F. N. ETHRIDGE.

EXPANSIBLE ROLL.

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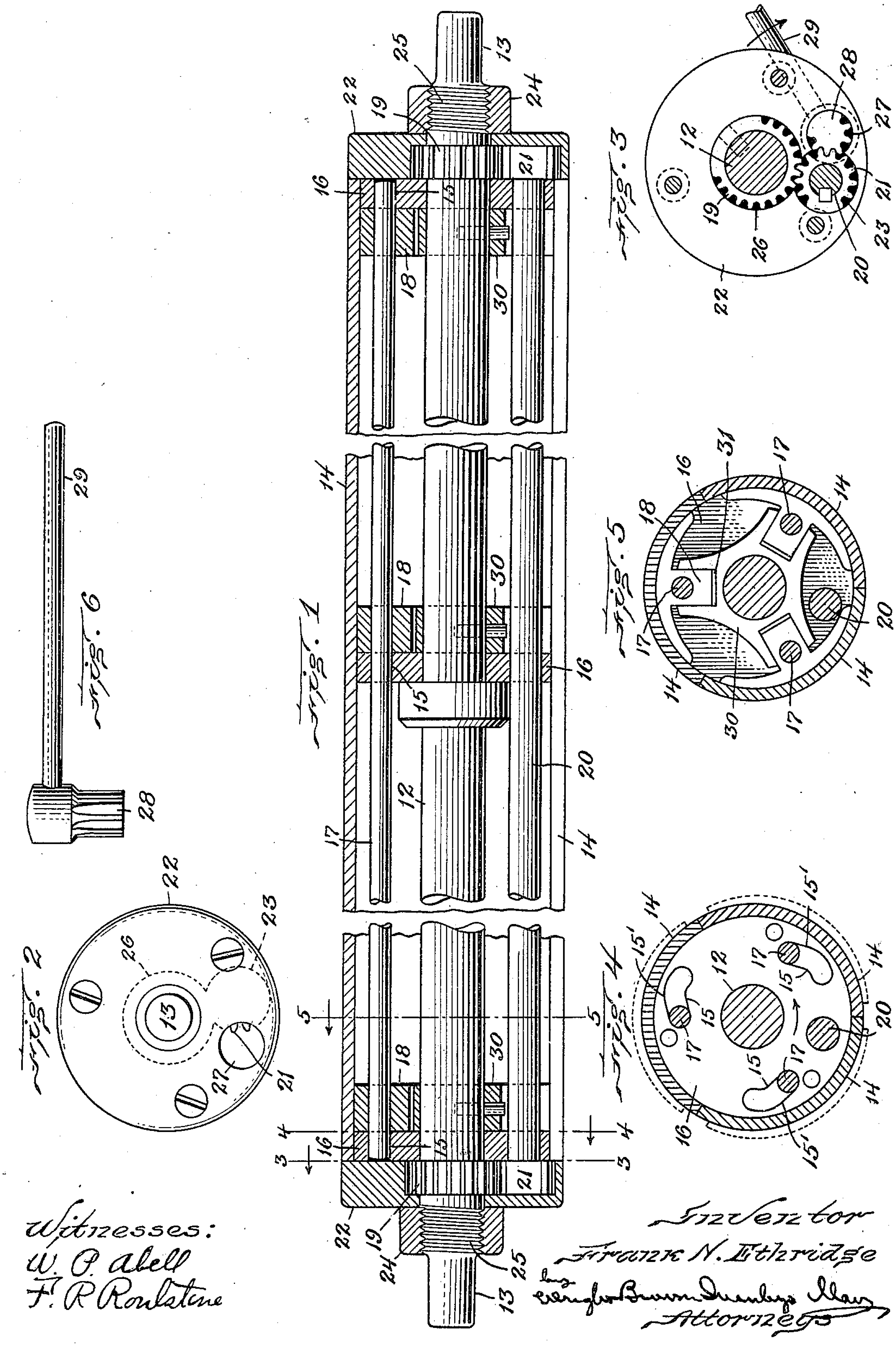

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UNITED STATES PATENT OFFICE.

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EXPANSIBLE ROLL.

934,964. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed January 9, 1909. Serial No. 471,445.

To all whom it may concern:

Be it known that I, FRANK N. ETHRIDGE, of Rumford, in the county of Oxford and State of Maine, have invented certain new and useful Improvements in Expansible Rolls, of which the following is a specification.

