(No Model.) 2 Sheets—Sheet 1.

J. LAIDLAW.

GEARING FOR DRIVING CENTRIFUGAL MACHINES.

No. 409,984. Patented Aug. 27, 1889.

Fig. 1.

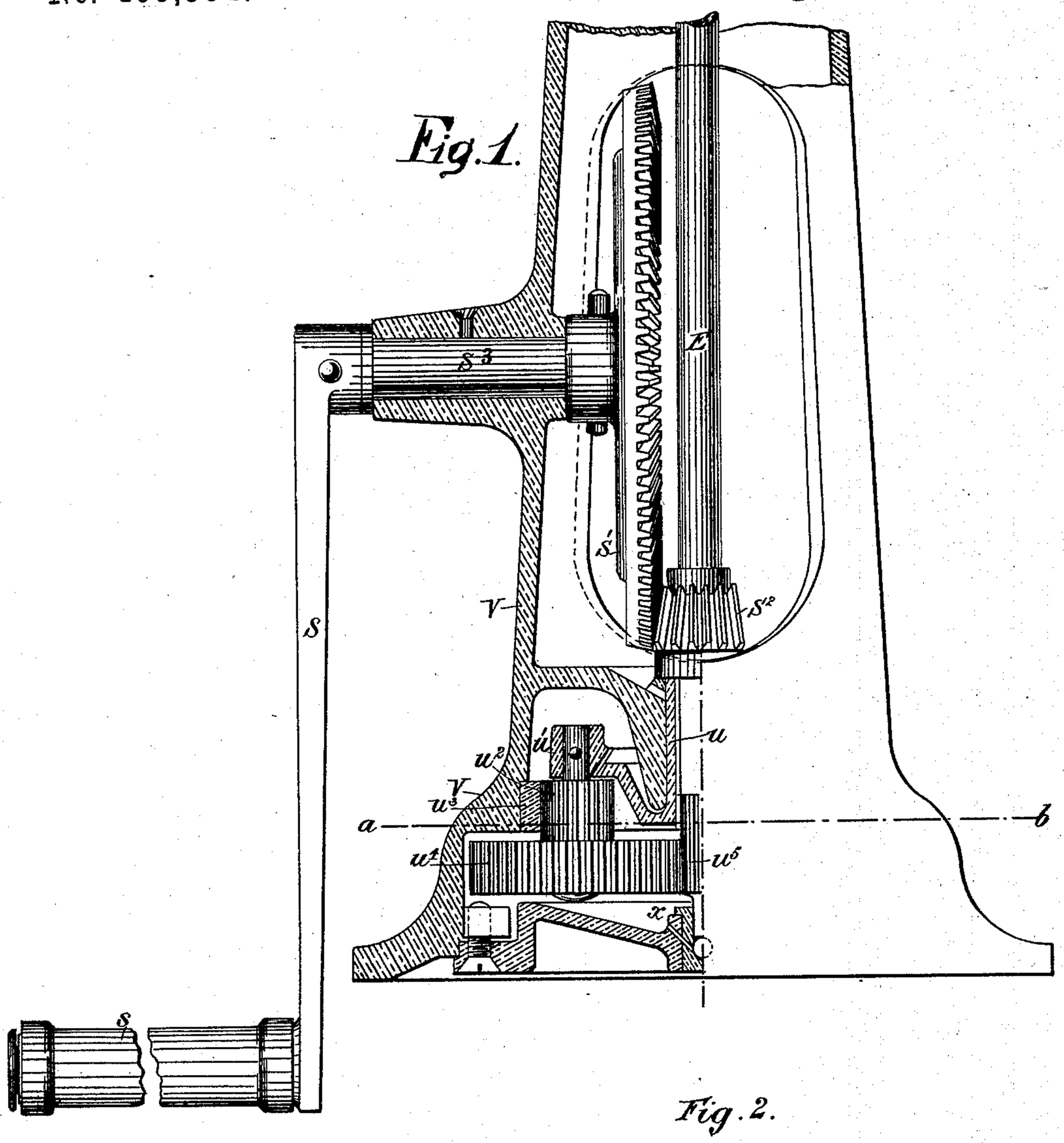
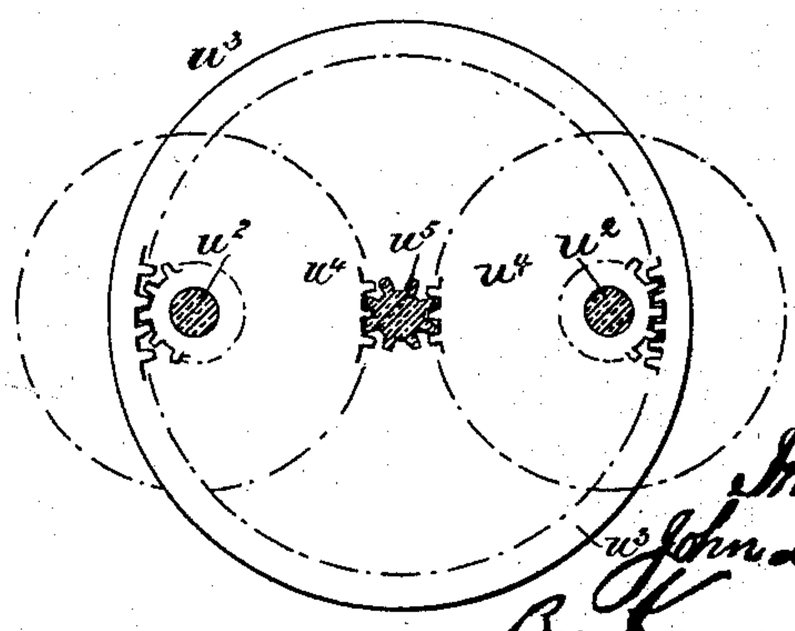


