(No Model.)

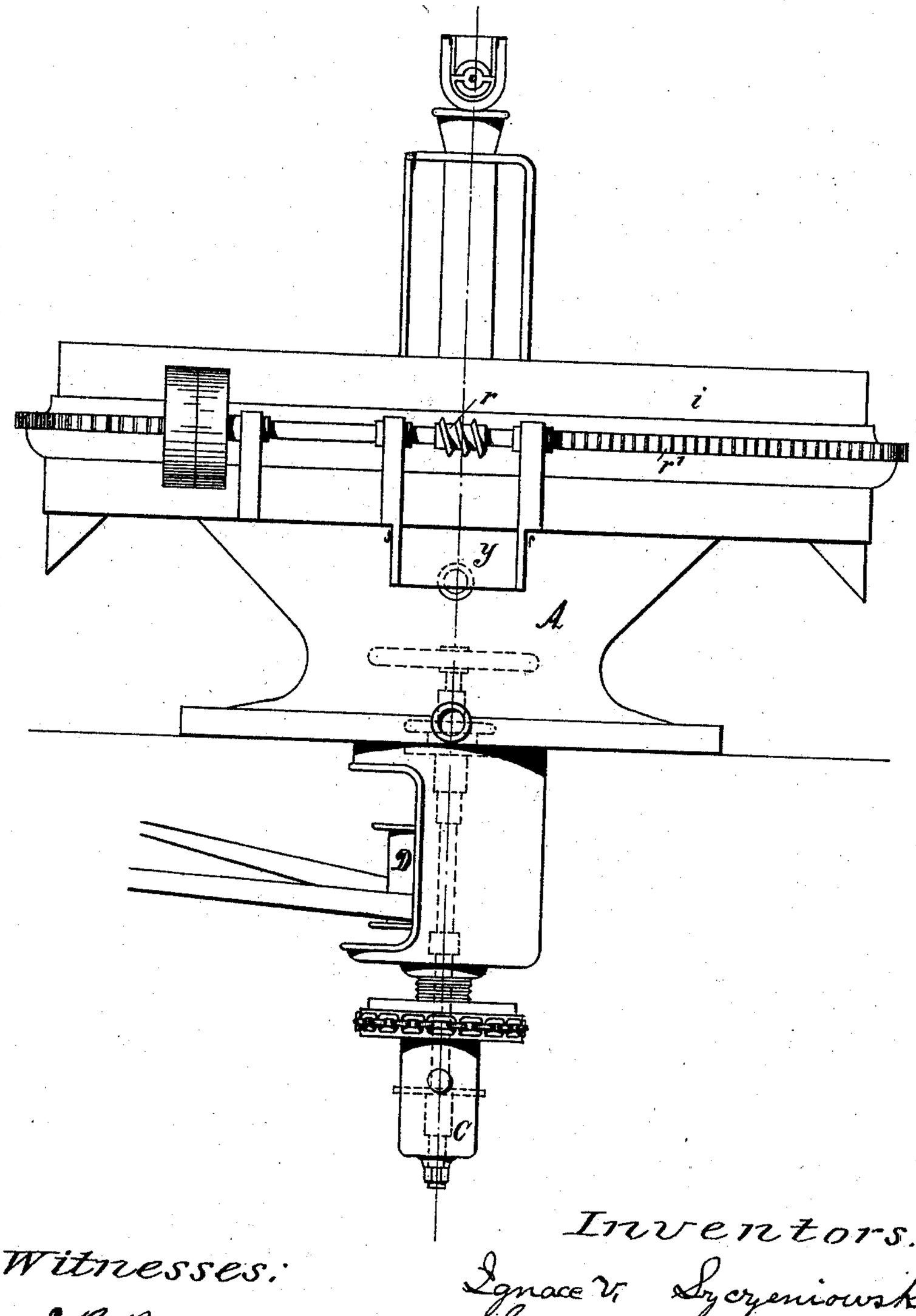
3 Sheets—Sheet 1.

I. v. SZCZENIOWSKI & G. v. PIONTKOWSKI.

CENTRIFUGAL MACHINE.

No. 500,782. Patented July 4, 1893.

Fig. 1.



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(No Model.)

