

(No Model.)

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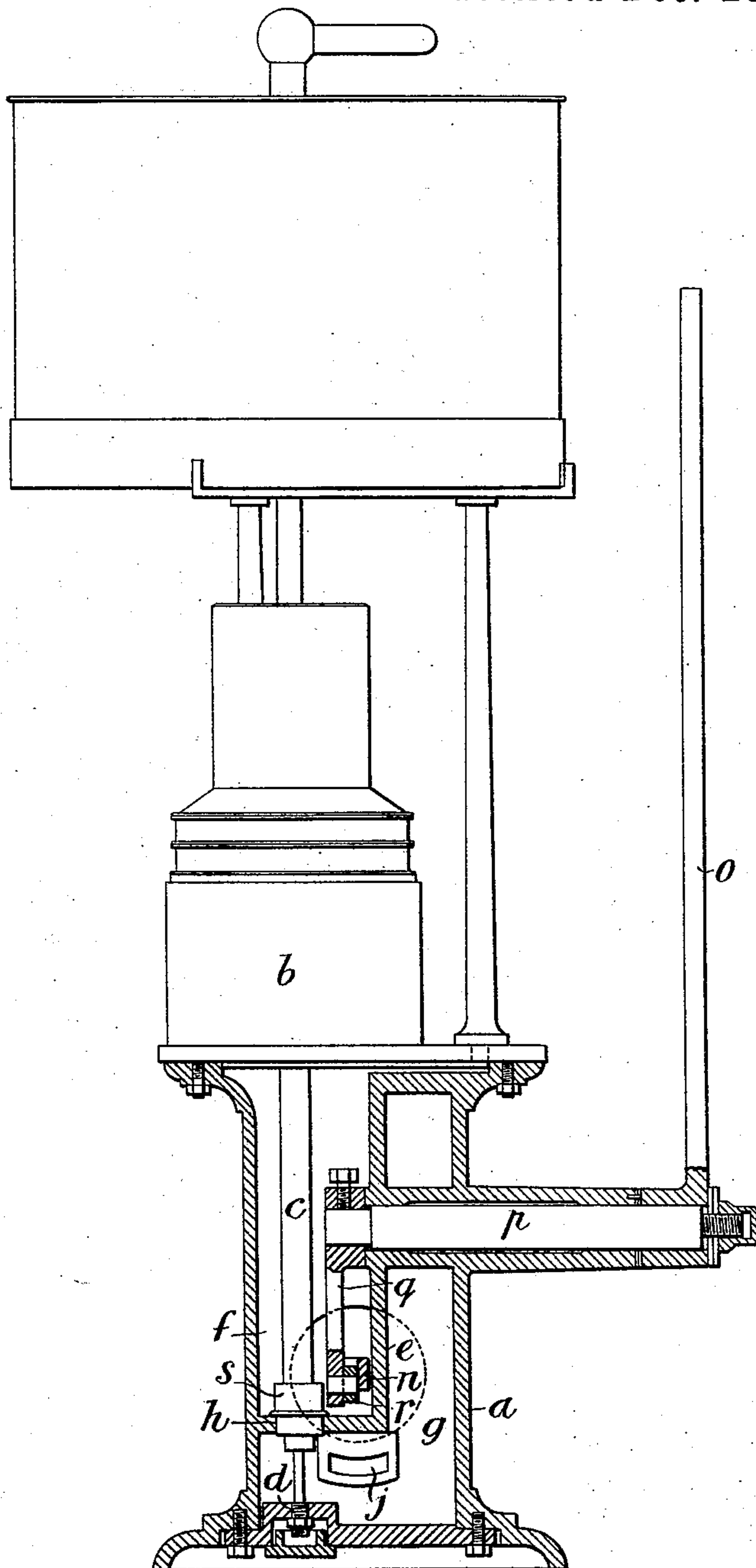
A. KRANK.

PRODUCTION OF HIGH SPEED ROTARY MOTION FOR CENTRIFUGAL  
OR OTHER MACHINES.

No. 531,539.

Fig. 1.

Patented Dec. 25, 1894.



Witnesses

Jesse Kingsbury.

G. A. Taubenschmitt.

Inventor.

By Albert Krank  
Whitaker & Treworth, Attys.

(No Model.)

