May 31, 1927.

G. N. SIMPSON

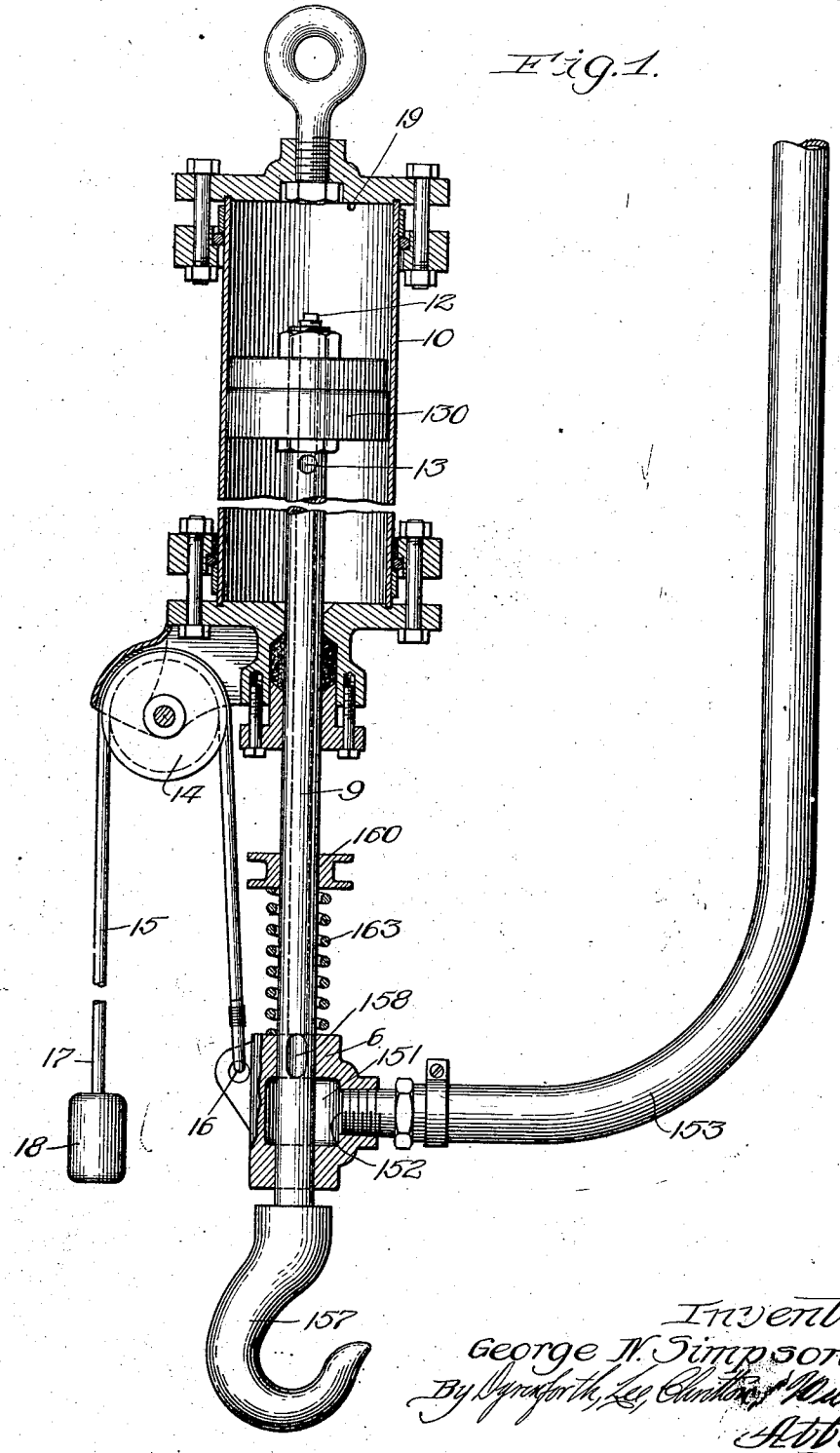
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POWER MECHANISM

Filed June 13, 1925

2 Sheets-Sheet 1

Fig. 1.