This invention relates to rolls or mandrels on which sheet material, such as paper, is to be wound, the roll being variable in diameter and adapted to be expanded before the winding operation, and contracted thereafter to permit its withdrawal from the accumulation wound thereon.

The invention has for its object to provide a roll or mandrel of this character of strong and durable construction, and having body sections collectively forming the periphery of the roll, which are firmly supported when projected to expand the roll, and are adapted to be quickly and easily adjusted to vary the diameter of the roll.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification,—Figure 1 represents a longitudinal section of an expansible roll embodying my invention. Fig. 2 represents a view of one end of the roll. Fig. 3 represents a section on line 3—3 of Fig. 1, looking toward the adjacent end of the roll. Fig. 4 represents a section on line 4—4 of Fig. 1. Fig. 5 represents a section on line 5—5 of Fig. 1. Fig. 6 represents a side view of the winding key or crank used by the operator to expand and contract the roll.

The same reference characters indicate the same parts in all the figures.

In the drawings,—12 represents an elongated shaft or spindle which forms the axis of the roll and may be made of any desired length, the end portions 13, 13 of the spindle forming journals adapted to be inserted removably in suitable bearings which support the roll during the operation of winding a sheet thereon.

The body of the roll is composed of a plurality of segmental body sections 14 which are radially movable toward and from the spindle, said sections when adjusted inwardly, as shown in Fig. 5, meeting at their edges and forming the cylindrical periphery of the roll. When the sections are adjusted outwardly, as indicated by dotted lines in Fig. 4, they form an enlarged interrupted periphery. The body sections 14 are seated on cams 15 which are preferably the inner sides of cam-shaped slots formed in disks 16 which are mounted to rotate upon the spindle 12, the body sections 14 being provided with bearing members 17 which are preferably elongated rods engaged with and passing through inwardly projecting arms 18 rigidly attached to the body sections.

The cams 15 are so formed that a movement of said cams in the direction indicated by the arrow in Fig. 4 will force the bearing members 17 and the body sections 14 radially outward, the body sections being thus adjusted to the position indicated by dotted lines in Fig. 4. The outer sides 15′ of the slots, whose inner sides form the cams 15, limit the outward movement of the bearing members 17 and sections 14, and thus prevent the separation of the body sections from the cams, the said outer sides 15′ causing the inward movement of the bearing members and body sections when the cams are turned in the direction opposite that indicated by the arrow in Fig. 4, thus contracting the roll. Means are provided for simultaneously turning the cams in either direction, said means being preferably as next described.

19, 19 represent gears rigidly attached to the spindle 12 near the end portions of the latter.

20 represents a rock shaft which passes through the series of disks 16, said disks being provided with orifices which closely fit the rock shaft, so that a lateral movement of the rock shaft in a segmental path will turn the cams simultaneously. The ends of the rock shaft 15 are provided with gears 21 which mesh with the fixed spindle gears 19. The ends of the rock shaft are supported by heads 22 which are journaled to rotate on the spindle and are provided with bearings 23 for the rock shaft, said bearings being preferably formed to bear on the perimeters of the gears 21, so that said gears constitute the journal portions of the rock shaft. The heads 22 are confined against lateral movement toward the ends of the spindle by stop collars 24 which are internally threaded and engaged with threaded portions 25 of the spindle.

The heads 22 are provided with cavities 26 which contain the spindle gears 19, and com-

municate with the bearings 23, as indicated in Fig. 2. One of the heads 22 is provided with an opening 27 into which one of the gears 21 partially projects, as shown in Fig. 2, said opening being adapted to receive an operating member 28 which is rotatable in the opening, and is preferably provided with gear teeth meshing with the teeth of one of the rock shaft gears 21, as shown in Fig. 3. The member 28 is provided with an arm or lever 29, the said operating member and arm constituting a key or crank adapted to be applied for the purpose of rotating the rock shaft 20.

It will be seen that when the rock shaft is rotated, the fixed spindle gears 26 and the rock shaft gears 21 meshing therewith, cause a limited planetary motion of the spindle gears 21, and a lateral movement of the rock shaft 20 in a segmental path. The rock shaft being engaged as described with the series of cams, its lateral movement causes the simultaneous turning of the cams on the spindle, and a corresponding adjustment of the body sections 14 by the cams.