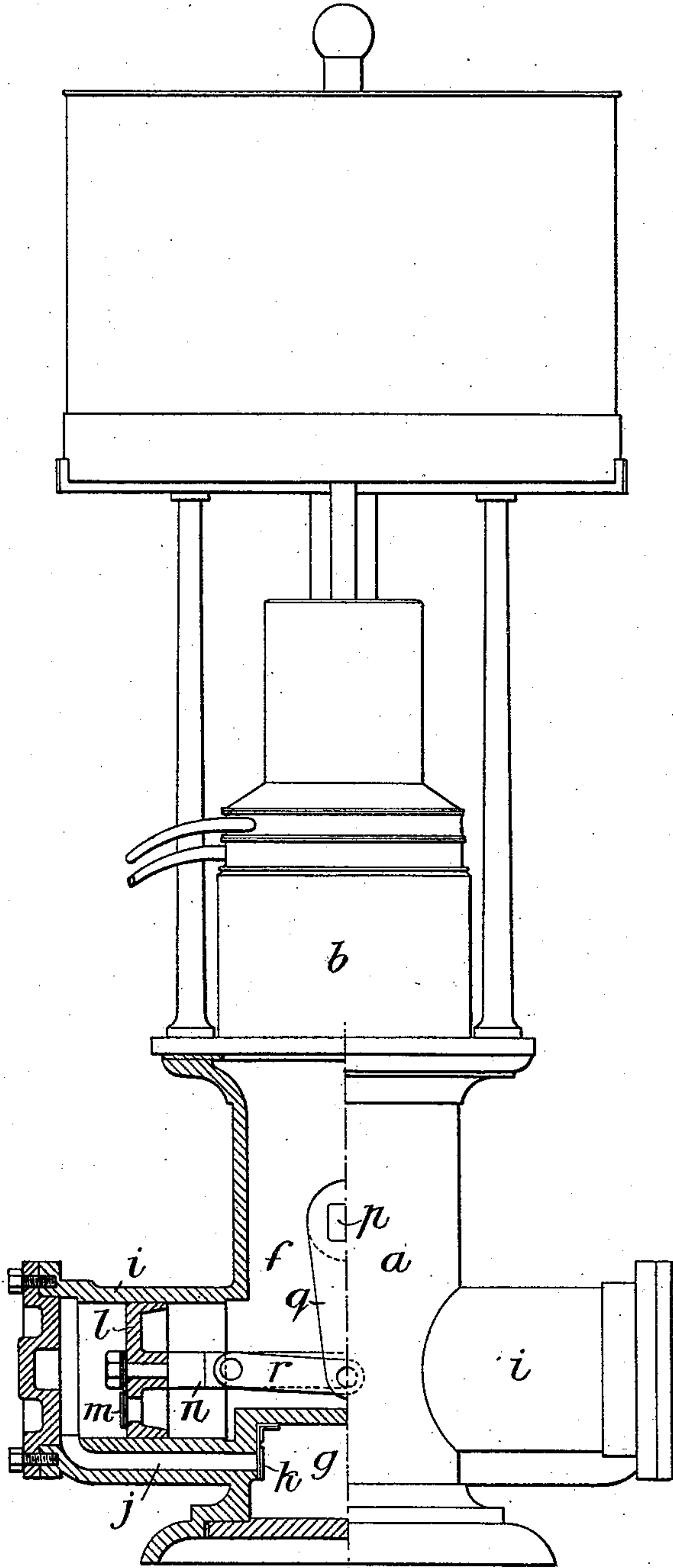
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PRODUCTION OF HIGH SPEED ROTARY MOTION FOR CENTRIFUGAL  
OR OTHER MACHINES.

No. 531,539.

Patented Dec. 25, 1894.  
*Fig. 2.*



Witnesses.

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J. A. Harschmann.

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(No Model.)

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A. KRANK.

PRODUCTION OF HIGH SPEED ROTARY MOTION FOR CENTRIFUGAL  
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No. 531,539.

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Fig. 3.

