(No Model.) 2 Sheets—Sheet 1.

R. BUTTERWORTH.

CALENDERING MACHINE.

No. 528,920. Patented Nov. 13, 1894.

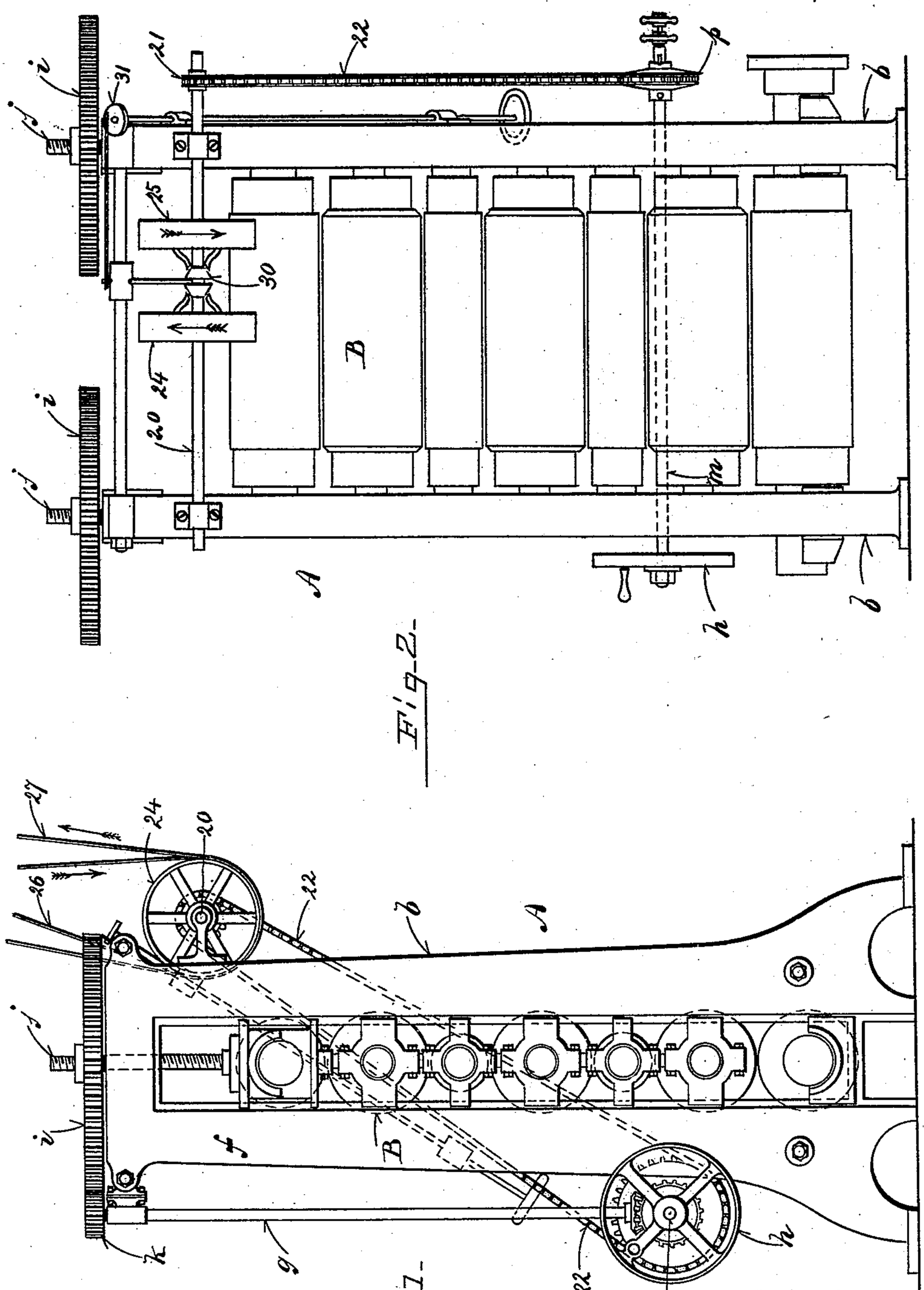

Fig. 2.

