No. 774,578 PATENTED NOV. 8, 1904.

T. GILLARD.

MACHINE FOR MAKING PAPER ROLLS.

APPLICATION FILED MAY 13, 1904.

NO MODEL. 5 SHEETS—SHEET 1.

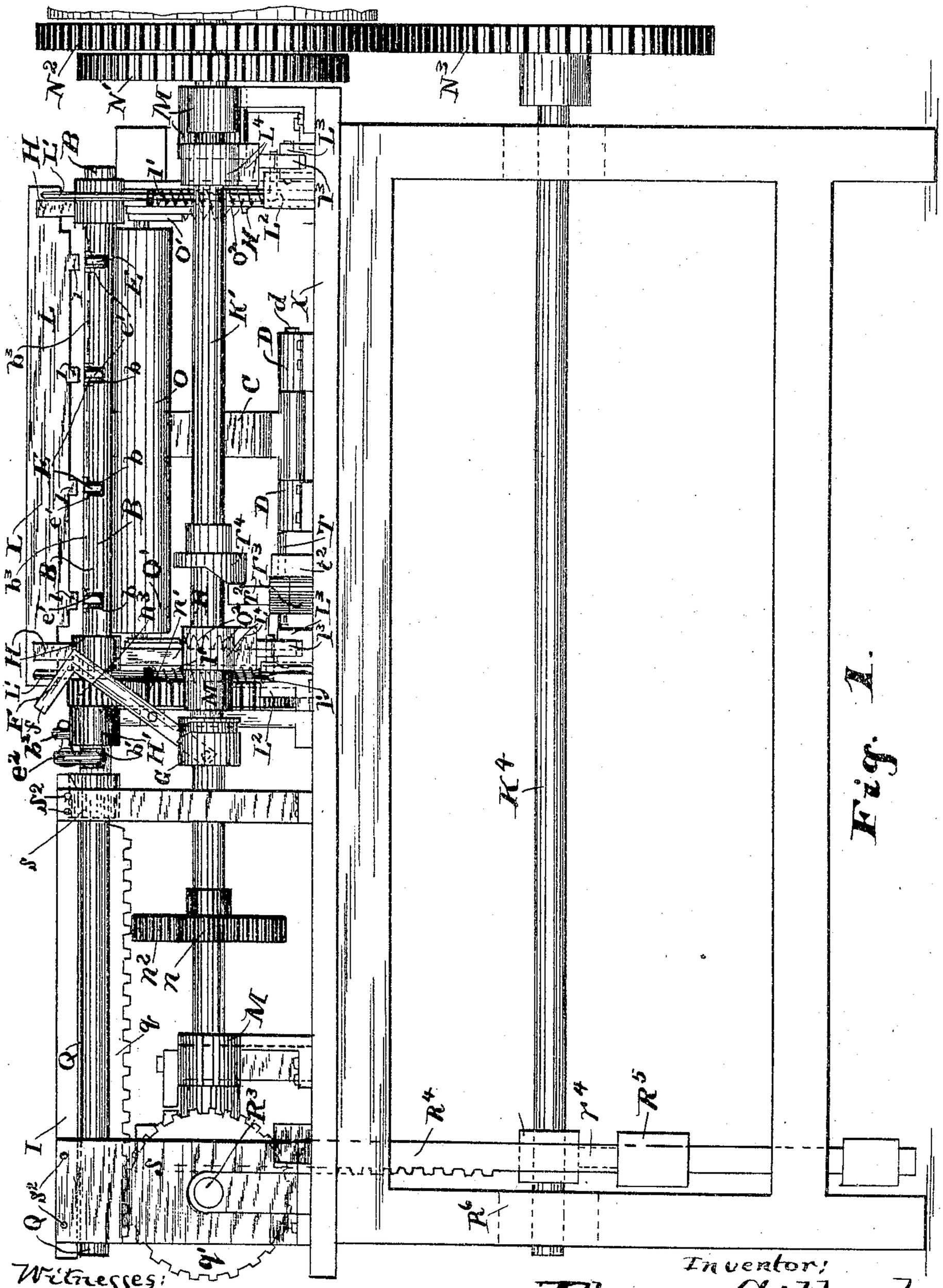

Fig. 1.