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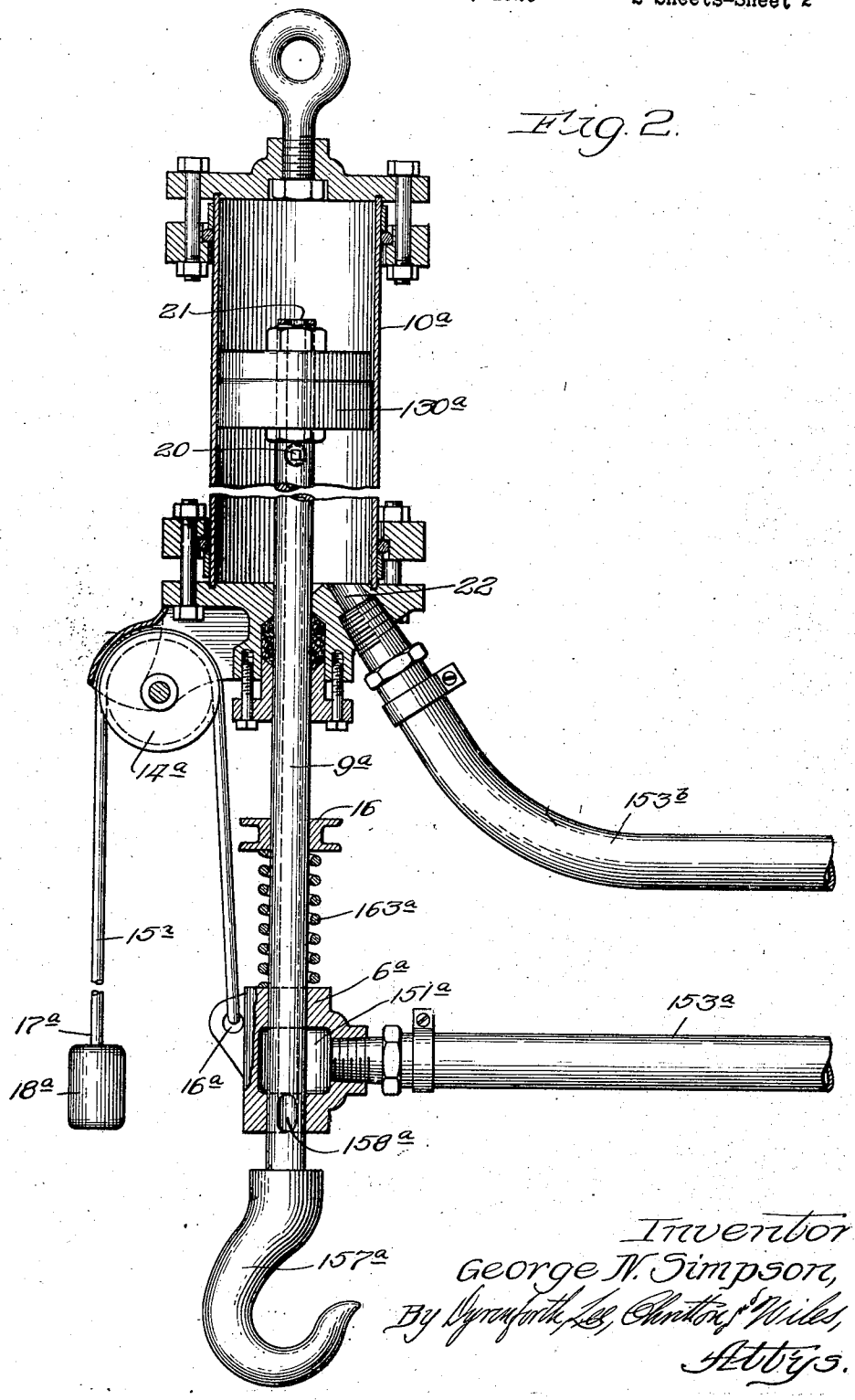
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Fig. 2.




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Patented May 31, 1927. 1,630,810

# UNITED STATES PATENT OFFICE.

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## POWER MECHANISM.

Application filed June 13, 1925. Serial No. 36,988.

This invention relates to improvements in power mechanism; and for the purpose of illustration is here shown as applied to a hoist. It is obvious, however, that, without detracting from the spirit of the invention, the mechanism may be used for furnishing power in other devices.

The invention as embodied in the hoist shown herein is simple in design and operation, and strong and rugged in construction. The hoist is sensitive in operation and easily controlled. By the use of a controlling rope, the hoist may be made to ascend or descend as desired.

Other features and advantages of my invention will appear more fully as I proceed with my specification.

In that form of device embodying the features of my invention, shown in the accompanying drawings, Figure 1 is a vertical sectional view of a hoist, and Figure 2 is a similar view showing a modified form.

As shown in the drawings, 10 indicates a cylinder provided with a piston 130 and a hollow piston rod 9.

6 indicates a valve part slidably mounted on the piston rod 9. The valve part 6 is provided with an internal annular recess 151 having an opening 152 communicating with a flexible hose connection 153, which leads to any suitable air compressor (not shown). The lower end of the hollow piston rod 9 is provided with a hook 157. 158 indicates a port near the lower end of the piston rod communicating with the lower end of the bore thereof. The upper end of the sliding valve part 6 is of sufficient thickness to completely close the port 158 when the valve is in the position shown in Fig. 1.