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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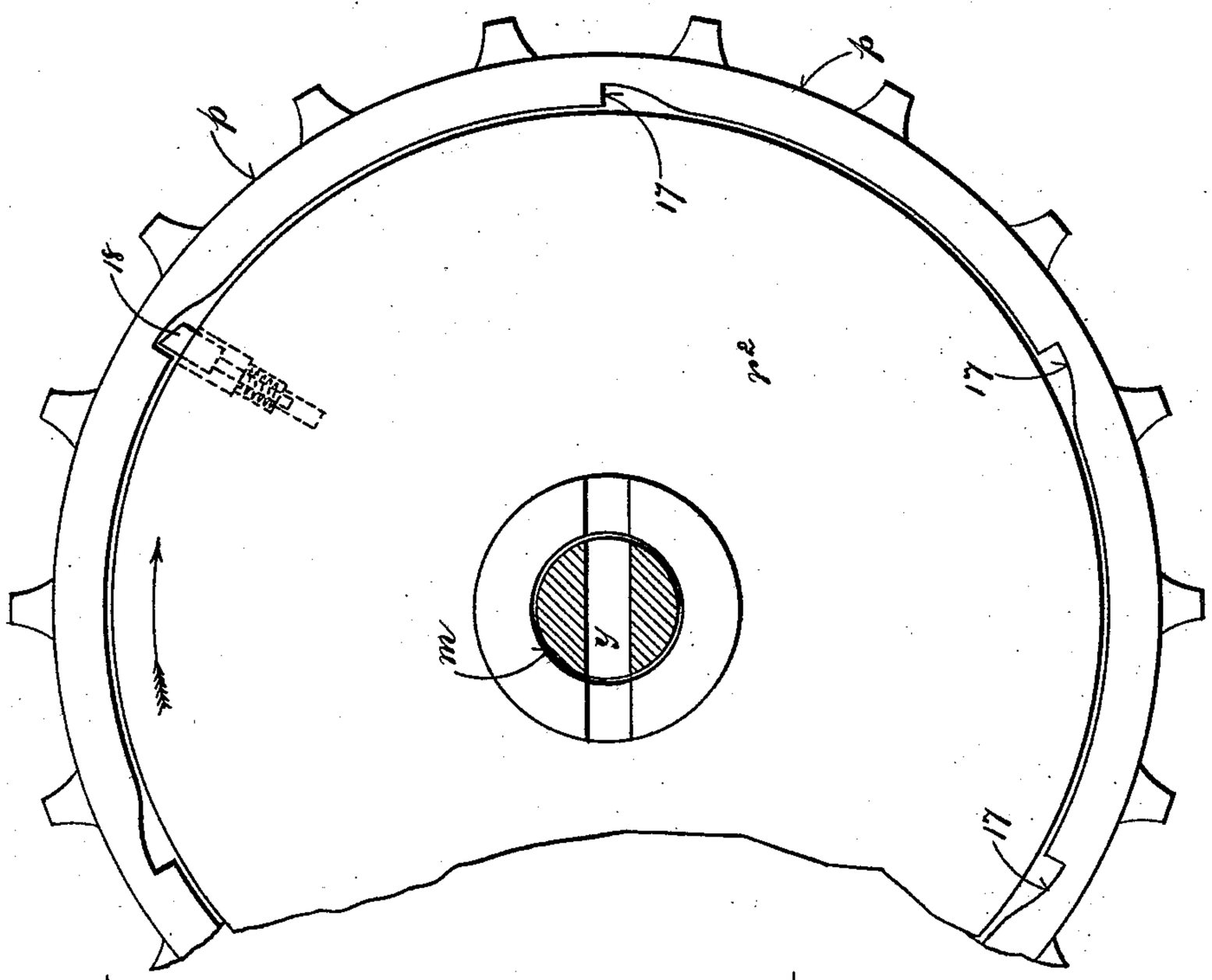

Fig. 4.