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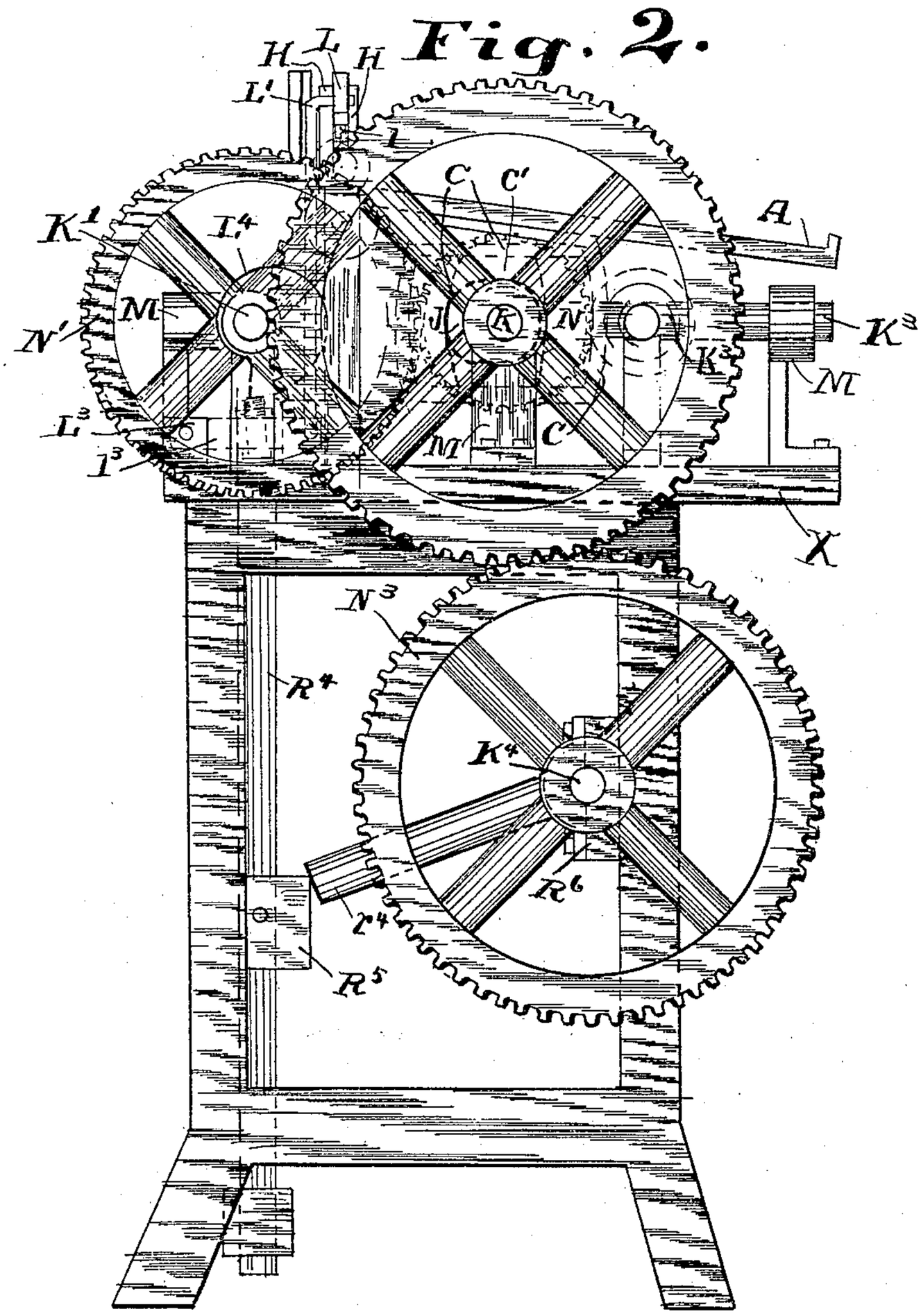
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.

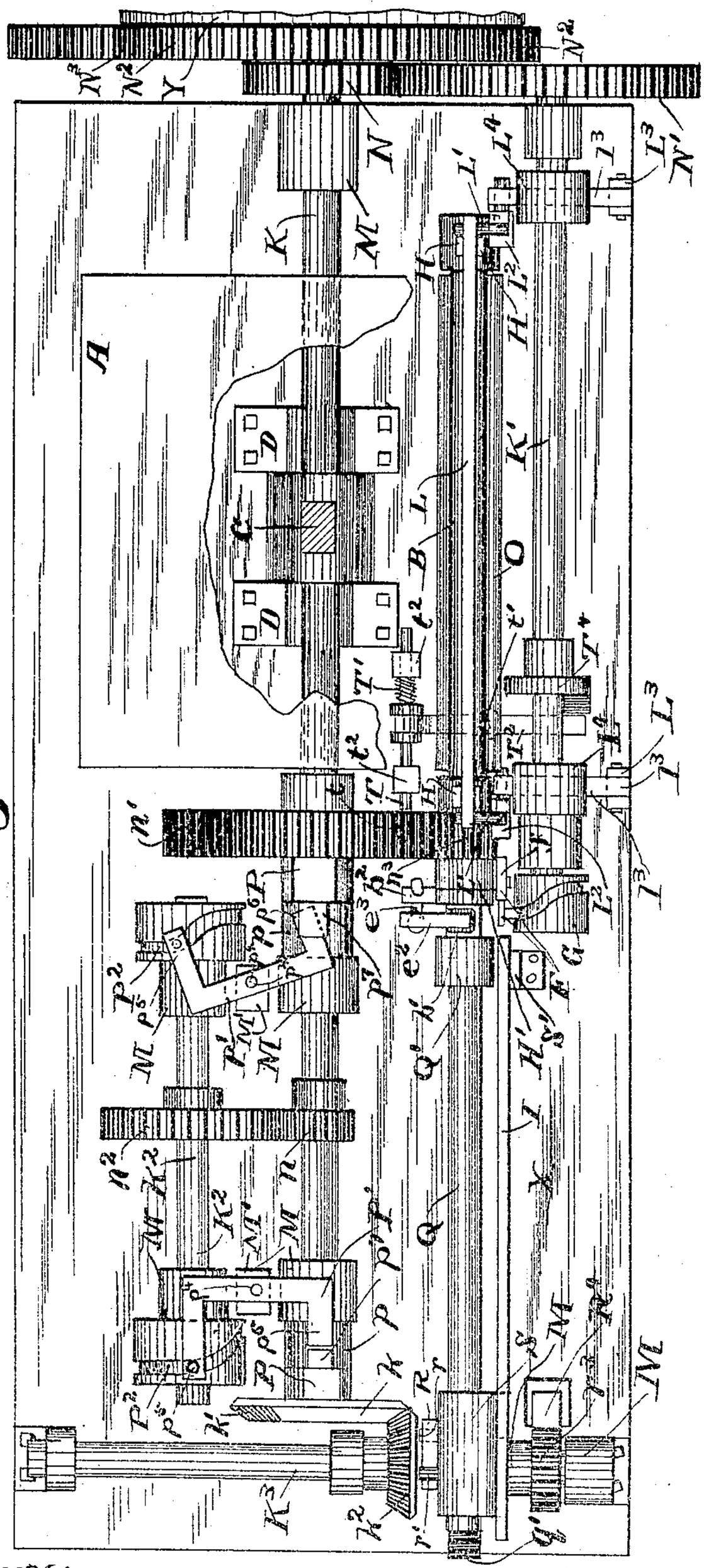
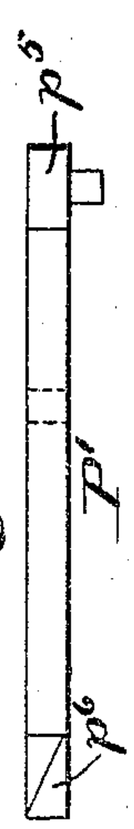


Fig. 11.



Witnesses:
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APPLICATION FILED MAY 13, 1904.

NO MODEL. 5 SHEETS—SHEET 4.