On the piston rod 9 above the valve part 6 is placed a collar 160; and between this collar and the valve part 6 is a spiral spring 163 exerting a downward pressure on the valve part with respect to the piston rod 9. The extreme upper end of the hollow piston rod 9 above the piston 130 is closed by means of a plug 12. 13 indicates a port in the piston rod 9 just below the piston 130 which communicates with the bore of the hollow piston rod.

To the lower end of the cylinder 10 is attached, in any suitable manner, a sheave 14 over which passes a control rope 15 having one end attached to the valve part 6 as indicated by 16. The other end of the control rope 15, as indicated by 17, is adapted to be of sufficient length to be held by an operator. 18 indicates a counterweight on the control rope 15 preferably of sufficient weight to counterbalance the weight of the valve part 6 and the pressure of the spring 163 so that when the rope is not held, the valve part 6 will remain in the position shown in Fig. 1, that is with the port 158 closed.

The operation of the device is as follows. A downward pull on the end 17 of the control rope 15 raises the valve part 6 thus putting the port 158 into communication with the recess 151 in the valve part 6. This permits air under pressure from the pipe 153 to enter the port 158 and escape through the port 13 into the cylinder 10 below the piston 130. This will raise the piston. Upward movement of the piston, however, raises the port 158 until pressure is again cut off by the upper edge of the valve part 6; and upward movement of the hook 157 is thereby stopped. Further downward pull on the end 17 of the control rope 15 will likewise cause further upward movement of the hoist. It will be seen that upward movement of the hoist will therefore follow downward pull on the end 17 of the control rope. When it is desired to lower the hoist, the end 17 of the control rope is raised. This will raise the counterweight 18 and lessen the weight on this end of the rope sufficiently so that the spring 163 will cause the valve part 6 to move downwardly. This will open the upper end of the port 158 to the atmosphere permitting pressure in the cylinder below the piston 130 to escape. The weight of the hook 157, or any load thereon, will then cause the hoist to descend by gravity. As the piston rod moves downwardly, however, the port 158 will again be covered by the valve part 6 thus cutting off escape of air from below the piston 130 and holding the hoist stationary. It will be seen, therefore, that the hoist will descend step by step as the rope 17 is raised.

19 indicates a small vent in the upper end of the cylinder.

The modified form of device shown in Fig. 2 is a balanced hoist, the construction and operation of which is substantially the same as the device shown in the preferred form. The differences in construction and operation will be pointed out. Corresponding parts in the modified form are indicated by corresponding reference numerals with

the designation "*a*." In the modified form the vent 19 is dispensed with and the port 13 is plugged up by means of a plug 20. The plug 12 is dispensed with in the modified form, the upper end of the bore in the hollow piston rod $9^a$ being left open as indicated by 21. In the modified form, also, the port $158^a$ corresponding to the port 158 in the preferred form, is made somewhat lower so that when the hoist is in its stationary position as shown in Fig. 2, the port $158^a$ will be entirely covered by the lower part of the valve part $6^a$. The modified form also has a port 22 entering the lower end of the cylinder $10^a$ which communicates by means of the hose $153^b$ to the air compressor. When the end of the rope $17^a$ is pulled down to raise the valve part $6^a$, the port $158^a$ at its lower end, is opened to the atmosphere, thus affording communication to the cylinder above the piston $130^a$. When this occurs, the pressure coming from the pipe $153^b$ will cause the piston to rise until the port $158^a$ is again cut off. When the rope $17^a$ is raised thus permitting the spring $163^a$ to lower the valve part $6^a$, pressure will be communicated from the pipe $153^a$ to the cylinder above the piston and the same pressure will come through the pipe $153^b$ to the cylinder below the piston. Gravity then will cause the hoist to descend until the port $158^a$ is again covered. It is to be understood that the pipes $153^a$ and $153^b$ lead to the same compressor and get the same pressure.

It will be seen that in each form of device that when the port $158^a$ is entirely covered, the hoist theoretically will remain stationary, if there is no leakage. If there is any leakage, the hoist will descend slightly until the port 158, or $158^a$, is slightly opened or "cracked" until there is just enough upward pressure to compensate for the leakage.

It will be seen that the hoist is very delicate and that it will remain stationary as long as the control rope 17 is held stationary. As the rope 17 is pulled downwardly the hoist will rise and vice versa.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claim, in which it is my intention to claim all novelty inherent in my invention as broadly as possible in view of the prior art.

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

In a device of the character described; an air cylinder having a piston therein provided with a hollow piston rod; a valve part slidably mounted on the piston rod; a fluid pressure connection to said valve part; a port in said piston rod communicating with the lower end of the bore therein, said port adapted to be closed by said valve part when in its neutral position on said piston rod, put into communication with the pressure connection by relative upward movement of said valve part on said piston rod and opened to the atmosphere by relative downward movement of said valve part on said piston rod; and a communication between the upper end of said bore and the interior of said cylinder.

Witness my hand this 11th day of June, A. D. 1925.

GEORGE N. SIMPSON.