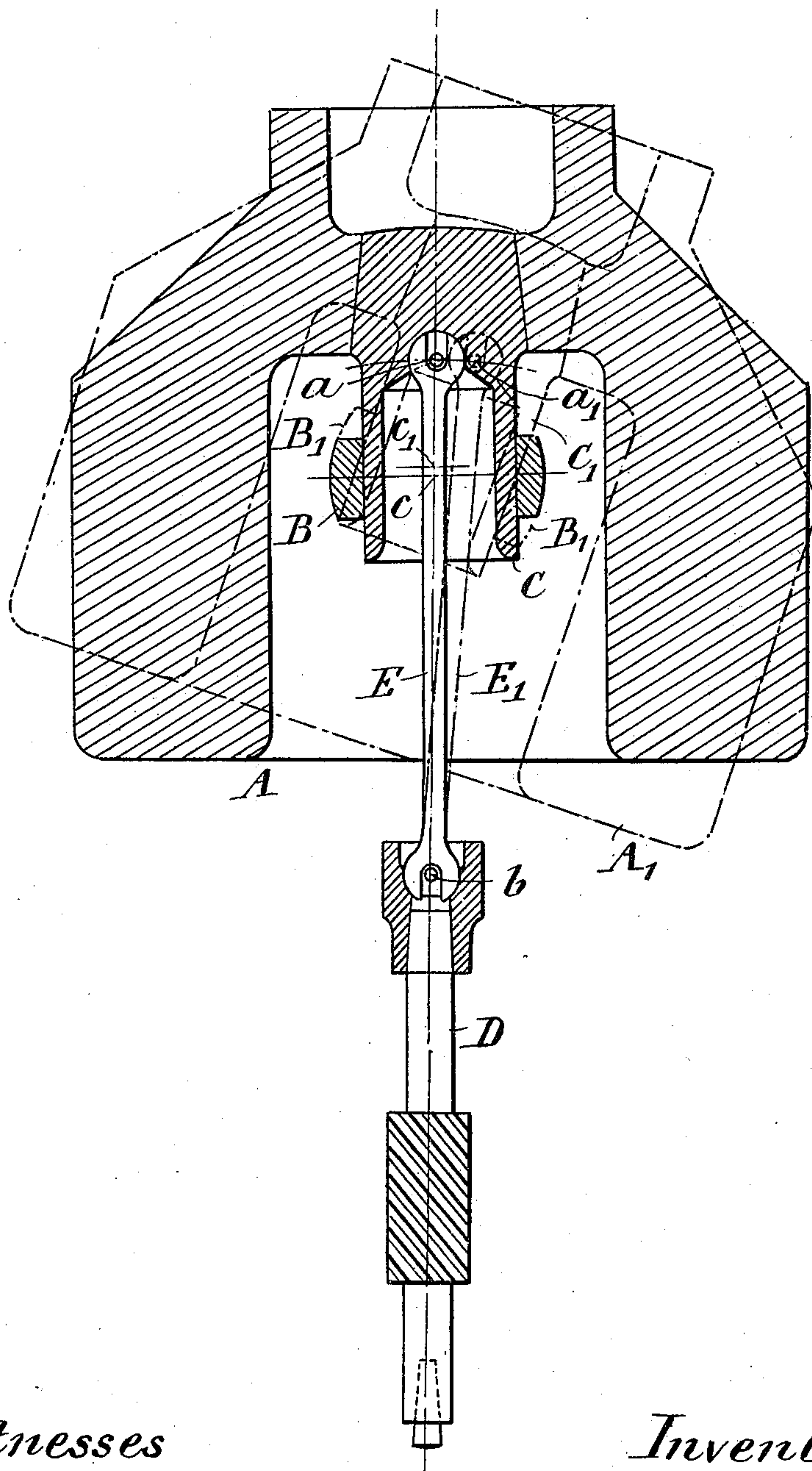


No. 861,736.

PATENTED JULY 30, 1907.

I. P. B. KNUDSEN.
CENTRIFUGAL MACHINE.
APPLICATION FILED SEPT. 24, 1906.



Witnesses
E. A. Panabaker.
M. E. Tucker.

Inventor
Ivar Peter Bagger Knudsen
By
Emil Bonnellycke
Attorney.

UNITED STATES PATENT OFFICE.

IVAR PETER BAGGER KNUDSEN, OF COPENHAGEN, DENMARK.

CENTRIFUGAL MACHINE.

No. 861,736.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed September 24, 1906. Serial No. 336,022.