The spindle is provided with radially arranged guide members adapted to coöperate with complemental guide members on the body sections 14 in controlling and guiding the body sections in their radial movements. The guide members on the spindle are preferably provided by spiders 30 affixed to the spindle and having radial slots 31, the sides of which engage the sides or the arms 18 on the body sections, said arms being adapted to slide radially in the slots 31. When the cams are in the position shown in Fig. 4, the body sections are at the inward extreme of their movement, as shown by full lines in said figure, the roll being therefore contracted. To expand the roll, the operating member 28 is inserted in the opening 27 and given a partial rotation in the direction indicated by the arrow in Fig. 3. This operation turns the cams 15 in the direction indicated by the arrow in Fig. 4, thus causing the cams to force the bearing members 17 and body sections 14 outwardly. It will be seen by reference to Fig. 4 that the cams are formed to positively support the bearing members 17 and body sections 14 in their outwardly adjusted position, so that the expanded roll is adapted to support any pressure likely to be exerted upon it by the material wound thereon. When the cams are turned in the opposite direction, the body sections are quickly retracted and adapted to release the roll from the coil formed thereon.

I claim:

1. An expansible roll comprising a spindle forming the axis of the roll, a series of adjusting cams journaled on the spindle, segmental roll-body sections seated on said cams and radially movable thereby toward and from the spindle, means for simultaneously rotating the cams to cause the radial adjustment of the body sections, radial guide members affixed to the spindle, and complemental guide members affixed to the body sections and coöperating with said radial guide members.

2. An expansible roll comprising a spindle forming the axis of the roll, a series of adjusting cams journaled on the spindle, segmental roll-body sections, each carrying an elongated bearing rod at its inner side, said rods being seated on the adjusting cams, means for simultaneously rotating the cams to cause the radial adjustment of the body sections, and means for guiding the body sections in their radial movements.

3. An expansible roll comprising a spindle forming the axis of the roll, a series of adjusting cams journaled on the spindle, segmental roll-body sections, each having a series of inwardly projecting guide members and an elongated bearing rod engaged with said guide members and seated on the cams, complemental guide members affixed to the spindle and engaging the guide members on the body sections, and means for simultaneously rotating the cams to cause the radial adjustment of the body sections.

4. An expansible roll comprising a spindle forming the axis of the roll, a series of adjusting cams journaled on the spindle, segmental roll-body sections seated on the cams, and radially movable thereby, means for guiding the body sections in their movements, a laterally movable rock shaft extending through and engaged with the series of cams, and means for moving the rock shaft laterally in a segmental path to simultaneously turn the cams.

5. An expansible roll comprising a spindle forming the axis of the roll, a series of adjusting cams journaled on the spindle, segmental roll-body sections seated on the cams, and radially movable thereby, means for guiding the body sections in their movements, a laterally movable rock shaft extending through and engaged with the series of cams, heads journaled on the spindle at the ends of the roll and supporting the rock shaft, gears affixed to the end portions of the spindle, and gears on the end portions of the rock shaft meshing with the spindle gears, the rock shaft being rotatable to give its gears a partial planetary motion, and cause a lateral movement of the rock shaft in a segmental path whereby the cams are simultaneously turned.

6. An expansible roll comprising a spindle forming the axis of the roll, a series of adjusting cams journaled on the spindle, segmental roll-body sections seated on the cams, and radially movable thereby, means for guiding the body sections in their movements, a laterally movable rock shaft extending through and engaged with the series of

cams, heads journaled on the spindle at the ends of the roll and supporting the rock shaft, gears affixed to the end portions of the spindle, and gears on the end portions of the rock shaft meshing with the spindle gears, one of said heads having an opening adapted to receive an operating crank or key whereby the rock shaft may be rotated.

7. An expansible roll comprising a spindle forming the axis of the roll, a series of disks journaled on the spindle, each having a cam slot, segmental roll-body sections having bearing rods located in said slots, means for simultaneously rotating the disks to cause the inner sides of the cam slots to radially adjust the body sections, and means for guiding the sections in their radial movements, the outer sides of the slots coöperating with said bearing rods in limiting the outward movement of the sections.

In testimony whereof I have affixed my signature, in presence of two witnesses.

FRANK N. ETHRIDGE.

Witnesses:

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