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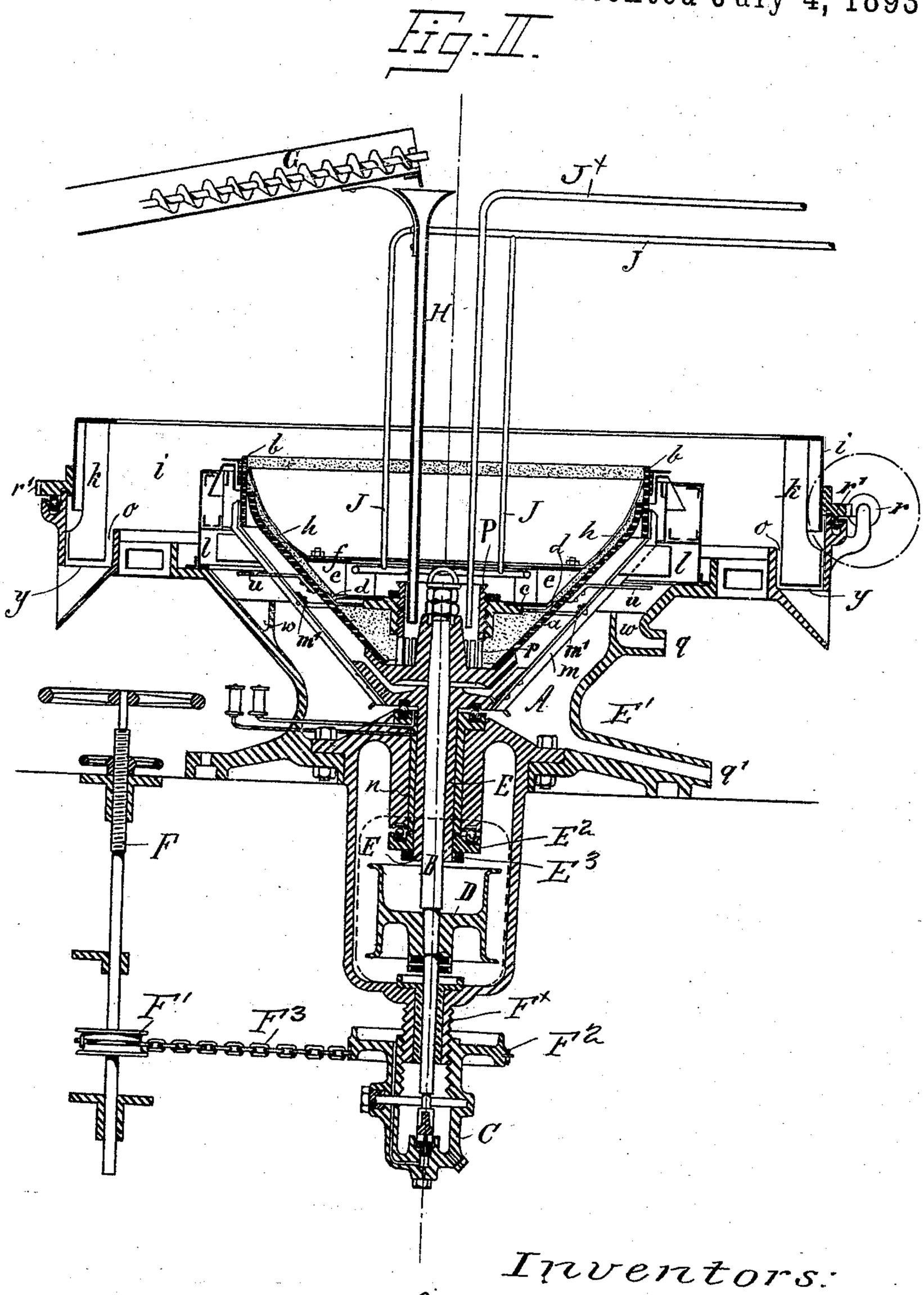
Fig. II.



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I. v. SZCZENIOWSKI & G. v. PIONTKOWSKI.

