

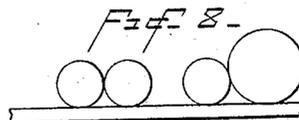
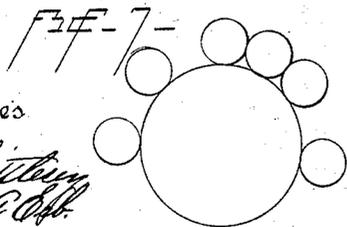
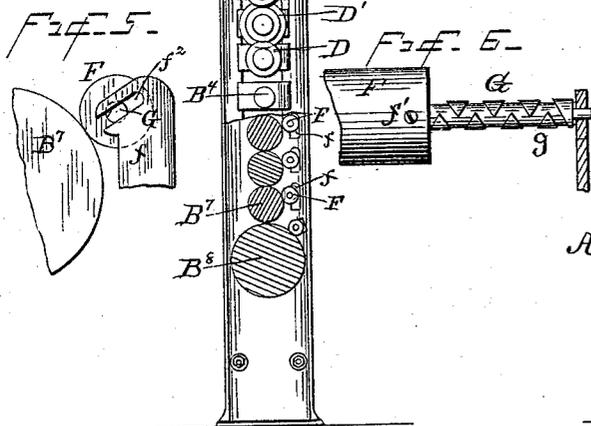
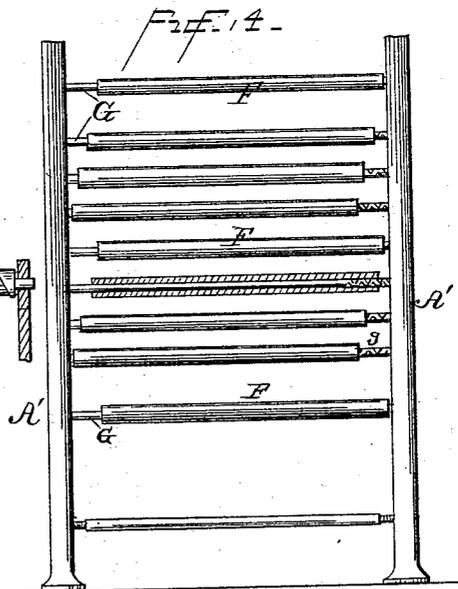
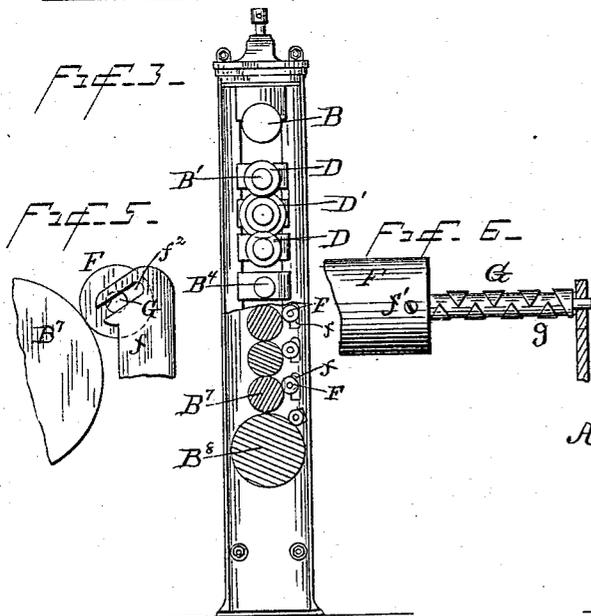
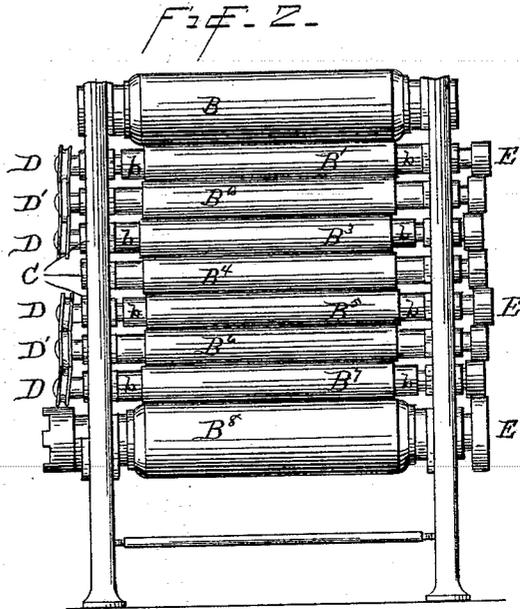
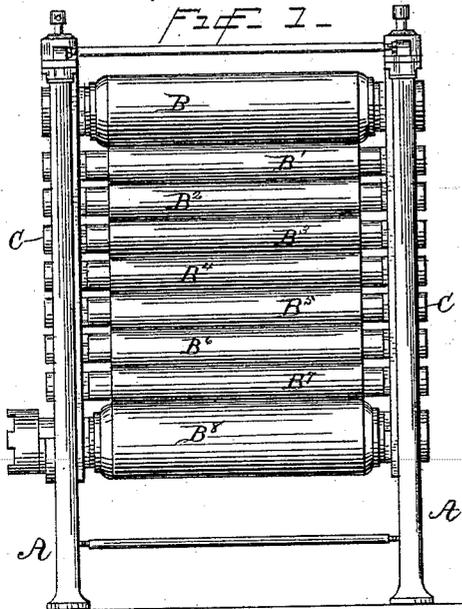
(No Model.)