Fig. 4.

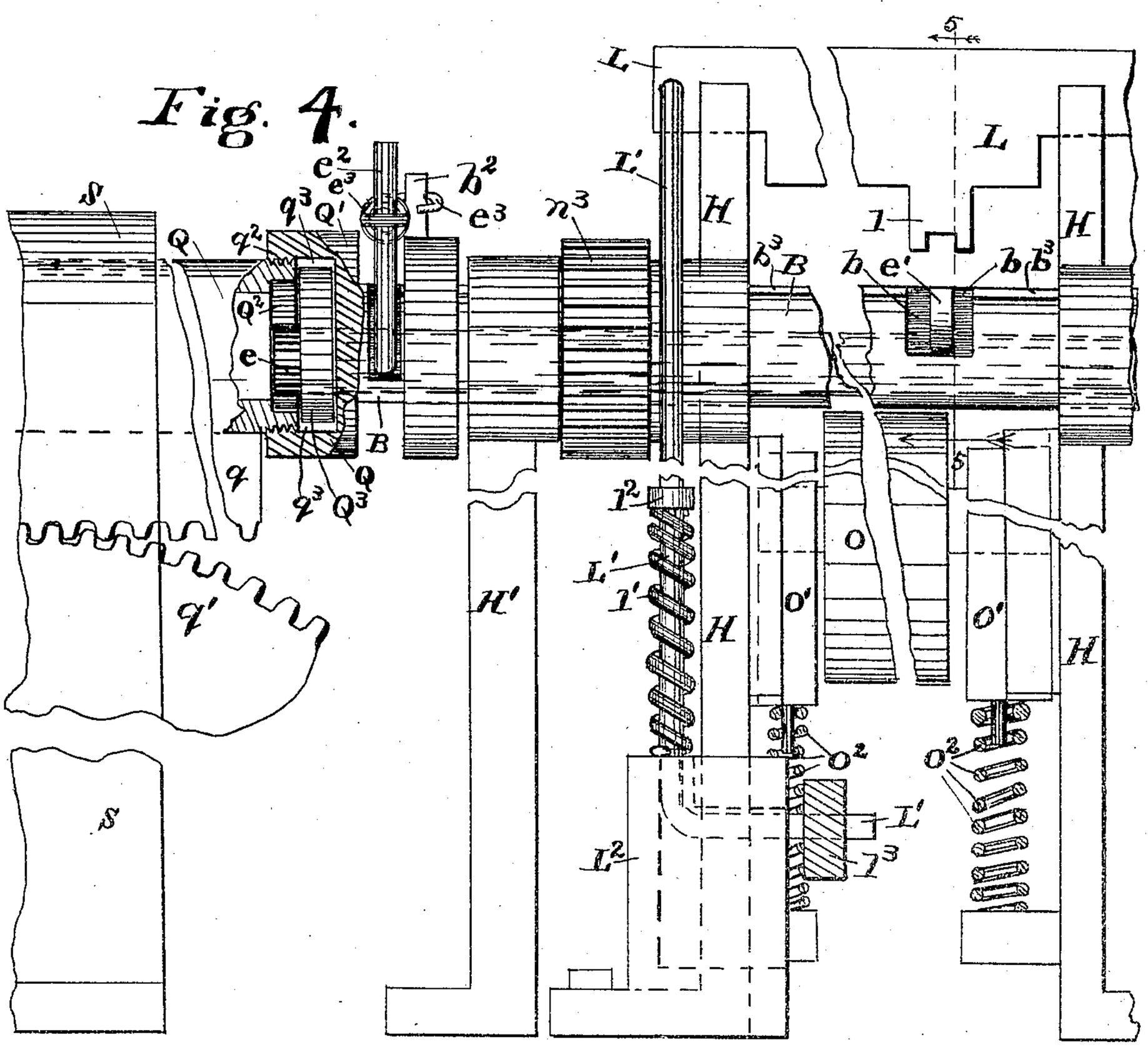


Fig. 6.

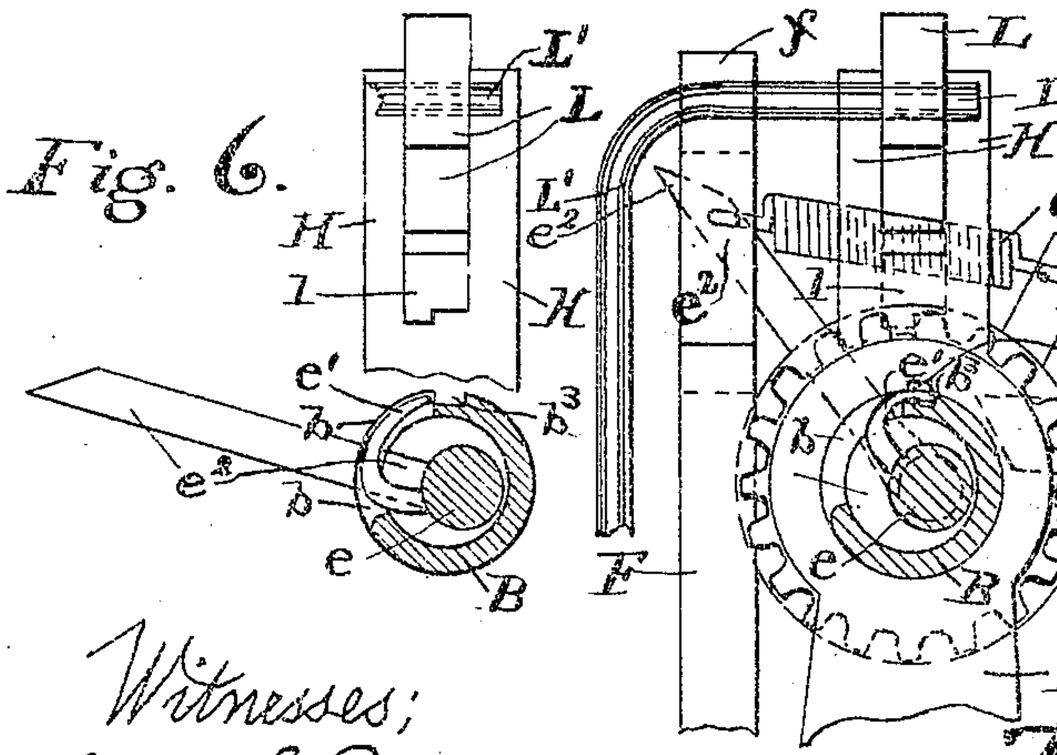
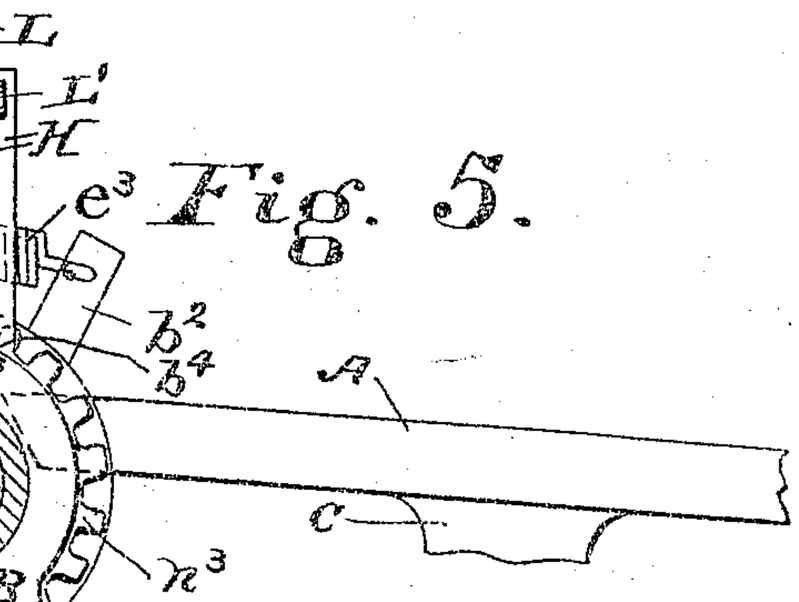