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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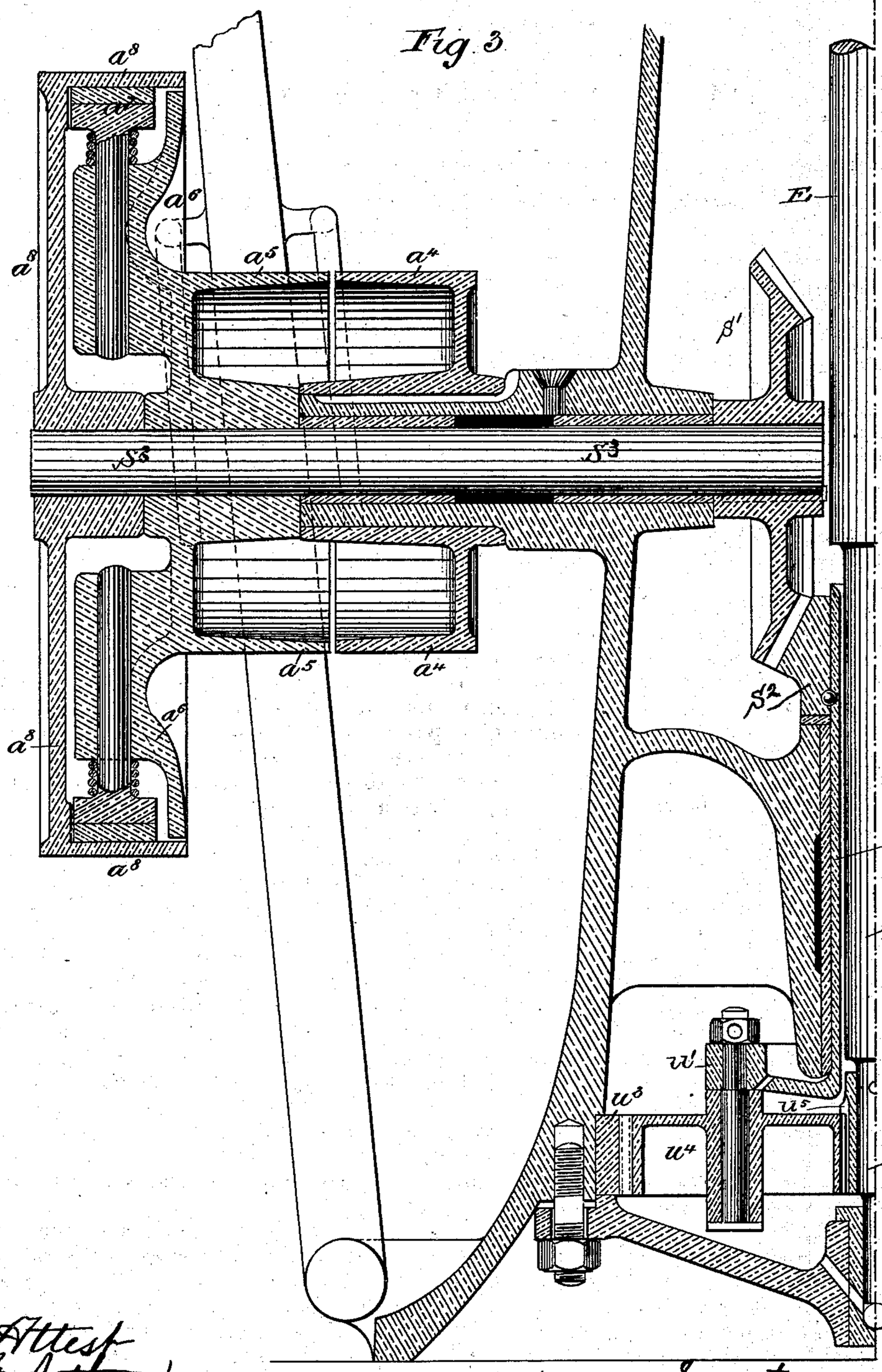
Fig 3