P. HOWIESON.

METHOD OF PRODUCING CYLINDRICAL SURFACES.

No. 439,819.

Patented Nov. 4, 1890.



Witnesses

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UNITED STATES PATENT OFFICE.

PETER HOWIESON, OF MALONE, NEW YORK, ASSIGNOR OF ONE-HALF TO
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METHOD OF PRODUCING CYLINDRICAL SURFACES.

SPECIFICATION forming part of Letters Patent No. 439,819, dated November 4, 1890.

Application filed April 26, 1889. Serial No. 308,732. (No model.)

To all whom it may concern:

Be it known that I, PETER HOWIESON, a citizen of the United States, residing at Malone, in the county of Franklin and State of New York, have invented certain new and useful Improvements in Methods of Producing Cylindrical Surfaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to the production of cylindrical surfaces, and has reference more particularly to the manufacture of rolls for calendering paper or other purposes.

In machines for calendering paper, rolling metal, and the like it is of the utmost importance that the rolls shall be perfectly straight, so that as two of them revolve adjacent to each other the space between them shall always be of uniform thickness at all points both of length and of circumference of the rolls. If not, the material that has been passed between them will not be of uniform thickness, which is a serious fault. It has been the custom to grind the surfaces of such rolls to bring them to a true cylindrical shape, and several machines have been devised to accomplish this result. So far as I am aware they all depend upon the action of a revolving grinding-wheel arranged to be traversed along guides in a line parallel with the axis of the roll upon which the grinding-wheel operates. The roll is mounted in bearings so that it can be turned to bring every part of its surface under the action of the grinding-wheel. These machines are frequently defective, however, owing to the practical difficulty of preserving an exact parallelism between the path of the wheel and the axis of the roll, the variation due to the wearing of the wheel, the presence of hard or soft spots in the roll, and other causes. Moreover, this mode of grinding requires a special and costly machine in which each roll is separately treated.

My process dispenses with all grinding-

wheels and other costly machinery. It can be carried out in a variety of ways, and though in some cases a special machine may be desirable for applying it, yet such machine may be simple and inexpensive. The process is adapted to finishing new rolls and also to truing old ones that have become worn or bruised. It can be applied to a set of new or old rolls mounted in the machine to which they belong or to one or more rolls removed from the machine.

In the drawings, Figure 1 is an elevation of a set of calender-rolls. Fig. 2 is an elevation of a similar set of rolls provided with devices for giving an axial reciprocating movement to certain rolls. Fig. 3 is an end elevation partly in section of a machine similar to that shown in Fig. 2 and provided with distributing-rollers. Fig. 4 is an elevation of a frame provided with a set of rollers for distributing a grinding mixture upon the surface of a set of rolls. Figs. 5 and 6 are details. Figs. 7 and 8 are diagrams showing other applications of the invention.

So far as I am aware the grinding of a curved surface has heretofore been effected by causing it to move in contact with another curved surface in such a manner that the two surfaces move in opposite directions or at different speeds, so as to produce a rubbing action between them. I am not aware that it has ever been proposed to grind a curved surface by simply rolling it in contact with another surface, so that the two surfaces move in the same direction and at the same speed.

My process consists in placing one or more calender-rolls or other cylindrical objects in contact with a curved or a plane surface, applying an abrasive or grinding substance to their surfaces, and then rolling them in contact with each other. The truing operation is greatly facilitated by giving one or more of the rolls an axial reciprocating motion at the same time that the rolling is taking place. When two or more rolls are reciprocated, the motion should be alternated, so that any two adjacent rolls will move in opposite directions. The combination of endwise and rolling motions causes the surfaces to react upon each other, and the presence of the abrasive

or grinding substance between them speedily reduces all inequalities and brings the roll or rolls to a true cylindrical surface.

The abrasive or grinding substance may be used for that purpose. I prefer a mixture of emery-powder and oil. It can be applied to the rolls in any convenient manner—as, for instance, by a swab or brush in the hands of an attendant or by a set of distributing-rollers similar to the inking-rollers in a power printing-press. The distributing-rollers may be given an axial reciprocating motion, if desired, and may be composed of a material adapted to assist in the grinding action, though this is not necessary.

