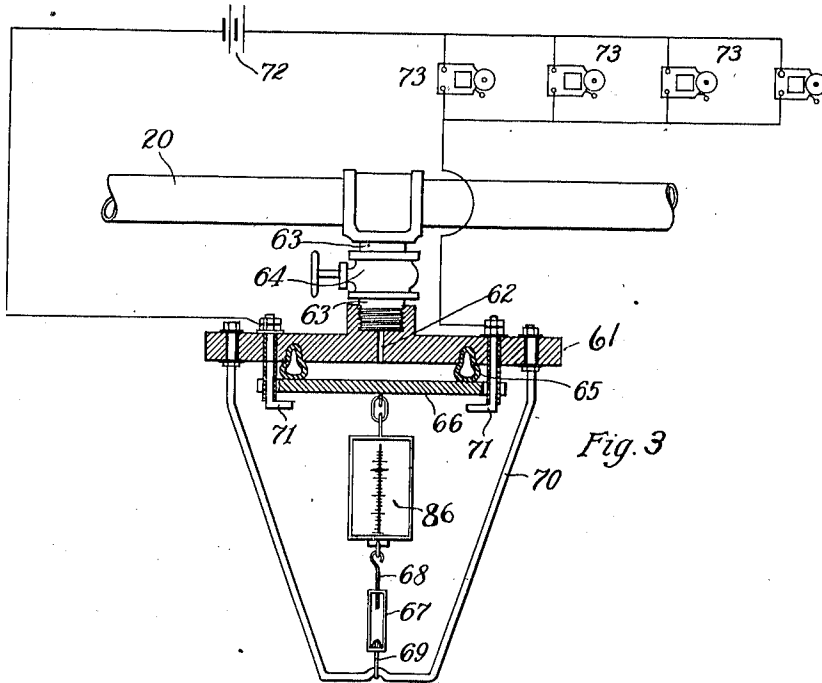


Fig. 3

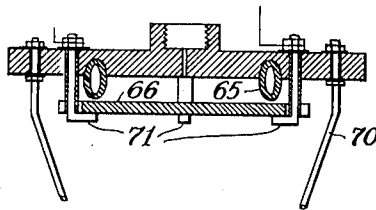


Fig. 4

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UNITED STATES PATENT OFFICE.

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HOLDING DEVICE.

1,041,028.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES F. CHURCH, a citizen of the United States, and a resident of Brooklyn, New York, have invented certain new and useful Improvements in Holding Devices, of which the following is a specification.

My invention relates to holding devices.

It particularly relates to devices for holding objects while they are being operated upon or manipulated, such as when they are rubbed, polished, covered, coated, turned, spun and the like.

The invention may be contained in many forms of construction. Of the many forms of such structures, I have selected one as an example, and will describe and illustrate it, to show that the invention contained in them is practical and that the structures are operative. Devices for holding objects heretofore used in the arts where the objects are to be securely held while being operated upon, have a clamping means, or screws or nails or some other securing means which injures, cuts or impresses the object and which in the work has to be rectified or covered or cared for, such as a bench-dog which penetrates the end of a board and can hold the object against movement in but one direction, or a vise which squeezes the object and causes the corners of the vise to mar the surface of the object, or a chuck to which the objects are secured by screws or bolts or clamps, while in the devices containing my invention, these objectionable features are entirely removed.

The particular structure selected as an example of the constructions containing the invention is shown in the drawings.

Figure 1 illustrates a pneumatic chuck which contains my invention. Fig. 2 illustrates a bench dog or other holding device. Figs. 3 and 4 illustrate a signal device.

In Fig. 1, 8 is a hollow shaft rotated by the pulleys 6. 10 is a face plate which is secured to the shaft 8. The face plate is provided with a tubular gasket 17 located in a recess 18 in the face of the plate. The space in front of the plate and within the area of the gasket may be connected through the shaft to a system of pipes or to the air tight receptacle 19 which gives capacity to the system. This permits uniformity of operations of the system or any of its parts. The system of pipes or the receptacle or both, as

the case may be, is connected to the air pump 39 which pumps the air out of the system and greatly reduces the interior air pressure to about one to four pounds to the square inch. The volume of the pipes or of the receptacle in the system gives the capacity to the system for it requires a great deal of air, which may enter into the system by leakage or in the use of the machines in removing the work or in placing the work on or holding the work on the machines to cause the interior pressure to rise a material amount. A great deal of air is required to fill the interior of the system even though the pumps are not operating to raise the interior pressure per pound if once the air is removed. Air may thus be drawn from a great many objects and there may be considerable leakage without materially altering the pressure and without changing the operation of any of the devices that may be used for holding the objects.

The coupling 22 effectually completes the connection between the pipe 20 and the space formed between the plate and the object.