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UNITED STATES PATENT OFFICE.

JOHN LAIDLAW, OF GLASGOW, COUNTIES OF LANARK AND RENFREW, SCOTLAND.

GEARING FOR DRIVING CENTRIFUGAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 409,984, dated August 27, 1889.

Application filed May 7, 1889. Serial No. 309,948. (No model.) Patented in England November 24, 1888, No. 17,105.

To all whom it may concern:

Be it known that I, JOHN LAIDLAW, engineer, of the firm of Watson, Laidlaw & Company, of 98 Dundas Street, Kingston, Glasgow, in the counties of Lanark and Renfrew, Scotland, have invented a new or Improved Gearing for Driving Centrifugal Machines, of which the following is a specification.

My invention, which relates to new or improved gearing for driving centrifugal machines, is more especially applicable to centrifugal machines of a small type. The new or improved gearing may be driven by hand or power, and the sleeve of the pinion by which it is driven is carried in a fixed bearing in the frame-work, while the spindle which carries the centrifugal basket passes up loosely through the aforesaid sleeve. On this sleeve there is carried a disk or arms, into which vertical studs projecting downward are fixed. Upon each of these studs there is carried a pinion, which gears into a fixed circular rack in the lower part of the frame, so that as the aforesaid disk or arms is or are turned round each pinion has at the same time an independent rotation imparted to it by traveling round the said circular rack. Each of the aforesaid pinions has either formed in one piece with it or attached to it a spur-wheel, and the lower part of the spindle of the centrifugal machine has teeth cut in it corresponding to the teeth of the said spur-wheels, so that as the gearing herein described is driven a great and uniform velocity is imparted to the centrifugal basket. Proper provision is made for oiling the aforesaid gearing.