Fig. 5.



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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 7.

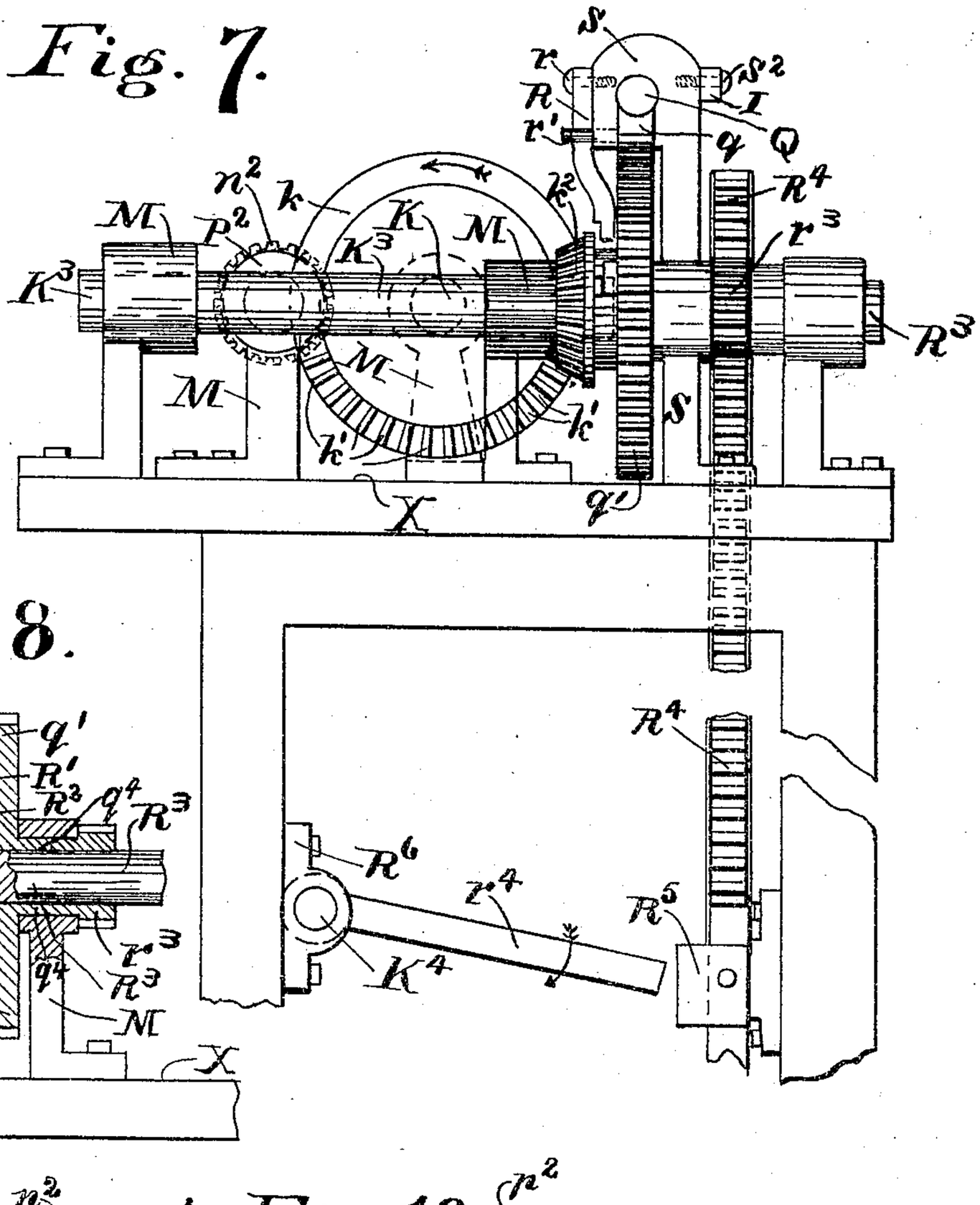


Fig. 8.

Fig. 9.