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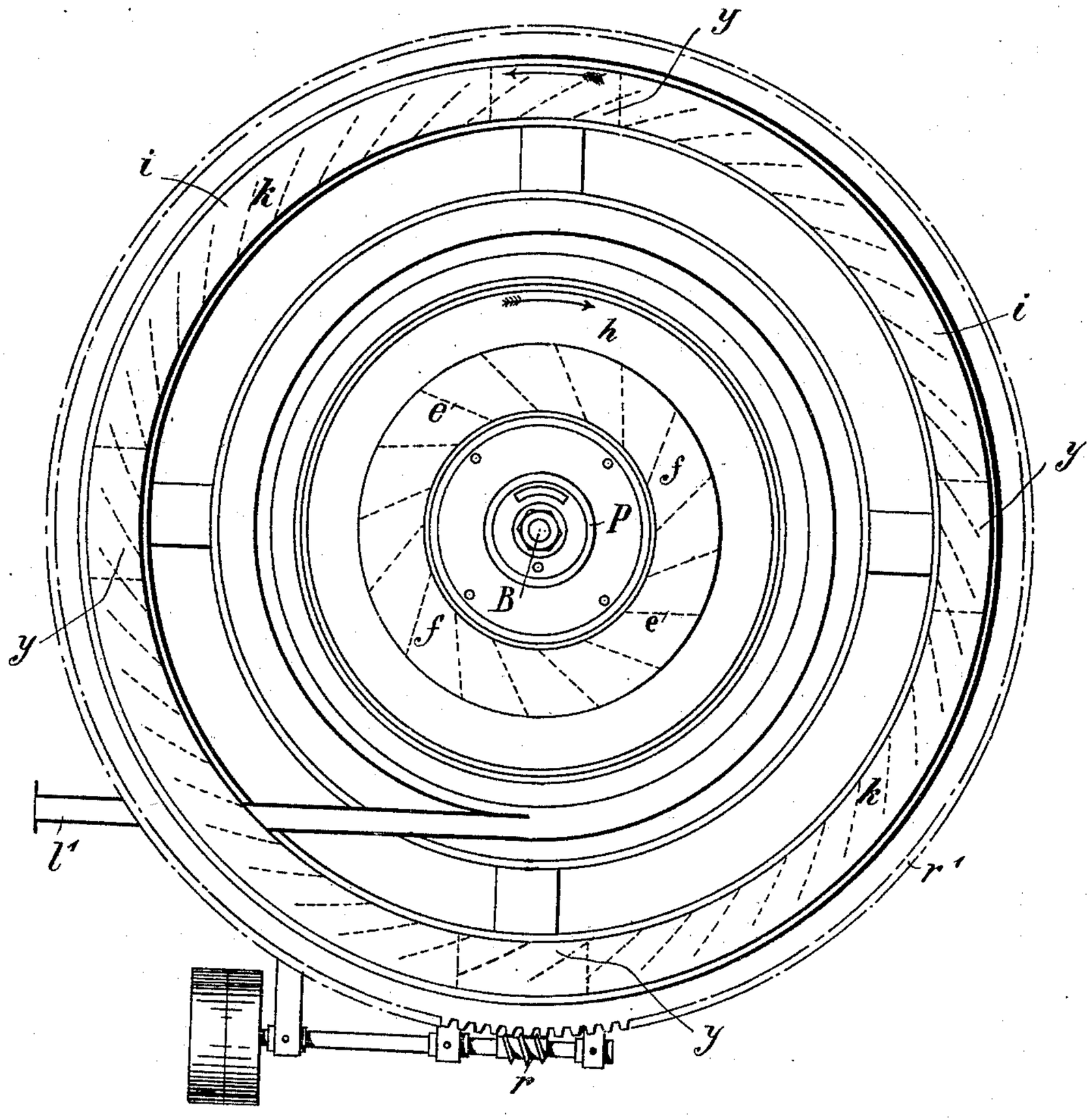
Fig. III.



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UNITED STATES PATENT OFFICE.

IGNACE v. SZCZENIOWSKI AND GUSTAV v. PIONTKOWSKI, OF KAPUSCIANI, RUSSIA.

CENTRIFUGAL MACHINE.

SPECIFICATION forming part of Letters Patent No. 500,782, dated July 4, 1893.

Application filed July 9, 1892. Serial No. 439,536. (No model.)

To all whom it may concern:

Be it known that we, IGNACE V. SZCZENIOWSKI and GUSTAV V. PIONTKOWSKI, subjects of the Emperor of Russia, residing at Kapusciani, a village of the Russian Empire, have invented certain new and useful Improvements in Centrifugal Machines, of which the following is a specification.

This invention relates to that class of centrifugal machines in which the material under treatment is driven upward by centrifugal force from the bottom of a sieve or drum, which tapers outwardly in order to cause the material to move up and over the edge which it passes in a dry or purified state.

The object of this invention is to construct a centrifugal machine in which a perforated sieve-like drum is adjustable vertically, its upper edge being somewhat bent inwardly and surrounded by a short cylindrical sieve which always partakes of the rotary motion of the drum, but remains stationary when the drum is raised or lowered, so as to retard or accelerate the discharge of the material according to the adjustment of the drum relatively to the cylindrical sieve.