When the operations on the object are completed it may be removed by shutting off the connection between the device and the capacity of the system by turning the cock 35. The cock 35 is preferably a three-way cock and when turned it lets air into the pipe and into the space between the cock and the work or the object placed upon the holding device. The air entering the space formed between the plate and the object raises the pressure on the plate side of the object until it is equal to the atmospheric pressure whereupon the object may be merely picked off from the device. The volume between the two and the volume of the connecting pipe between the cock and the device being small this requires scarcely a measureable length of time it being so short. Another object may then be placed on the device and the cock opened whereupon it is immediately held by the suction of the capacity.

In Fig. 1 is shown such a device. 8 is a hollow shaft rotated by the pulleys 6. 10 is a face plate secured to the shaft 8. The face plate is provided with a tubular gasket 17 located in a recess 18. The space in front of the plate is connected through a shaft to the receptacle 19 which gives capacity to the system. A coupling 22 effect-

5 tually completes the connection between the pipe 20 and the space formed between the plate and the object. A three-way cock opens and closes the pipe passage-way between the device and the capacity of the system or with the outside air.

10 When the objects are placed on the face plate and the cock is turned, the gasket is compressed and the space between the plate and the object placed on the gasket is sealed. The compression and the consequent flattening of the gasket holds the object in position and prevents any lateral movement of the object relative to the plate.

15 In Fig. 2 a standard 41 is shown having a holding device on it adapted to hold objects in a horizontal position. A plate 42 is secured to the top of the standard. The surface 43 is roughened or gnarled or spirally grooved. A gasket 44 is located in a groove or recess 45. A pipe 46 is connected with the opening through the plate and to a receptacle 47. A three-way valve opens and closes the passage way through the pipe.

25 When the object 50 is placed on the gasket 44, the gasket is pressed down into the recess forming a flat contact surface sealing the space formed between the object and the plate. The groove 45 is so cut as to allow the gasket to spread and form a large contact surface and the gasket is made sufficiently pliable to allow the object to be forced down on to the plate where it is held from any lateral movement, not only 30 by the gasket, but also by the frictional engagement of the two surfaces.

The tables shown in Fig. 2 may be made rotatable for ease of manipulation of the work and various convenient devices may be added to the systems and apparatus shown.

45 If the vacuum decreases because of unusual leakage, or the pumps should stop working, and, although the capacity of the system may keep the vacuum sufficiently great to enable the system to perform all of its functions for a considerable time after the unusual conditions arise, yet unless the operators receive a timely warning the vacuum may be reduced so that work on the machines may be spoiled or injury done to the workman if the work is being rotated at a high speed.

55 In connection with the device shown in Fig. 1, the reduction of the vacuum may occur at a time when the work will drop off or be thrown from the revolving plate. I have, therefore, provided an alarm device, which will be operated upon the reduction 60 of the vacuum. It is controlled by the difference of the pressure within the system and the atmospheric pressure. It may be made adjustable for the different conditions of working. Referring to Fig. 3, in which 65 it is shown, 61 is a supporting plate which

is connected to the system. It is provided with a very small opening 62. A pipe 63 connects the plate with the system. The pipe connection may be closed and opened by means of the valve 64. The front of the plate is provided with a gasket 65, 70 which is located in a recess formed in the face of the plate. A small plate 66 closes the space formed by the gasket and the plate 61. When the air in the system is exhausted, the plate 66 is pressed with more or less pressure against the gasket 65. A tension spring is connected to the plate 66 and tends to pull the plate 66 away from the plate 61. I have shown a spring scales 80 86 which is connected to the lower side of the plate 66 and will indicate the amount of the pull on the plate 66. The lower end of the spring or scales is connected to a variable tension member 67 which is adapted to 85 increase the tension at which the plate 66 will be pulled away from the plate 61. The tension member is provided with a brace and a screw-threaded hook 68 and swiveled eyebolt 69. As the brace is turned the hook is 90 drawn into the brace and the tension of the spring of the scales increased. The lower end of the brace is connected to the frame 70 which is secured to the plate 61. The plate is limited in its downward movement 95 by the angular posts 71. The posts are surrounded by insulating sleeves which prevent contact with either the plate 61 or the plate 66, except when the lower plate rests on the lower ends of the posts. The posts 100 are connected to the battery 72 and the circuit of the battery is completed through the bells and the plate when the plate is drawn down to its lowest point along the posts. In Fig. 3 the plate is shown in the position it occupies when it is drawn up by the suction of the system and in Fig. 4 is shown the position of the plate when it rests on the stops and completes the circuit of the battery and causes the bells to ring. When the 110 bells ring the operators of the machines in the vicinity of the bells will be signaled that the vacuum is reducing and passed the point for safe working of the machines. The devices shown in Figs. 3 and 4 are connected to the pipe 20 of the system shown in Fig. 1 and gives the alarm in order that the operator may stop the revolving plate and remove the work.