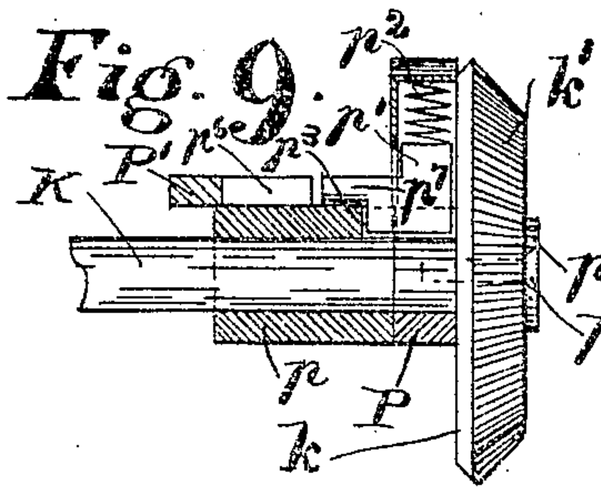
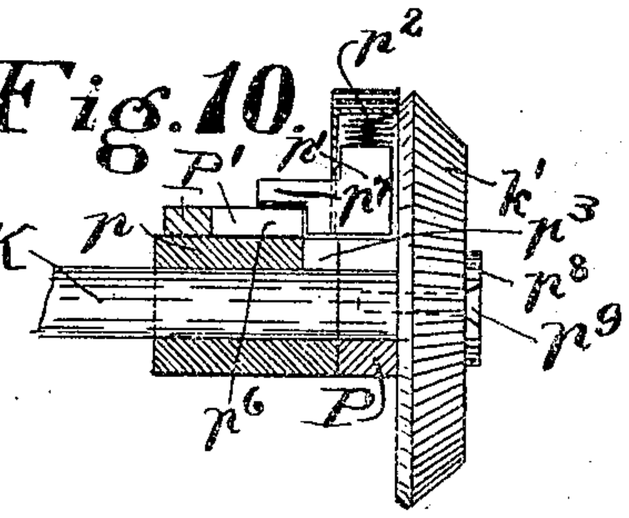


Fig. 10.



Witnesses:
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Inventor:
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No. 774,578. Patented November 8, 1904.

UNITED STATES PATENT OFFICE.

THOMAS GILLARD, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING PAPER-ROLLS.

SPECIFICATION forming part of Letters Patent No. 774,578, dated November 8, 1904.

Application filed May 13, 1904. Serial No. 207,763. (No model.)

To all whom it may concern:

Be it known that I, THOMAS GILLARD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Paper-Rolls, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete specification, sufficient to enable those skilled in the art to which it pertains to understand, make, and use the same.

The object of this invention is to obtain a machine whereby sheets of paper, strawboard, or cardboard may be taken and rolls successively made therefrom, such machine being arranged to grasp the sheet of paper, strawboard, or cardboard of which the roll is to be made when the same is laid in a determined position, to roll such sheet into a roll on a mandrel, to detach the mandrel on which the roll is made from such roll when the same is completed, and to deliver the completed roll from the machine, and thereafter to grasp an additional sheet of such paper, strawboard, or cardboard and repeat the operation of making and discharging a roll.

In the making of rolls by this machine the material from which the roll is to be made is designed to be properly smeared with paste before the same is grasped and rolled by the machine.

In the drawings referred to as forming a part of this specification Figure 1 is a rear elevation of a machine embodying this invention. Fig. 2 is an end elevation of such machine, showing particularly the respective distances of the several shafts of the machine from the table thereof. Fig. 3 is a top plan view of the machine. Fig. 4 is a rear elevation, on an enlarged scale, of the mandrel around which paper, strawboard, or cardboard is rolled in the operation of the machine with the several parts adjacent to such mandrel. Fig. 5 is a vertical sectional view of the mandrel and adjacent parts on line 5 5 of Fig. 4 viewed in the direction indicated by the arrows with the nippers of the mandrel closed. Fig. 6 is a like sectional view of the mandrel and as is Fig. 5 with the nippers of such mandrel open. Fig. 7 is an end elevation, on an enlarged scale, of the end of the machine-table opposite to the one shown in Fig. 2. Fig. 8 is a vertical sectional view, on an enlarged scale, of the small beveled wheel shown in Fig. 7, of the gear-wheel and bearings adjacent thereto, and of the connecting-clutch. Fig. 9 is a vertical sectional view, on an enlarged scale, of the large beveled wheel illustrated in Fig. 7 and a vertical sectional view of the clutch connecting such wheel to the shaft thereof, such clutch being in engagement; and Fig. 10 is a like view of the several parts shown in Fig. 9 with the clutch out of engagement. Fig. 11 is a front elevation of a lever forming an element in some of the clutches of the apparatus.

A reference-letter applied to indicate a given part is used to designate such part throughout the several figures of the drawings wherever the same appears.

A is a table on which paper, strawboard, or cardboard to be rolled by the machine is placed by the operator, and B is the mandrel of the machine on which such paper, strawboard, or cardboard is turned to form a roll.

I prefer to give the table A a forward-and-backward movement, so that paper to be grasped by fingers e' e' of the clutch E of mandrel B may be placed in a determined position on the table and held in such position and by the movement of such table carried forward to the clutch, and for this purpose the table A is secured to the upper end of the arm or lever C, and such lever is pivoted to the top of the bed X of the machine, as by the bearings D D and shaft or pin d therethrough.

Mandrel B is hollow, and clutch E consists of a rod e, set therein eccentrically to the axis thereof and provided with fingers e' e', extending through holes b b in the mandrel, (see Figs. 1 and 6,) and also provided with arm e^2, extending through hole b'. (See Fig. 1.) The clutch is opened by turning the rod e in its bearing in the mandrel by means of arm e^2. b^2 is an arm rigidly secured to the mandrel B, and e^3 is a spring connecting arm e^2 to arm b^2, yieldingly holding the arm e^2 so that fingers e' e'

of the clutch E are closed. The arm b^2 turns, of course, with the mandrel B, and preparatory to opening the fingers e' e' the rotation of the mandrel B is stopped after a roll is made thereon by mechanism hereinafter described in position, so that arm e^2 is underneath lever F, (see Figs. 1 and 3,) and such lever F is so controlled by cam G that in the rotation of such cam the upper end f of lever F is forced down onto arm e^2 and the fingers e' e' opened. After a roll is made on mandrel B and the fingers e' e' are opened, as described, the mandrel is moved longitudinally in its bearings H H by mechanism hereinafter described, and as such mandrel moves longitudinally the end of arm e^2 is drawn underneath the horizontal bar I, and thereby the fingers e' e' are maintained in an open position. After the mandrel B has been withdrawn from the completed roll it is returned to its initial position with arm e^2 underneath the end f of lever F, and the fingers e' e' are thereby maintained in an opened position until by the forward movement of the table (or by other suitable means) paper or strawboard or cardboard has been fed to a proper position for such fingers to engage therewith and hold the same to the mandrel B (as such mandrel is rotated) to form or wind such material into a roll.

