(No Model.) 2 Sheets—Sheet 1.

# M. SOLINGER.

## MACHINE FOR CALENDERING PAPER.

No. 337,028. Patented Mar. 2, 1886.

*Fig. 1.*

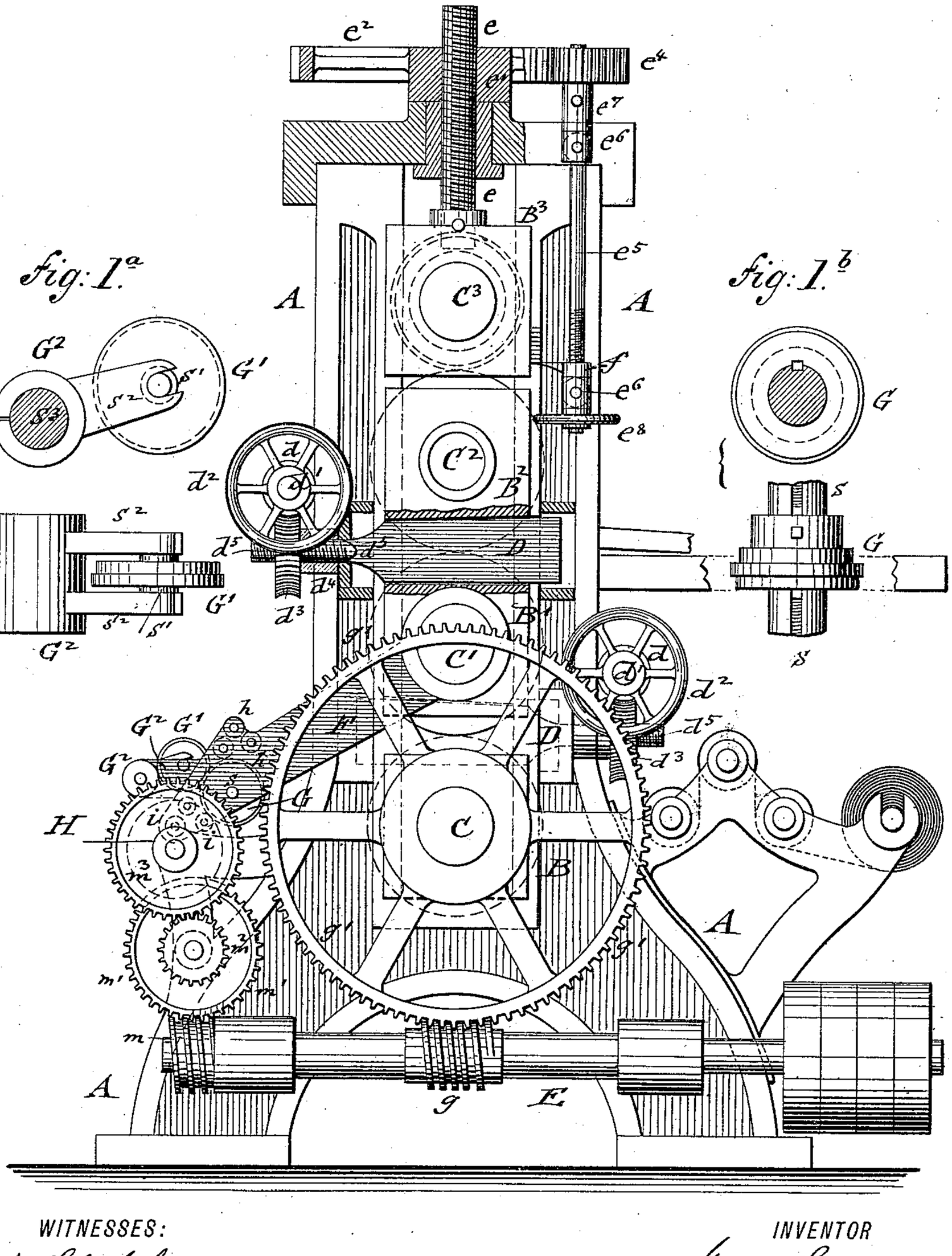


*Fig. 1ª*

*Fig. 1ᵇ*

WITNESSES:

A. Schehl.

Carl Kehr

INVENTOR

Moses Solinger

BY Goepel & Raegener

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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## MACHINE FOR CALENDERING PAPER.