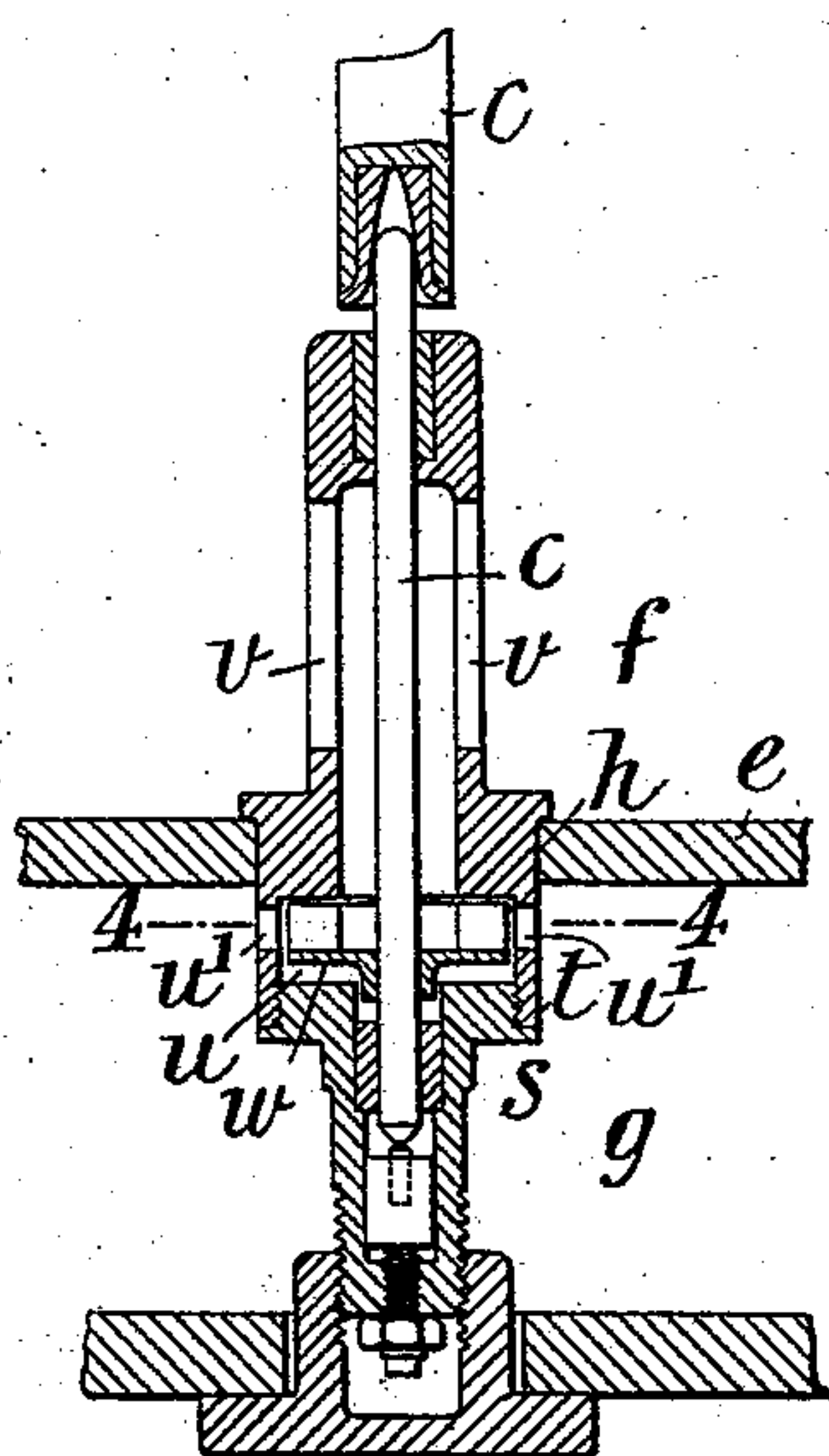
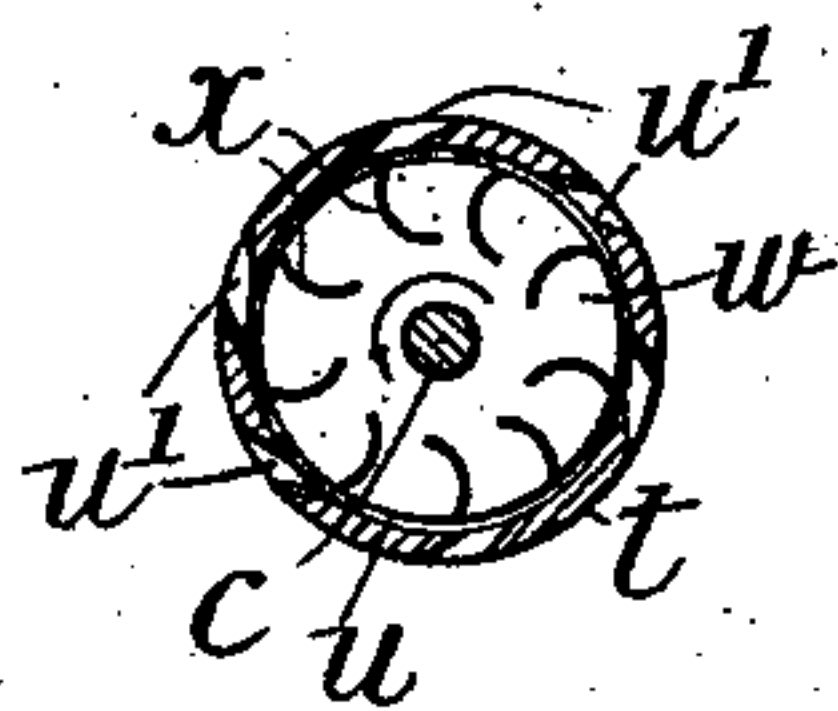