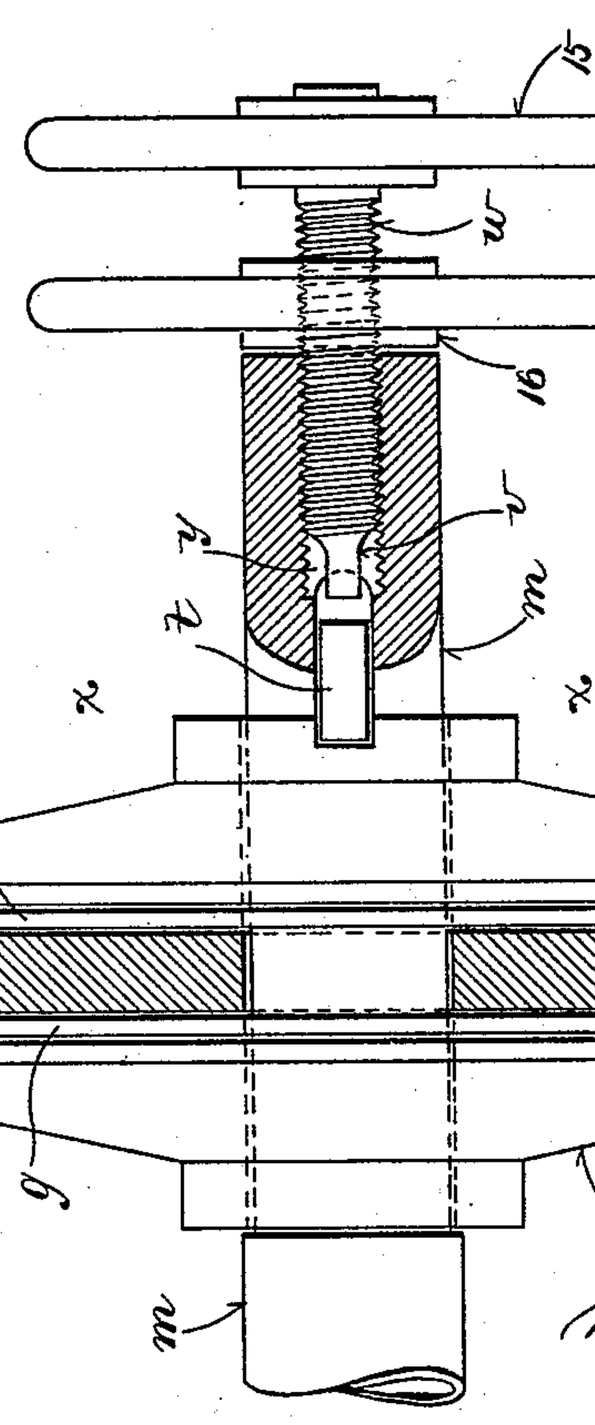

Fig. 3.

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UNITED STATES PATENT OFFICE.

ROBERT BUTTERWORTH, OF SOMERVILLE, MASSACHUSETTS.

CALENDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 528,920, dated November 13, 1894.

Application filed June 6, 1894. Serial No. 513,599. (No model.)

To all whom it may concern:

Be it known that I, ROBERT BUTTERWORTH, of Somerville, in the county of Middlesex, State of Massachusetts, have invented certain new and useful Improvements in Calendering-Machines, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an end elevation of a calendering machine provided with my improvement; Fig. 2, a rear elevation of the same; Fig. 3, a sectional view of the friction sprocket; and Fig. 4, a side elevation of the same partly broken away.

Like letters and figures of reference indicate corresponding parts in the different figures of the drawings.

My invention relates especially to a "power" set for the calendering rolls of paper calendering machines and it is designed particularly as an improvement on the device shown in my United States Letters Patent, No. 425,978, of April 22, 1890, the objecting being to produce a device which will automatically adjust the tension on the rolls and obviate the necessity of employing a helper to perform this function.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation:

In the drawings, A represents the frame of the machine which is of the ordinary construction and comprises two standards, *b*, slotted at *f*, vertically to receive the boxes of the rolls, B, which are fitted to slide therein in the usual manner. A vertical shaft, *g*, is fitted to rotate in suitable supports on the frame and is driven by a gear on the stub-shaft of a hand-wheel, *h*, at its lower end. One of these shafts is employed at each end of the machine. Horizontally arranged gears, *i*, on the top of the standards actuate screws, *j*, to elevate the upper roll by raising its boxes. The gear, *i*, meshes with a pinion, *k*, on the top of each vertical shaft, *g*. The parts as so far described are of the common construction.

When the tension of the rolls has been adjusted for a certain thickness of paper and the operator observes a splice or other imperfection in the paper approaching that would injure the rolls, it becomes necessary for his assistant to again adjust the tension of the roll to compensate for these variations by means of the hand-wheel. This requires such constant attention and such an expenditure of strength to lift the heavy rolls that the aid of a separate workman is necessary as described. I provide in my improvement a mechanism whereby this may be accomplished automatically. On one end of the horizontal shaft, *m*, I mount a loose sprocket-wheel, *p*, shown in detail in Fig. 3. Bearing against the web of this wheel on both faces there is a copper friction-disk, *g*. Against the inner disk, *g*, a similar convex plate, *r*, bears, said plate being squared or splined on the shaft, *m*. Against the outer disk, *g*, a similar convex plate, r^2, engages, said plate being splined on the shaft, the spline, *t*, thereof being movable.

The outer end of the shaft, *m*, is tapped and interiorly screw-threaded at *v*, and working in said threaded socket there is a screw, *w*, the toe, *y*, of which will engage the spline, *t*, and crowd the convex plate, r^2, against the copper friction disk. This screw is provided with a hand-wheel and there is a check-nut, 16, thereon.

The rim of the sprocket, *p*, is notched at 17, (see Fig. 4) on its inner face and the plate, r^2, has a spring-pushed click, 18, therein arranged to take in said notches.