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*Fig. 2.*

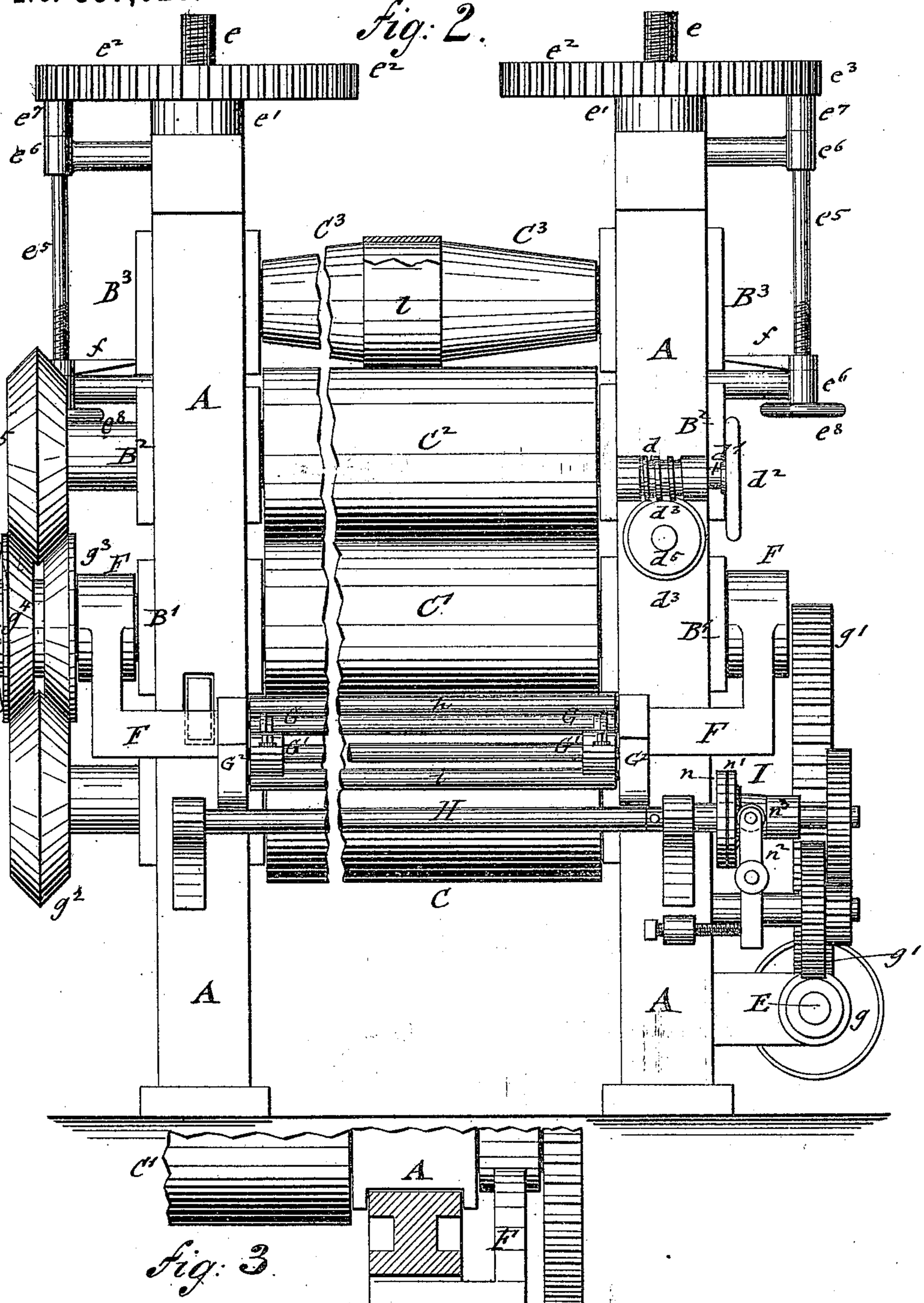
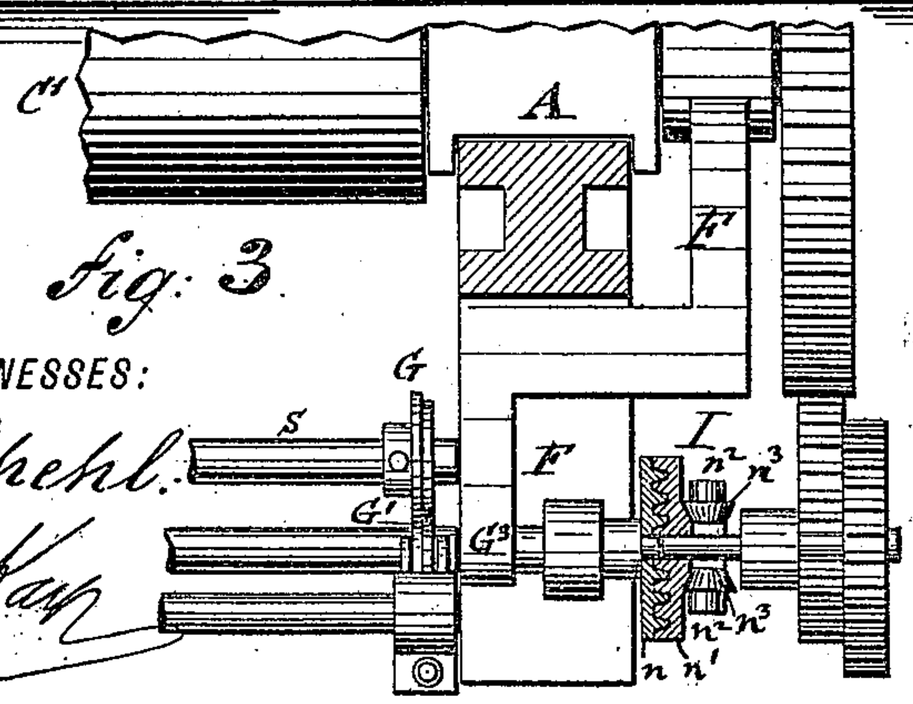