Fig. 4.



Witnesses.

J. D. Knigshorn.  
C. A. Pamberschmitt.

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Whitaker & Prevost atts.



# UNITED STATES PATENT OFFICE.

ALBERT KRANK, OF TAIPALE, FINLAND.

• PRODUCTION OF HIGH-SPEED ROTARY MOTION FOR CENTRIFUGAL OR OTHER MACHINES.

SPECIFICATION forming part of Letters Patent No. 531,539, dated December 25, 1894.

Application filed February 14, 1894. Serial No. 500,170. (No model.)

*To all whom it may concern:*

Be it known that I, ALBERT KRANK, a citizen of the Duchy of Finland, residing at Taipale, Finland, have invented new and useful  
5 Improvements in the Production of High-Speed Rotary Motion for Centrifugal or other Machines and in Apparatus Therefor, of which the following is a specification.

My invention relates to improved means or  
10 apparatus for converting a relatively slow reciprocating or rotary motion into a high speed rotary motion, the said invention being especially applicable for use in connection with milk separators and other centrifugal ma-  
15 chines.

According to my invention I mount upon the shaft to be rotated at high speed a fluid motor such as a turbine of the Jonval or other type and in connection with this turbine I  
20 arrange a pump in such a manner that it forces water or other liquid through the turbine or other motor, the liquid after it has passed through the turbine or other motor again returning to the pump so that it is used  
25 over and over again.

A suitable arrangement for carrying out my invention is as follows:

I provide a pedestal for the machine to be driven, the said pedestal being divided into  
30 two compartments by means of a suitable partition and upon the sides of the said pedestal I form or mount two pump cylinders, the pistons of which are connected to a common lever so that they may be reciprocated simultaneously, these pistons, which are provided  
35 with suitable valves, being adapted to draw the water from one compartment and force it into the other. The driving shaft of the machine extends through an opening formed in the partition between the two compartments  
40 and on the said shaft in the said opening is fixed the turbine or other motor so that, as the fluid is forced from one compartment to the other through the said opening, it will rotate the turbine and consequently also the  
45 shaft to which the turbine is fixed. An air-chamber advantageously formed by the upper part of one of the said compartments serves to insure the uniform pressure of the water  
50 in a well known manner.

To enable my invention to be fully understood I will describe it as applied to a cen-

trifugal cream separator, and, in the accompanying drawings—

Figure 1 is a sectional side elevation of such  
55 a machine having my improvements applied thereto, and Fig. 2 is a sectional elevation of the machine and my improvements from a position at right angles to that from which Fig. 1 is taken. Fig. 3 is a vertical section  
60 showing the arrangement of the turbine, and Fig. 4 is a section on the line 4—4 Fig. 3.

*a* is the pedestal of the apparatus.

*b* is the centrifugal machine, and *c* is the  
65 shaft carrying the centrifugal drum, the said shaft being supported in suitable bearings, the lower of which (indicated by the letter *d*) is, as shown, a foot step.

*e* is the partition dividing the interior of the pedestal into two compartments *f, g*, the  
70 lower horizontal part of the said partition having in it an opening *h* through which the shaft *c* passes.

*i, i* are the two pump cylinders secured to or formed in one piece with the pedestal *a*,  
75 each of the said cylinders being open at one end to the compartment *f* and at the other end communicating with the compartment *g* through a passage *j* closed by a valve *k*. The pistons *l, l* of the cylinders *i, i* are each pro-  
80 vided with a valve *m* which opens when the piston moves in one direction and closes when moved in the other direction. The said pistons, which may be connected to a common  
85 rod *n*, are reciprocated through the medium of a lever *o* secured to one end of a shaft *p* mounted in a suitable bearing in the pedestal *a* and having on its other end an arm *q* connected by a link *r* to the said rod *n*.