The invention is useful in many arts and 120 is subject to diversified purposes and many alterations in the parts and many features may be added without departing from the spirit of the invention and the combinations of elements set forth in the claims. 125

What I claim as new and desire to secure by Letters Patent is as follows:—

1. In a holding device the combination of a plate, a gasket located on the face of the said plate, the said plate having an open- 130

ing located within the area inclosed by the gasket, a pipe connected with the said opening and means for continuously exhausting the air through the said opening and pipe and rigidly holding the object on the said plate.

2. In a holding device the combination of a plate, a gasket located on the face of the said plate, the said plate having an opening located within the area inclosed by the gasket, a pipe connected with the said opening, a means for giving vacuum capacity connected to the said pipe, a vacuum producing means for drawing the air from the said capacity means, whereby an object will be rigidly held upon the said plate.

3. In a holding device the combination of a plate, a gasket located on the face of the said plate, the said plate having an opening located within the area inclosed by the gasket, a pipe connected with the said opening, a reservoir connected to the said pipe, a vacuum pump for drawing air from the said reservoir.

4. In a holding device the combination of a face plate a gasket located on the face of the said plate, an opening located in the center of the said plate, a hollow shaft connected to the said opening, a means for rotating the said shaft and face plate, a stationary pipe, a pipe coupler for connecting the said rotatable shaft and the said stationary pipe together with means for continuously drawing air through the said pipe and shaft for rigidly holding an object on the said plate.

5. In a holding device the combination of a face plate a hollow gasket located on the face of the said plate, an opening located in the center of the said plate, a hollow shaft connected to the said opening, a means for rotating the said shaft and face plate, a stationary pipe, a pipe coupler for connecting the said rotatable shaft to the said stationary pipe, a means for continuously drawing air through the said pipe and shaft for rigidly holding an object on the said plate.

6. In a holding device the combination of a face plate a gasket located on the face of the said plate, an opening located in the center of the said plate, a hollow shaft connected to the said opening, a means for rotating the said shaft and face plate, a stationary pipe, a pipe coupler for connecting the said rotatable shaft and the said stationary pipe together, a means for producing vacuum capacity connected to the said pipe and means for continuously drawing air from the said capacity means for rigidly holding an object on the said plate.

7. In a holding device the combination of a face plate a gasket located on the face of the said plate, an opening located in the center of the said plate, a hollow shaft connected to the said opening, a means for ro-

tating the said shaft and face plate, a stationary pipe, a pipe coupler for connecting the said rotatable shaft and the said stationary pipe together, a reservoir connected to the said pipe and a vacuum pump for continuously drawing air from the said reservoir.

8. In a holding device the combination of a face plate having a recess, a hollow gasket located in the said recess and an opening located within the area inclosed by the gasket, a pipe connected with the said opening and means for drawing air through the said opening and the said pipe to draw an object to the face plate and rigidly holding the object against the plate.

9. In a holding device the combination of a face plate having a recess, a hollow gasket located in the said recess, the said plate having a roughened surface and an opening located within the area inclosed by the gasket, a pipe connected with the said opening and means for drawing air through the spaces formed by the said roughened surface of the said plate through the said opening and the said pipe to rigidly hold the object against the said plate.

10. In a holding device the combination of a face plate having a recess, a gasket located in the said recess, the said plate having a roughened surface and an opening located within the area inclosed by the gasket, a pipe connected with the said opening and means for drawing air through the spaces formed by the said roughened surface of the said plate through the said opening and the said pipe to rigidly hold the object against the said plate.

11. In a holding device the combination of a face plate, a gasket carried by the said face plate, having an opening located within the area inclosed by the said gasket, a pipe for connecting the said opening with a suction apparatus, an automatic alarm device connected to the said pipe and adapted to produce a signal when the vacuum produced by the suction apparatus becomes less than a certain amount.

12. In a holding device the combination of a face plate, a gasket carried by the said face plate, the said face plate having an opening located within the area inclosed by the gasket, a means for rotating the said face plate, a suction apparatus, a pipe and a coupler for connecting the said face plate with the said suction apparatus, an automatic alarm device connected to the said pipe and adapted to produce a signal when the vacuum produced by the suction apparatus becomes less than a certain amount.

13. In a holding device the combination of a face plate, a gasket carried by the said face plate, a pipe connected to the said face plate, a second face plate connected to the said pipe, a second gasket located on the

1
said second face plate, a third plate located
in proximity to the said gasket, a suction
apparatus connected to the said pipe, an
electric alarm adapted to be operated by the
5 last named plate when the vacuum produced
by the suction apparatus becomes less than
a certain amount.

In testimony whereof, I have signed my
name to this specification, in the presence of
two subscribing witnesses.

CHARLES F. CHURCH.

Witnesses:

ADOLPH LAUKUS,
J. E. ROBERTS.