*Fig. 3.*




WITNESSES:

A. Schehl.

Carl Kan

INVENTOR

Moses Solinger

BY Goepel & Raegener

ATTORNEYS.

# UNITED STATES PATENT OFFICE.

MOSES SOLINGER, OF NEW YORK, N. Y., ASSIGNOR TO SOLINGER, SCHINDLER & CO., OF SAME PLACE.

## MACHINE FOR CALENDERING PAPER.

SPECIFICATION forming part of Letters Patent No. 337,028, dated March 2, 1886.

Application filed November 23, 1885. Serial No. 183,592. (No model.)

*To all whom it may concern:*

Be it known that I, MOSES SOLINGER, of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Calendering Paper, of which the following is a specification.

This invention relates to an improved machine for calendering paper and cutting the same into rolls of any required width; and the invention consists of three calendering-rolls, a lower stationary and two upper adjustable and heated rolls, and of a fourth top roll that revolves in contact with the upper heated roll, for preventing the cracking or warping of the same. The bearings of the middle rolls are adjusted by wedges, which are guided in recesses of the bearings and adjusted by worm-gears. The rolls are driven by a friction-wheel transmission, whereby a smooth and uniform motion is obtained. A cutting attachment is hung by cranked arms to the shaft of the calendering-rolls, which are provided with two sets of transverse guide-rolls and disk-shaped cutting-knives, as will appear more fully hereinafter, and finally be pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation, partly in section, of my improved machine for calendering paper. Figs. $1^a$ and $1^b$ are details of the disk-shaped knives of the cutting attachment. Fig. 2 is a front view of the machine; and Fig. 3 is a plan, partly in horizontal section, showing the cutting attachment.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A A represent two upright standards, which are provided with central openings for guiding the journal-bearings of the different rolls of the machine. A roll, C, of paper or other suitable material, is arranged in stationary bearings B at the lower part of the standards A, and above the same two hollow heated rolls, C′ $C^2$, which are capable of adjustment in the standards A A. A fourth roll, $C^3$, above the roll $C^2$, is made cylindrical at the middle part and tapering toward the ends, the middle part being covered by a layer, *l*, of leather or other suitable material, and pressed tightly on the roll $C^2$, so as to exert thereon a counter-pressure to that of the stationary roll C on the heated rolls and prevent thereby the warping or cracking of the heated rolls C′ $C^2$. This fourth counter-pressure roll, $C^3$, forms an essential feature of my invention, as thereby the expensive chilled steel rolls used in calendering-machines are more fully protected against injury and rendered more durable and effective.

The journal-bearings B′ $B^2$ of the middle rolls, C′ $C^2$, are adjusted by means of transverse wedge-pieces D D, which are guided in recesses of said bearings and the supporting-standards A A. The wedge-pieces D are adjusted by means of worms *d d*, keyed to shafts *d*′, having hand-wheels $d^2$ and worm-wheels $d^3$ placed on hollow shafts $d^4$, which latter turn in bearings of the standards A A and engage the threaded shanks $d^5$ of the wedge-pieces D, so that they can be moved in either direction, whereby the degree of pressure on the paper can be diminished or increased, as required.

To the bearings $B^3$ of the roll $C^3$ are attached vertical screw-rods *e*, which are passed through the hollow threaded hubs *e*′ of gear-wheels $e^2$, said hubs turning in bearings at the top of the standards. The hollow hubs *e*′ engage the threaded rods *e* and raise or lower the same by the action of pinions $e^4$, that mesh with the gear-wheels $e^2$. The pinions $e^4$ are keyed to the upper ends of vertical shafts $e^5$, that are supported by collars $e^7$ on bracket-arms $e^6$. A hand-wheel, $e^8$, at the lower ends of the shafts $e^5$, operates the intermediate gear-wheels and serves to adjust the bearings $B^3$, as shown in Figs. 1 and 2.

An indicator, *f*, moves up and down along the threaded lower part of each vertical shaft $e^5$ and along a graduated scale on the standard A, so as to indicate the extent to which the bearings $B^3$ of the roll $C^3$ have been raised or lowered.

Rotary motion is imparted to the heated calendering-rolls C′ $C^2$ from the shaft of the lower roll, C, which receives rotary motion from a main shaft, E, that is supported in bearings at the lower part of one of the standards A. A worm, *g*, on the driving-shaft E, meshes with a gear-wheel, *g*′, on the shaft of the roll C, which shaft carries at the opposite end a beveled friction-disk, $g^2$, that meshes with a fixed disk, $g^3$, and a sliding and spring-pressed disk,

$g^4$, on the shaft of the roll C'. The disks $g^3$ $g^4$ again mesh with a beveled friction-disk, $g^5$, on the shaft of the roll $C^2$, whereby rotary motion is transmitted to the rolls C' $C^2$, as shown in Fig. 2. Any other form of friction-disks may be used, the advantage of the same, as compared to gear-wheel transmission, being the smooth continuous motion of the calendering-rolls, without the vibrations caused by the teeth of the gear-wheels, the effect of which can be clearly observed on the finer grades calendered on machines with gear-driven rolls.