Instead of making the vertical studs which carry the spur-pinions and wheels to project downward, as hereinbefore described, they may be made to project upward, and in place of cutting the teeth in the spindle of the machine a pinion may be placed on the spindle; also, in place of using spur-teeth in the gearing, what are known as "spiral teeth" may be substituted.

Instead of having a pinion and spur-wheel to give motion from circular rack to pinion or spindle, a single wheel may be employed to gear direct from rack to spindle.

It is to be understood that the gearing hereinbefore described is applicable to both vertical and horizontal centrifugal machines.

In the drawings, Figure 1, Sheet 1, shows a vertical, and Fig. 2 a horizontal, section, taken on the line *a b*, of my improved gearing when driven by hand. Fig. 3, Sheet 2, shows a vertical section illustrating a modification.

S is the handle of a shaft S^3, to which is attached the bevel gear-wheel S′, the teeth of which mesh with the teeth of the bevel-pinion S^2, attached to the sleeve *u*. The sleeve *u* is supported on the frame of the machine and has the spindle E of the centrifugal machine passing through it.

The sleeve *u* has formed in one piece with it, or attached to it, a disk or arms *u′*, which carries the spur-pinion u^2. This spur-pinion gears into the circular rack u^3, attached to the lower part of the frame-work V of the machine. As the sleeve *u* and disk *u′* makes one revolution round the axis, it carries the axis of the spur-pinion u^2 round with it. The pinion u^2, gearing, as aforesaid, in the circular rack of the frame-work, rotates at a much greater speed than the sleeve *u*. Attached to the pinion u^2 there is a gear-wheel u^4, the teeth of which mesh with corresponding teeth in a pinion u^5, attached to or formed in the lower part of the spindle E of the machine.

In order to balance this system of gearing, I attach to the disk or arms *u′* a second and similar set of wheels diametrically opposite to those already described, as shown in Fig. 2.

By means of this system of driving-gear above mentioned I obtain about seven thousand revolutions of the separating-drum per minute to about forty revolutions of the driving-handle.

Instead of driving the said machine by hand, as hereinbefore described with reference to Figs. 1 and 2, Sheet 1, of the annexed drawings, the shaft may have a belt and friction-clutch driving-gear attached to it, and may be driven by steam or other power. This method of driving is shown at Fig. 3, Sheet 2, of the annexed drawings. Upon the boss which carries the shaft S^3 there is an ordinary loose pulley a^4, while upon the shaft there is carried loosely a pulley a^5, with arms

or projections a^6, for carrying the automatic clutches a^7. At the outer end of the shaft S^3 the clutch-box a^8 is keyed. The object of this arrangement is to enable the speed of the centrifugal machine to be gradually brought up to its highest point. As this arrangement is well understood, it is not necessary to particularly describe it.

With a driving-belt for working the centrifugal machine I can obtain a very much higher initial velocity of the shaft S^3 than when driving by hand. I am therefore able to simplify the multiplying-gear between the shaft S^3 and the spindle E of the machine. This may be done as shown in Fig. 3, Sheet 2, of the annexed drawings, in which the gear-wheel u^4 is made to gear directly into the circular rack u^3 and into the teeth of the pinion on the spindle E.

I claim—

1. The combination of the spindle E, having pinion u^5, the sleeve u, having arm u', the gear-wheel u^4, carried by the arm, the fixed circular rack u^3, the bevel-pinion S^2 on the sleeve, and the shaft having bevel gear-wheel S′, substantially as described.

2. The combination of the spindle E, having pinion u^5, the sleeve u, having arm u', the pinion u^2, and gear-wheel u^4, carried by the arm, the fixed circular rack u^3, the bevel-pinion S^2 on the sleeve, and the shaft having bevel gear-wheel S′, substantially as described.

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

JOHN LAIDLAW.

Witnesses:

JOHN LIDDLE,

ARTHUR HARTLEY TUILE,

Both of 154 *St. Vincent Street, Glasgow.*