To all whom it may concern:

Be it known that I, IVAR PETER BAGGER KNUDSEN, director, a subject of Denmark, residing at 56 Svanemøllevej, Copenhagen, in the Kingdom of Denmark, have invented new and useful Improvements in Centrifugal Machines, of which the following is a specification.

This invention relates to centrifugal apparatus wherein the pivot of the centrifugal drum is loosely connected to the driving shaft, and it has for its object to provide a mounting for the centrifugal drum such that the drum can freely accommodate itself to the oscillations or vibrations produced by the forces generated by the rotation, without such oscillations etc. being transmitted to the driving shaft, and, further, that the drum will have a constant tendency to return to its normal position of equilibrium.

By observations and experiments made in connection with supported centrifugal drums it has been ascertained that, notwithstanding the presence of the actual shaft, the drum when rotating has a tendency to revolve round the geometrical axis in which the moment of inertia is greatest, and since (in the constructions heretofore employed) it is impossible to make the geometrical axis coincide with the center line of the actual or mechanical shaft, such arrangements always exhibit great friction in the bearings, with a correspondingly great consumption of power and wear and tear. The present invention is designed to remedy this drawback by enabling the centrifugal drum to rotate freely round an axis situated in any position independently of the axis of the mechanical shaft, while the arrangement is also such that the oscillation of the drum will cause the center of gravity of the drum to be raised, with the result that the drum will have a constant tendency to return to its normal position of equilibrium.

The improved construction is characterized by the fact that the connection between the drum and the driving shaft is effected by means of a carrier which is loosely connected to the drum and which supports the latter at a point situated some distance above its center of gravity and is capable of oscillating about its point of connection with the driving shaft, which point is situated considerably below the said center of gravity, while the carrier, in transmitting rotary movement to the drum, also allows free rotation of the drum about any axis of inertia outside of the axis of the carrier and in relation to which the drum has its greatest moment of inertia. It is also a condition that the bearing for supporting the pivot of the drum (which bearing is ca-

pable of following the oscillation of the drum) shall have its center situated in or near the horizontal plane passing through the center of gravity of the drum. In consequence of this arrangement, the oscillations of the drum are always transmitted in only a very reduced degree to the carrier, and through the latter to the driving shaft, while further, the horizontal pressures that would otherwise be transmitted from the drum through the shaft to the driving mechanism disappear altogether. The raising of the center of gravity has also the result of reducing the oscillation of the axis of inertia, without this having any influence upon the light running of the centrifugal apparatus.

The accompanying drawings illustrate one form of the invention by way of example.

The centrifugal drum A is so formed that the supporting bearing B of the pivot C may be placed at such a height as to allow of its center being situated in or near the horizontal plane passing through the center of gravity c of the drum, while at the same time the drum is supported by a carrier E at a point some distance above its center of gravity. The motion is transmitted from the driving shaft D to the pivot C by means of this carrier E which is loosely connected to both. In the example illustrated the carrier is in the form of a shaft the two ends of which engage with cross pins a and b or with trunnions provided on the pivot C and the driving shaft D. In consequence of this arrangement, by reason of the mobility of the supporting bearing and also by reason of the fact that the pivot is only loosely connected to the carrier shaft E, the drum is enabled to follow freely in all direction the movements which are produced by the vibration and oscillation that occur during the rotation, yet without such movements being transmitted to the driving shaft. At the same time the drum, in consequence of its point of support being situated above the center of gravity of the drum, will have a constant tendency to return to its normal position of equilibrium. This will be obvious from the drawing which shows that the drum rises when moved out of its normal position of equilibrium; if, for example, the drum moves into the position A^1 , its pivot will assume the position C^1 , its supporting bearing will move to the position B^1 , and the carrier shaft will assume the position E^1 . Consequently the drum will have been raised so that its center of gravity is now situated at c^1 , while the distance $a^1 c^1$ must always be equal to the distance a, c .

Having now particularly described and ascertained the nature of the said invention and in what manner

the same is to be performed. I declare that what I claim is.

5 In a centrifugal machine, the combination of a vertical shaft, a drum oscillatably mounted on the upper end of said shaft to be rotated thereby and supported by the shaft some distance above the center of gravity of the drum, a driving shaft to which the lower end of the vertical shaft is oscillatably connected at a point considerably below the center of gravity of the drum, a pivot fixed on the drum,

and an oscillatory bearing for said pivot having its center 10 located substantially in a plane passing through the center of gravity of the drum.

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

IVAR PETER BAGGER KNUDSEN.

Witnesses:

MARCUS MÖLLER,

AXEL PERMIN.