A paper-cutting attachment is supported by cranked arms F, that are hung to the shaft of the roll C', as shown in Figs. 1 and 2. At the outer ends of the arms F are arranged two sets of guiding and stretching rolls, *h* and *i*, each set having three rolls, by which the proper tension is imparted to the paper while the same passes between two sets of cutting-disks, G G', which are located intermediately between the two sets of rolls *h* and *i*. The shaft *s* of one set of cutting-disks, G, turns in bearings of the cranked arms F, while the second set of disks, G', turn by short shafts *s'* in bearings of forked arms of sleeves $G^2$, that are rigidly clamped to shafts $s^3$, supported in brackets $G^3$ of the cranked arms F. The cutting-disks of both sets can be adjusted toward each other, the disks G by means of splines sliding in the grooved shaft *s*, as shown in Fig. $1^b$, and the disks G' by the sleeves $G^2$ on the shaft $s^3$, as shown in Fig. 2. The paper is moved through between the cutting-disks G G' by a winding-up roller, H, to which rotary motion is imparted by a worm-gear and gear-wheel transmission, *m m' $m^2$ $m^3$*, from the main shaft E, as shown in Fig. 1.

The cutting-disks G G' are rotated by the friction with the paper passing through between the same, so that the same is cut up in rolls of any suitable width. The winding-roller H of the cutting attachment is thrown in or out of motion by a clutch device, I, (shown in Figs. 2 and 3,) which clutch device consists of a fixed and a laterally-movable disk, *n n'*, both having concentric interlocking ribs and corrugations, the movable disk being forced by a fulcrumed fork, $n^2$, having beveled anti-friction rollers $n^3$, into mesh with the fixed disk. By releasing the movable disk *n'* the clutch device is thrown out of gear and thereby the winding-roller H, and thereby the cutting attachment, brought to rest.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of a lower roll, intermediate rolls above the same, and an adjustable counter-pressure roll bearing on the upper intermediate roll, substantially as set forth.

2. The combination of a lower roll, intermediate rolls above the same, and an adjustable counter-pressure top roll having a central covering layer of leather or other suitable material, substantially as set forth.

3. The combination of the supporting-standards having transverse guide-recesses, a lower roll, adjustable rolls turning in recessed bearings, transverse wedge-pieces engaging the recessed bearings of said adjustable rolls, and worm-gears for adjusting said slide-pieces, substantially as set forth.

4. The combination of the rolls C C' $C^2$ and the bearings B B' $B^2$ with a counter-pressure top roll, $C^3$, having adjustable bearings $B^3$, screw-rods *e*, gear-wheels $e^2$, having threaded hubs *e'*, pinions $e^4$, and shaft $e^5$, supported in bracket-arms $e^6$, substantially as set forth.

5. The combination, with calendering-rolls, of a cutting attachment supported by cranked arms, the cutting attachment consisting of two sets of guiding and stretching rolls, intermediate rotary cutting-disks supported on transverse shafts, a winding-up roller, and mechanism for imparting rotary motion to the winding-up roller, substantially as set forth.

6. The combination, with calendering-rolls, of cranked supporting-arms F, guide and stretching rolls *h* and *i*, transverse shaft *s*, disk-shaped cutting-knives G, splined thereto, a transverse shaft, $s^2$, cutting-disks G', supported in adjustable brackets of the shaft *s*, a winding-up roller, H, and transmitting gear-wheels, by which rotary motion is imparted to the winding-up rollers, substantially as set forth.

7. The combination of the rolls C C' $C^2$, arranged one above the other, with a double-beveled friction-wheel, $g^2$, on the shaft of the roll C, a fixed friction-wheel, $g^3$, and a sliding and spring-actuated friction-wheel, $g^4$, on the shaft of the roll C', and a double-beveled friction-wheel, $g^5$, on the shaft of the roll $C^2$, whereby a smooth and even motion is imparted to the rolls C' $C^2$ from the lower roll, C, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

MOSES SOLINGER.

Witnesses:
PAUL GOEPEL,
SIDNEY MANN.