At the rear of the machine near the top of the standard there is a horizontally arranged shaft, 20, journaled, which bears a sprocket-wheel, 21, connected by a jack-chain, 22, with the sprocket, *p*, on the shaft, *m*. On the shaft, 20, there are two loose pulleys, 24, and 25, which are connected by a cross-belt, 26, and straight belt, 27, respectively with any suitable source of power. A friction clutch, 30, of any well known construction is mounted on the shaft, 20, between the pulleys, 24, and 25, and is operated by the usual shipping lever, 31, to lock either pulley as desired.

In the use of my improvement, by turning in the screw, *w*, the plate, r^2, is crowded to a determined degree against the friction plate, *q*, which bears against the wheel, *p*, and is held there by the check-nut. The friction

clutch, 30, being engaged with a pulley, as 24, driving the shaft, 20, in one direction, the shaft, *m*, is driven thereby correspondingly and the screws, *j*, are actuated to impart a certain degree of pressure on the rolls, by means of the vertical shafts, *g*, driven by the shaft, *m*, and actuating the gears, *k*, which drive said screws. When this pressure increases sufficiently on the rolls it will overcome the friction of the disk, r, r^2, on the sprocket, *p*, permitting said sprocket to run free on its shaft. The screws are thereby stopped from increasing the pressure on the rolls. As will be readily understood the point at which the sprocket is released can be regulated by adjusting the screw, *w*, increasing or decreasing the pressure of the friction disks on the sprocket according to the pressure desired on the rolls, the shaft, *m*, always stopping as soon as such pressure is reached. When it is desired to elevate the rolls to prevent their indenting or becoming distorted from contact with each other, the operator ships the clutch, 30, to fasten the pulley bearing the crossed belt and thereby drives the shafts in the opposite direction, moving the screws to raise the rolls.

It will be seen that a single operator by a rapid movement of the shipping lever can adjust the rolls and obviate the necessity of employing an assistant to constantly manipulate the shaft, *m*, for this purpose.

As described, the tension on the rolls can accurately be adjusted by means of the screw, *w*, so that substantially the same pressure, for calendering purposes, is imparted at all times without regard to the variation in thickness of the paper, as after the sprocket begins to run free the pressure at which this occurs is maintained no matter how much the stock varies.

I do not confine myself to the particular mechanism described for adjusting the tension on the sprocket, *p;* nor do I confine myself to the particular means shown for adjusting the rolls, a salient feature of my invention comprising the maintaining of a determined pressure on the calendering rolls by a mechanism which automatically imparts and maintains said pressure.

It will be seen that when it is desired to elevate the rolls and the shafts are reciprocated for this purpose, the click, 18, will lock the sprocket, *p*, to the friction-plate adjacent and consequently to the shaft. When the operator shifts the clutch to lock the other pulley and to raise the rolls for any purpose after the pressure mechanism has been once adjusted he has only to again shift the clutch, locking the other pulley when said mechanism will at once operate automatically to return the rolls to such determined pressure.

Having thus explained my invention, what I claim is—

1. In a calendering machine, calendering rolls movable as to the relative position of their journals in combination with a rotary shaft; a loose sprocket thereon; an adjustable friction device for locking said sprocket to the shaft against a determined resistance; drive mechanism for said sprocket; and mechanism actuated by said shaft for applying pressure to said rolls, substantially as described.

2. In a calendering machine, a series of calendering rolls in combination with mechanism for adjusting said rolls in relation to each other; a drive-shaft; a loose pulley thereon; a clutch for locking said pulley; a driven shaft for actuating said roll-adjusting mechanism; a loose wheel on said driven shaft connected with said pulley; and a friction device for locking said wheel to oppose a determined resistance on said shaft, substantially as described.

3. In a calendering machine, the adjustable calendering rolls and the screws and actuating mechanism in combination with the shaft, *m*, for actuating said mechanism, the sprocket, *p*, and its friction mechanism and the click in said mechanism for locking the sprocket to rotate in one direction.

4. In a calendering machine, the shaft, *m*, and mechanism for adjusting the calendering rolls therefrom in combination with the loose sprocket, *p*, and its friction and locking mechanism; the shaft, 20; the loose pulleys thereon and a clutch for locking said pulleys.

5. In a calendering machine, the frame and its adjustable rolls in combination with the shaft, *m;* the sprocket, *p*, having a notched rim; the plates, r, r^2, for engaging said rim, the click in one of said plates engaging said notches; a screw for gaging the tension of said plates; drive mechanism for the shaft and a roll adjusting mechanism actuated from said shaft, substantially as described.

ROBERT BUTTERWORTH.

Witnesses:
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T. M. FRAULEY.