J, Fig. 2, is a cam rigidly secured on driving-shaft K to turn in aperture C' of swinging standard C, and thereby impart the forward-and-backward movement to table A hereinbefore referred to.

To insure the engagement of the fingers e' e' with the paper, strawboard, or cardboard on table A when such table is in a forward position, I mount bar L in standards H H and place fingers l l on such bar, so that as the bar is depressed by the mechanism about to be described the fingers l l will enter the holes b b, respectively, in mandrel B on each side of the fingers e' e' of the clutch E, thereby forcing the paper, strawboard, or cardboard into the groove b^3 of mandrel B forward of the fingers e' e' when such fingers are open and so that as such fingers close they will press downward upon the paper, strawboard, or cardboard, holding it firmly to the mandrel B.

L' L' are rods respectively secured at their upper ends to bar L and at their lower ends respectively movable in bearing L^2.

l', Fig. 1 and Fig. 4, is a spring on rod L', abutting at its lower end on bearing L^2 and at its upper end against collar l^2, which is rigidly secured to rod L'. A like spring l' is mounted on the rod L' at the other end of bar L. (Not shown in Fig. 4.) The springs l' l' yieldingly hold rods L' L' and bar L in an upward position. l^3 l^3 are levers pivotally mounted at one end of each thereof in bearings L^3 L^3, respectively, and at the other ends thereof respectively engaging with the lower ends of the rods L' L', and L^4 L^4 are cams on shaft K', engaging with the levers l^3 l^3 as such shaft rotates, thereby depressing such levers l^3 l^3 and drawing rods L' L' and bar L down.

The main driving-wheel Y, Figs. 1 and 3, is mounted on the shaft K, and the rotation of such shaft K is continuous in one direction in the operation of the machine, as is also the rotation of shafts K' and K^2, (see Fig. 3,) but in the opposite direction. The rotation of the shaft K^3 is intermittent, such shaft being driven in one direction by means of gear-teeth k' on beveled wheel k engaging with gear-teeth on beveled wheel k^2 when the portion of the beveled wheel k having teeth thereon is adjacent to the beveled wheel k^2 and the teeth k' k' in engagement with the teeth of such beveled wheel. Shaft K^3 is not, of course, rotated by the rotation of the beveled wheel k when the smooth portion of such beveled wheel is adjacent to the beveled wheel k^2.

K^4 is a shaft underneath the table X of the machine.

M M are the bearings of the several shafts K, K', K^2, and K^3.

N is a gear-wheel rigidly secured on shaft K, intermeshing with the teeth of gear-wheel N', which is rigidly secured on shaft K'. The number of teeth in wheel N is one-half the number of teeth in wheel N' in the construction illustrated in the drawings.

n is a gear-wheel rigidly secured on shaft K, intermeshing with the teeth of gear-wheel n^2 on shaft K^2. The number of teeth in wheel n is one-half the number of teeth in wheel n^2 in the construction illustrated in the drawings.

n' is a gear-wheel loosely mounted on the shaft K.

N^2 is a gear-wheel rigidly secured on shaft K, intermeshing with the teeth of wheel N^3, which is rigidly secured on shaft K^4.

n^3 is a gear-wheel loosely secured on mandrel B to intermesh with gear-wheel n'. Wheel n^3 is feathered to mandrel B, as by feather b^4, Fig. 5, so that such wheel and the mandrel turn together, while the mandrel may be drawn or forced through the gear-wheel in the longitudinal movement of such mandrel.

The shaft K is designed in the construction herein illustrated and described to turn twice around in the making of a roll or case by the machine, and the wheel n' is designed to turn once around synchronously with one of the revolutions of such shaft K in the making of the roll or case. As more than one thickness of paper, strawboard, or cardboard is required in the rolls made on mandrel B, more than one revolution of mandrel B to each revolution of loose wheel n' is required, and hence the relative sizes of wheels n' and n^3 are such that the desired number of revolutions to wheel n^2 for making the roll is obtained by one revolution of wheel n'. H' is a bearing on one side of gear-wheel n^3. Longitudinal or side

movement of gear-wheel n^3 is prevented by bearings H H′ adjacent thereto.

To bring the several layers of the rolls or cases which are made on mandrel B into close contact, I provide the roller O, bearings O′ O′, and springs O^2 O^2, tending to force such roller O up toward the under side of the mandrel B. Bearings O′ O′ and springs O^2 O^2 are mounted on bearings H H. (See Fig. 4.)

The clutch mechanism by means of which the gear-wheel n' is alternately secured to to turn with the shaft K and released from such shaft to remain stationary is similar to the mechanism employed for the same purpose with beveled wheel k and shaft K, and such mechanism is well illustrated in Figs. 3, 9, and 10 of the drawings, and because of such similarity the same lettering is applied to similar parts of such mechanisms of the wheels k and n'.

P P are hubs turning loosely on shaft K and respectively secured to wheels n' and k.

p p are collars rigidly secured on shaft K to turn therewith.

p' is a bolt on hub P radially movable.

p^2 is a spring yieldingly holding the movable bolt p' in close contact to the shaft K. When in such position, such bolt is in slot p^3 in collar p, (see Figs. 9 and 10,) and thereby, together with the hub P, on which it is mounted, such bolt p' is turned by the shaft K.