In some rolling-machines—such as calendering-machines—the rolls normally rest upon each other. Such a machine is shown in Fig. 1, in which the frame A supports a set of rolls B B' B², &c., suitably journaled in boxes C, which are free to slide vertically in the frame A. In such a machine as this it is only necessary to apply the abrasive substance to the rolls and start the machine in order to cause the rolls to true themselves. In some cases special temporary attachments may be provided to cause the rolls to reciprocate axially at the same time that they are rotating in their bearings in rolling contact with each other. An arrangement for this purpose is shown in Fig. 2, in which the journals of a stack of rolls are extended beyond their bearings at each end. The necks of the rolls B' B² B³ B⁷ are shorter than the necks of the other rolls, so that the rolls named can have an axial reciprocating movement in their bearings, while the remaining rolls have no such motion. In order to produce the axial reciprocation of the rolls B' B² B³ B⁷ their journals are fitted at one end with grooved wheels D set obliquely to the axis of the rolls. On the extended journal of the roll B² is fixed a wheel D', having a projecting flange, which engages with the groove in the wheels D on the rolls B' and B³. A similar wheel D' on the journal of the roll B⁶ engages with the wheels D on the rolls B⁵ and B⁷. The extended journals at the other ends of the rolls are all provided with gear-wheels E, meshing with each other, so that all the rolls are positively driven at the same rate of peripheral speed. The gear-wheels have sufficiently broad faces to insure their always remaining in mesh while the rolls are reciprocated. When power is communicated to the stack, the rolls B' B² B³ B⁷ will be given an axial reciprocation as well as a rotary motion, which tends to spread the grinding mixture evenly on their surfaces. The abrasive substance may be applied by hand or by a special device. This latter may consist of a set of distributing-rollers F, mounted in bearings *f*, temporarily attached to the frame of the machine, as shown in Fig. 3. These rollers may simply rotate in contact with the rolls; but they may, if desired, be given an

axial reciprocation by means of certain devices—such, for instance, as that shown in Fig. 6. The roller as here shown is made shorter than the space between its bearings, and is mounted loosely on a stationary shaft G. A stud *f'* projects inwardly and engages with a double screw-thread *g*, cut in the shaft G, so that as the roller rotates by contact with the roll it will also be carried back and forth continuously on its stationary shaft G. The ends of the shaft are flattened, as shown in Fig. 5, and are received in inclined slots *f''* in the bearings *f*, so that the roller constantly gravitates against the rolls. When the rolls have been ground true, the wheels D D' and the gear-wheels E are removed. The rolls B' B² B³ B⁷ are placed with their ends in line with the other rolls, and collars or washers are inserted between their boxes and the ends of their short necks, so as to prevent any end-wise motion. The rolls are then ready for use.

When it is not convenient to attach the special devices for reciprocating the rolls and feeding the abrasive substance to the calendering or other rolling machine, a special frame-work A', Fig. 4, may be provided, adapted to receive the rolls in the same relative arrangement they occupy when at work and furnished with appliances for rotating and reciprocating the rolls and feeding them with the abrasive substance, preferably by means of distributing-rollers F, as shown. In other cases it may be convenient to arrange the rolls around the circumference of a drum, as indicated in Fig. 7, by which they can all be rotated by rolling contact and properly supplied with an abrasive mixture. In this arrangement some, or all, or none of them may be in contact with each other.

The process can also be carried out by placing the rolls side by side, in contact or not, as desired, on a horizontal or inclined plane surface, as indicated in Fig. 8, and then rolling them back and forth on said surface. Axial reciprocation may be given them, if desired, and the abrasive substance can be supplied to them in any convenient manner.

I have mentioned several different modes of carrying out the invention to show that the process does not depend upon any particular machine or device, but is capable of a great variety of development.

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

1. The process of truing the surface of a cylindrical object, which consists in applying to it an abrasive substance and rolling it in contact with another surface, substantially as described.

2. The process of truing the surface of a cylindrical object, which consists in applying to it an abrasive substance, rolling it in contact with another surface, and giving it at the same time an axial reciprocation, substantially as described.

3. The process of truing two or more cylin-

drical objects, which consists in applying to their surfaces an abrasive substance and rolling them in contact with each other, substantially as described.

5 4. The process of truing two or more cylindrical objects, which consists in applying to their surfaces an abrasive substance, rolling them in contact with each other, and at the same time imparting to one or more of them
10 an axial reciprocation, substantially as described.

15 5. The process of truing two or more cylindrical objects, which consists in applying to their surfaces an abrasive substance, rolling them in contact with each other, and at the same time imparting to them an axial reciprocation in opposite directions, substantially as described.

6. The process of truing a set of calendering-rolls, which consists in mounting them in bearings, applying to their surfaces an abrasive substance, and rotating them in rolling contact, substantially as described. 20

7. The process of truing a set of calender-rolls, which consists in mounting them in bearings, applying to their surfaces an abrasive substance, rotating them in rolling contact, and at the same time giving one or more of them an axial reciprocation, substantially as described. 25

In testimony whereof I affix my signature i
presence of two witnesses. 30

PETER HOWIESON.

Witnesses:

A. MCDONELL,
MOSES VIAU.