The invention refers moreover, to mechanism adapted to this centrifugal machine for the purpose of regulating the thickness of the layer of material driven upward against the inner walls of the drum; of insuring the uniform distribution of the covering liquid, whether steam, water or clear, upon the material under treatment; of allowing the covering liquid to remain long enough in contact with the material, and finally of catching up and feeding forward the material passing over the upper edge of the said cylindrical sieve.

The accompanying drawings illustrate a centrifugal machine provided with the improved mechanism above mentioned. Figure 1 is a side view thereof, Fig. 2 a central vertical section, and Fig. 3 a plan partly in section of the same.

a, Fig. 2 is the conical drum tapering upwardly, and the upper part or edge of which is somewhat bent inwardly. This drum is firmly fixed upon the vertical main shaft B, carrying the driving pulley D and resting below upon a step bearing C which can be raised or lowered by means of the adjusting shaft F. This shaft carries a sheave F′ connected with the chain wheel F^2 by a chain F^3. This wheel F^2 is on the step bearing C, which is screw-threaded internally to engage the lower end $F^\times$ of the stationary frame work. By turning the bearing through the described devices, it will move up or down on the end $F^\times$ and thus raise or lower the shaft. When this device has to be raised or lowered the drum is correspondingly lifted or lowered, whereby the distance between its upper edge and the upper edge of a cylindrical rim *b* can be decreased or increased respectively, this rim surrounding the upper and inwardly bent edge of the drum, so as to fit snugly thereto. This rim *b*, which is formed like a cylindrical sieve is carried by the arms *m* which extend obliquely upward, around the drum, and are secured to the hollow shaft E through which the main shaft B passes. The hollow shaft E turns in a collar or bearing *n* in which it can rotate freely while being incapable of shifting in a vertical direction; between the front walls of this bearing and the disks fixed above and below on the hollow shaft E, are placed a number of balls for the purpose of reducing the friction when the hollow shaft rotates. The shaft is held from vertical movement by the upper disk E′ and the lower disk E^2 and collar E^3.

The mechanism consisting of the hollow shaft E, of the arms *m*, connected together centrally by the ring *m′* and of the rib *b* rotates with the main shaft B and the drum *a*, the latter being provided upon its outer periphery with a number of forked brackets *u* each of which embraces one of the arms *m* carrying the rim *b*. By this arrangement the cylindrical sieve or rim *b* partakes only of the rotary motion of the drum *a*, but not of its up and down shifting motion caused by the adjustment of the step bearing C. According to the nature of the material to be treated the position of the drum *a* is raised or lowered relatively to the rim *b*, but for the same material the adjustment effected is maintained throughout.