P′ P′ are levers pivotally mounted on bearings M′ M′, respectively, (as by means of pivots p^4 p^4, Fig. 3,) and P^2 P^2 are cams rigidly secured on shaft K^2, with which cams a projection on the respective ends p^5 p^5 of levers P′ P′ engages, and thereby the position of the levers P′ P′ are respectively controlled. When a lever P′ is in the position of the one adjacent to wheel n', the beveled end p^6 of such lever is in the path of movement of projection p^7 on bolt p' of the clutch mechanism adjacent thereto, and as bolt p' moves with hub P as such hub is rotated, as hereinbefore set forth, such projection p^7 is forced onto the end p^6 of such lever, and thereby moved radially from the position thereof illustrated in Fig. 3 (adjacent to wheel k) and in Fig. 9 of the drawings into the position thereof illustrated in Fig. 3 (adjacent to wheel n') and in Fig. 10 of the drawings. At such time the bolt p' is out of engagement with the recess p^3 in collar p, and hence the hub P, together with the wheel on such hub (k or n',) is not turned by the turning of the shaft K. When the relative sizes of the gear-wheels n and n^2 are as hereinbefore mentioned, so that the shaft K^2 rotates once upon two revolutions of shaft K, the cams P^2 P^2 on shaft K^2 are so constructed that levers P′ P′ will alternately assume substantially the position of such levers P′ P′ as illustrated in Fig. 3 of the drawings, so that one of the wheels k n' will be turned once around synchronously with shaft K and will then remain at rest while shaft K makes one revolution, during which revolution the other one of such wheels k n' will turn around synchronously with shaft K.

By the foregoing-described arrangement the mandrel B and shaft K^3 are alternately rotated. The rotation of shaft K^3 is designed by the mechanism about to be described to move the mandrel B longitudinally, thereby drawing it out of a made tube or case.

Q is a non-rotatable rod provided with rack q. Rack q is in engagement with the teeth of gear-wheel q', Figs. 1, 4, and 7. The connection between the rotatable mandrel B and the non-rotatable rod or shaft Q is illustrated in detail in Fig. 4 of the drawings, where Q′ is a collar tightly fitted on shaft Q, as by screw-threads q^2, and loosely fitting over the mandrel B, so that such mandrel will rotate without the rotation of the collar Q′. The end of the rod or shaft Q adjacent to the mandrel B is provided with a recess Q^2, in which the end of rod e of the clutch E may extend, and Q^3 is a collar rigidly secured to mandrel B to rotate therewith. Collar Q^3 is contained in recess q^3 of the non-rotatable collar Q′. Rotation of the mandrel B may thus occur, as by engagement of gear-wheel n^3 with gear-wheel n', without rotation of the rod or shaft Q, while longitudinal movement of the rod or shaft Q will produce corresponding longitudinal movement of mandrel B.

The wheel k is provided with teeth k' on a portion of its peripheral surface, as is illustrated in Figs. 3 and 7 of the drawings, and the relative sizes of the wheels k and k^2 are such that one revolution of the wheel k will, by means of the teeth k' thereon, produce at least one revolution of the beveled wheel k^2 and shaft K^3. The beveled wheel k is held on shaft K by means of washer p^8 and bolt or screw p^9, Figs. 9 and 10.

I prefer to have the relative sizes of beveled wheels k and k^2 and the number of teeth k' on wheel k such that slightly more than one revolution will be given to beveled wheel k^2 upon each revolution of wheel k and to rely upon the catch between the beveled wheel k^2 and the gear-wheel q' (illustrated in Figs. 7 and 8 of the drawings) to obtain one revolution of the wheel q' and also to construct wheel q' of suitable diameter, so that one revolution thereof will produce the requisite longitudinal movement of shaft or rod Q and mandrel B. The catch between beveled wheel k^2 and shaft R^3 consists of the latch R, pivotally attached to bearing S, as by bolt r, pin r', radially-movable bolt R′, spring R^2, and projection r^2.

r' is a pin or bolt in bearing S preventing forward movement of the lower end of latch R.

R′ is a radially-movable bolt on gear-wheel q', and R^2 is a spring yieldingly holding bolt R′ in an extended position, as is illustrated in Fig. 8 of the drawings, at which time such bolt is in engagement with the projection r^2 on beveled wheel k^2. When bolt R′ and pro-

jection r^2 are in engagement, as just described, rotation of shaft K^3 and beveled wheel k^2 produces rotation of wheel q', together with gear-wheel r^3, hereinafter described, to which it is secured by connecting-sleeve q^4 through bearing M adjacent thereto. (See Fig. 8.) The outer end of the bolt R′ projects beyond the periphery of the hub of wheel q', and in the rotation of such wheel such outer end is forced under the end of latch R, and thereby the bolt is moved radially in toward shaft R^3 and out of engagement with projection r^2 on wheel k^2, and thereafter further rotation of wheel k^2 will not produce rotation of the wheels q' r^3.

Rotation of shaft K and beveled wheel k thereon in the direction indicated by the arrow on wheel k in Fig. 7 of the drawings will rotate wheel q' and move rod or shaft Q and mandrel B longitudinally to withdraw the mandrel from between bearings H H, Figs. 1, 3, and 4, and from the roll or case on such mandrel.

To return the rod or shaft Q and mandrel B from the position last above described to a position so that the mandrel is in the bearings H H and in position so that a roll or casing may be wound thereon, I secure the vertically-movable geared rack R^4 to engage with geared wheel r^3 on shaft R^3 and place the abutment R^5 on rack R^4, so that arm r^4 (which is secured rigidly to shaft K^4) will engage therewith when shaft K^4 is rotated and such rack is in a raised position and force the rack down.

R^6 R^6 are the bearings of shaft K^4. One of such bearings R^6 is shown in Fig. 2, the other in Fig. 7, and both are indicated by broken lines in Fig. 1.

S S′ are the bearings of rod or shaft Q. Horizontal bar I is also secured to bearings S S′, as by the screws or bolts S^2 S^2, Figs. 1 and 7.