*s* is the turbine which is connected with  
90 the shaft *c* in the opening *h* in such a manner that as liquid is forced by the pumps from the chamber *g* into the chamber *f* through the opening *h* it will cause the rotation of the said turbine and consequently also the rota-  
95 tion of the shaft *c* and the centrifugal drum carried thereby.

The turbine consists of a casing *t* fixed in the opening *h* and having in its lower part a chamber *u* with lateral openings *u' u'* below  
100 the said partition and at its upper part above the partition other openings *v*. In the chamber *u* is fixed the motor wheel *w* through which passes the shaft to be driven, the wheel



*w* having vanes *x* on its upper side curved in such a manner that the water flowing through the openings *u' u'* will impinge against the same on the concave sides. The water after  
 5 passing from the periphery to the center of the wheel flows upward and escapes through the openings *v* which is a distinct advantage as by this means I utilize a considerable  
 10 amount of power which in ordinary turbines is wasted, as in such turbines the water still possesses great velocity when escaping at the outer periphery of the wheel whereas in my arrangement, by forcing the liquid toward the center of the turbine the velocity of the  
 15 water is completely utilized in acting upon the vanes.

The operation of the apparatus hereinbefore described is as follows: The lower parts of the chambers *f* and *g* being filled with water, oil or other suitable liquid the lever *o* is  
 20 oscillated whereby the pistons are reciprocated in their cylinders, the valve *m* of each piston during the instroke of the latter opening to allow the liquid from the chamber *f* to pass behind the piston so that on the next  
 25 outstroke of the piston such liquid will be forced through the passage *j* and past the valve *k* into the chamber *g* whence the liquid is forced through the opening *h* past the turbine and so imparts motion to the latter.  
 30 The liquid which has passed the turbine and entered the chamber *f* again flows toward the pistons so that the same liquid is used over and over again, the pump continually drawing the liquid from the chamber *g* and discharging it through the opening *h* into the chamber *f*. The upper part of the chamber  
 35 *g* serves as an air chamber to maintain a uniform pressure of liquid passing through the opening *h*.  
 40

As hereinbefore stated I may employ any suitable kind of water motor but in practice I find it advantageous to employ a turbine of the Jonval type.

45 It will be obvious that with the arrangement hereinbefore described I can obtain from a very slow motion a relatively high speed motion, for instance, with a turbine having a diameter of one inch I have converted  
 50 an oscillating movement of thirty strokes per minute into a rotary movement of six thousand revolutions per minute.

Although I have described my invention as applied to a cream separator it is to be understood that it is also applicable for driving  
 55 other machines and in general where frictional, belt or toothed-gearing has heretofore

been employed, in which case it is obvious that the arrangement of the apparatus can be correspondingly modified. It is also to be understood than one pump or more than two may be used for forcing the liquid and that one or several turbines may also be employed.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. The combination with the hollow pedestal casing for supporting a machine to be driven and provided with pump cylinders and plungers, said casing being divided into two  
 70 fluid chambers by a stationary partition, a turbine and turbine shaft located adjacent to said partition, and adapted to be operated by the fluid in passing from one chamber to the other, said shaft extending above said pedestal for operating said machine to be driven, a reciprocating lever for operating said pump  
 75 plungers to force the fluid from one chamber through said turbine to the other chamber and a return passage for said fluid, substantially as described.

2. The combination with the hollow pedestal casing for supporting a machine to be driven, said casing being divided into two  
 85 chambers by a partition, provided with an opening therein, a turbine located in said opening and communicating with both chambers, pumps located in said hollow pedestal for forcing the fluid from one chamber through  
 90 said turbine into the other chamber and a reciprocating lever for operating said pumps, substantially as described.

3. The combination with the hollow pedestal casing for supporting a machine to be driven, provided with oppositely horizontally  
 95 disposed pump cylinders and plungers for said cylinders, said casing being divided by a partition into two fluid chambers, a turbine located in an aperture in said partition and communicating with both chambers, a shaft  
 100 operated by said turbine extending above said pedestal for operating the machine to be driven, return passages from said pump cylinders to one of said chambers and a reciprocating lever operatively connected with the  
 105 plungers of both of said cylinders for forcing the fluid through said turbine from one chamber to the other, substantially as described.

ALBERT KRANK.

Witnesses:

WERNER HULT,  
 F. BERRGREG.