The material required to be treated is fed

by a traveling screw G at the top, Fig. 2, to the funnel H and falls from this funnel upon the solid bottom of the perforated drum *a*, which is covered outside with a sieve or wire gauze, whence the said material is dashed by centrifugal force through the side slots *p* of a ring or collar P, projecting upward from the bottom of the drum, against the side walls of the said drum, being subsequently fed upward along the same. To insure that only a layer of material of uniform thickness should be fed upward along the central and upper part of the inner walls of the drum *a*, the perforated flanged disk *c* is provided and screwed upon the collar P at the bottom of the drum, being arranged and adjusted in such a manner that between its outer edge and the inner wall of the drum *a* a circular opening or passage *d* of the desired width is formed. As the material lingers in that part of the drum which is below the disk *c*, it is freed from the greatest part of the liquid contained therein which passes through the walls of the drum and falls on the bottom of the casing A of the centrifugal machine, being discharged outside through the outlet *g'*. The material thus freed from water is treated according to requirements with a liquid or gaseous material after having first passed through the opening *d* formed as above stated, between the disk *c* and the inner wall of the drum and having been subsequently fed upward. This material is introduced through the pipes J above the disk *c* and is uniformly distributed upon the layer of material by the oblique blades *e* (Fig. 3) which are fixed on the upper part of the disk *c* between the latter and a ring *f* arranged higher up. The disk *c*, the blades *e*, and the ring *f* form one piece which partakes of the rotary motion of the drum *a* owing to the disk *c* being mounted on the fixed collar P secured to the bottom of the drum. As soon as the material has passed on its way up beyond the outer edge of the ring *f*, the inside of the layer of material arrives below a flexible strip *h* of conical form and made of any suitable fabric, tissue, leather, india rubber, or the like, this strip or covering being fixed below to the ring *f* and turning with the drum *a* while stretching freely upward. This flexible strip is tightly held by centrifugal force against the drum *a* and the upper part of the rim *b* and has for its object to retain, for a sufficient period of time the liquid or steam upon the material so as to promote its action thereon. The liquid expelled from the upper part of the drum falls in a circular canal *w* which is formed upon the inner wall of the casing A and is provided with an outlet *g*. The steam likewise issuing from the upper part of the drum *a* is removed by a ventilator or fan, consisting of the blades *l* fixed to the carrier arms *m* of the rim *b* and moving in a sheet iron frame resting upon the casing A and furnished with an outlet opening *l'* (see also Fig. 3). The material now separated from the liquid reaches as it leaves the upper edge of the drum *a*, the inner walls of the likewise perforated rim *b* which is covered with a sieve and upon which the centrifugal force acts radially so that the material can no more be propelled upward by the centrifugal force. The material collects subsequently upon the inner walls of the cylindrical sieve *b* and forms a circular layer, remaining at rest in consequence of the friction which it exerts upon the said sieve *b* until the pressure of the material following on underneath has become great enough to overcome this friction. The material on the cylindrical sieve takes now an ascending course and is pushed by the material underneath over the upper edge of the said sieve whence it is removed outside. The higher the rim projects above the upper edge of the drum *a* the greater is the mass of material which is collected on the said rim or sieve and the greater is also the resistance which the material accumulating likewise in a thicker layer upon the walls of the drum *a* and following underneath has to overcome in order to feed upward the material collected on the sieve or rim *b*. By suitably adjusting the drum relatively to the sieve *b* the length of time during which the material is to remain under treatment in the centrifugal machine can be accurately regulated. The material passing over the upper edge of the rim *b* is expelled in a tangential direction against the side walls of a hood *i* furnished with a number of curved scoops *k*, Figs. 2 and 3; these scoops catching the material and allowing it to fall in a circular groove or channel *o*. The rotary motion imparted to the hood *i*, by means of the screw *r* and worm wheel *r'* and which takes place in a contrary direction to that of the drum enables the scoops *k* to propel the material in the channel *o* over the openings *y* formed in the bottom of the said channel whence the said material is removed outside.

When the above described centrifugal machine is used for operating on a sugar mass, it requires only to be rotated at a speed of four hundred and ten revolutions per minute with a diameter of fifteen hundred mpm., wherefor one horse-power is sufficient, the machine will then produce three thousand six hundred kegs of raw sugar or two thousand kegs of pure dried sugar of commerce, and one thousand kegs of by-products. The pipe $J^{\times}$ Fig. 2 serves to clean the lower part of the drum by introducing water or steam thereto.

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

1. In a centrifugal machine, the combination of a conical drum *a*, a perforated rim at the top thereof, means for turning the drum *a*, and with it the rim *b*, the said drum being vertically adjustable in relation to the rim, and the means for effecting said adjustment, substantially as described.

2. In a centrifugal machine the combina-

tion of a conical drum with means for rotating the same, a central collar P projecting from the bottom of the drum, a disk *c* screwed on the central collar and arranged with an opening *d* between its outer edge and the interior of the said drum, the said collar P having perforations, and the means for feeding the material into the collar, substantially as described.

3. In a centrifugal machine the combination of a rotary conical drum, a disk within the same, arranged with an opening *d* between its edge and the wall of the drum, means for introducing a liquid or gaseous material and blades *e* arranged above the disk for distributing said liquid or gaseous material, substantially as described.

4. In a centrifugal machine the combination of a rotary conical drum, means therein for distributing a liquid or gaseous material, and a flexible covering *h* within the upper part of the drum, arranged to press upon the material in its passage from the drum, substantially as described.

5. In a centrifugal machine the combination of a rotary conical drum and means for rotating the same, and a flexible covering within the said drum and extending along the walls thereof to press upon the material, substantially as described.

6. In a centrifugal machine the combination of perforated rotary drum, a casing about the same, an upper rim carried by arms *m* outside the drum, and means for vertically adjusting the drum with relation to the rim, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

IGNACE v. SZCZENIOWSKI.
GUSTAV v. PIONTKOWSKI.

Witnesses:
THOMAS MILES,
J. H. VOLKMANN.