In order that the mandrel B shall be in proper position when returned to between bearings H H by the mechanism hereinbefore described, so that the paper-grasping device E will be in place underneath bar L and fingers l and in proper position to grasp paper, strawboard, or cardboard presented thereto on table A and wind the same into a roll or case, it is essential that the mandrel be stopped at a given place and there maintained, and for this reason I provide the bolt T, Fig. 3, yieldingly held in a corresponding hole in gear-wheel n', (such hole being indicated by broken lines t in Fig. 3,) spring T′ yieldingly holding the bolt T in the hole indicated by broken lines t and lever T^2 pivotally mounted, as by pin or bolt t', on bearing T^3, so that one end thereof is in engagement with bolt T and the other end thereof with cam T^4 on shaft K′.

t^2 is the bearing of bolt T, such bolt being longitudinally movable in its bearing.

When the mandrel B is about to be rotated, the cam T^4 turns the lever T^2 slightly on its pivot t', forcing the bolt T back against the resiliency of spring T′, thus retracting such bolt from the hole in wheel n', permitting such wheel to turn. The turning of the wheel n' by means hereinbefore described turns the mandrel B. Wheel n' is of proper relative diameter to wheel n^3 on mandrel B to turn such mandrel the desired number of times to make a roll or tube thereon, and cam T^4 permits the lever T^2 to be turned by the longitudinal movement of bolt T at about the time wheel n has made a complete revolution, (and mandrel B has made a given number of complete revolutions,) and as such wheel n' completes its revolution the bolt T is forced into the hole in such wheel by spring T′, where it remains until again retracted by cam T^4 and lever T^2. When the bolt T is in the hole (indicated by dotted lines t) in wheel n', such wheel is held rigidly in place thereby, and thus wheel n^3 and mandrel B are held firmly in place, such mandrel being at such time in proper position for the grasping device E and bar L to coact.

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

1. In a machine for making rolls, a rotatable and longitudinally-movable mandrel, provided with a longitudinally-extending groove thereon, means to force flexible material into the groove, mechanism to grasp such flexible material to hold the same to the mandrel, means to release such grasping mechanism, a gear-wheel mounted on the mandrel to turn therewith and to permit longitudinal movement of the mandrel therethrough, a rotatable shaft, a gear-wheel loosely mounted on the shaft to intermesh with the gear-wheel on the mandrel, means to lock the loosely-mounted gear-wheel to the rotatable shaft and means to release such locking mechanism, and means to move the mandrel longitudinally while the same is not rotating; substantially as described.

2. In a machine for making rolls, a rotatable and longitudinally-movable mandrel, mechanism to grasp flexible material to hold the same to the mandrel, means to release such grasping mechanism, a gear-wheel mounted on the mandrel to turn therewith and to permit longitudinal movement of the mandrel therethrough, a rotatable shaft, a gear-wheel loosely mounted on the shaft to intermesh with the gear-wheel on the mandrel, means to lock the loosely-mounted gear-wheel to the rotatable shaft and means to release such locking mechanism, a longitudinally-movable non-rotatable shaft mounted in alinement with the mandrel, a connection between such non-rotatable shaft and the mandrel, a geared rack on the non-rotatable shaft, a rotatable shaft, a gear-wheel on such shaft, engaging with the rack, an additional rotatable shaft, at right angles to the first-named shaft, beveled wheels on the shafts, the wheel on the additional shaft, loosely mounted thereon and having teeth on a portion of the periphery thereof engaging with

the teeth of the other beveled gear, locking mechanism between the loosely-mounted beveled wheel and the shaft on which it is mounted and means to automatically actuate such locking mechanism in the continuous rotation of such shaft; substantially as described..

3. In a machine for making rolls, a rotatable and longitudinally-movable mandrel, mechanism to grasp flexible material to hold the same to the mandrel, means to release such grasping mechanism, means to rotate the mandrel, means to stop such rotation, and means to move the mandrel longitudinally when the same is not rotating, a transversely-movable bar mounted above the mandrel, fingers on such bar, and means to force the bar down when the grasping mechanism of the mandrel is open and thereunder; substantially as described.

4. In a machine for making rolls, a rotatable and longitudinally-movable mandrel, mechanism to grasp flexible material to hold the same to the mandrel, means to release such grasping mechanism, a gear-wheel mounted on the mandrel to turn therewith and to permit longitudinal movement of the mandrel therethrough, a rotatable shaft, a gear-wheel loosely mounted on the shaft to intermesh with the gear-wheel on the mandrel, means to lock the loosely-mounted gear-wheel to the rotatable shaft and means to release such locking mechanism, and means to move the mandrel longitudinally while the same is not rotating; a transversely-movable bar mounted above the mandrel, fingers on such bar and means to force the bar down when the grasping mechanism of the mandrel is open and thereunder; substantially as described.

5. In a machine for making rolls, a rotatable and longitudinally-movable mandrel, mechanism to grasp flexible material to hold the same to the mandrel, means to release such grasping mechanism, a gear-wheel mounted on the mandrel to turn therewith and to permit longitudinal movement of the mandrel therethrough, a rotatable shaft, a gear-wheel loosely mounted on the shaft to intermesh with the gear-wheel on the mandrel, means to lock the loosely-mounted gear-wheel to the rotatable shaft and means to release such locking mechanism, a longitudinally-movable non-rotatable shaft mounted concentrically to the mandrel, a connection between such non-rotatable shaft and the mandrel, a geared rack on the non-rotatable shaft, a vertically-movable geared rack, a projection on such rack, a rotatable shaft, a gear-wheel on such shaft, engaging with the rack and an additional gear-wheel on such shaft engaging with the vertically-movable rack, an additional rotatable shaft, at right angles to the first-named shaft, beveled wheels on the shafts, the wheel on the additional shaft loosely mounted thereon and having teeth on a portion of the periphery thereof engaging with the teeth of the other beveled gear, locking mechanism between the loosely-mounted beveled wheel and the shaft on which it is mounted, means to automatically actuate such locking mechanism in the continuous rotation of such shaft, a third rotatable shaft and an arm on such third shaft to engage with the projection on the vertically-movable rack; substantially as described.

THOMAS GILLARD.

In presence of—
CHARLES TURNER BROWN,
CORA A. ADAMS.