3 Sheets—Sheet 1.

C. FORD, J. M. SLADE & F. BAYLIES.

Rubber-Cutting Machine

No. 204,145. Patented May 28, 1878.

Fig 2.

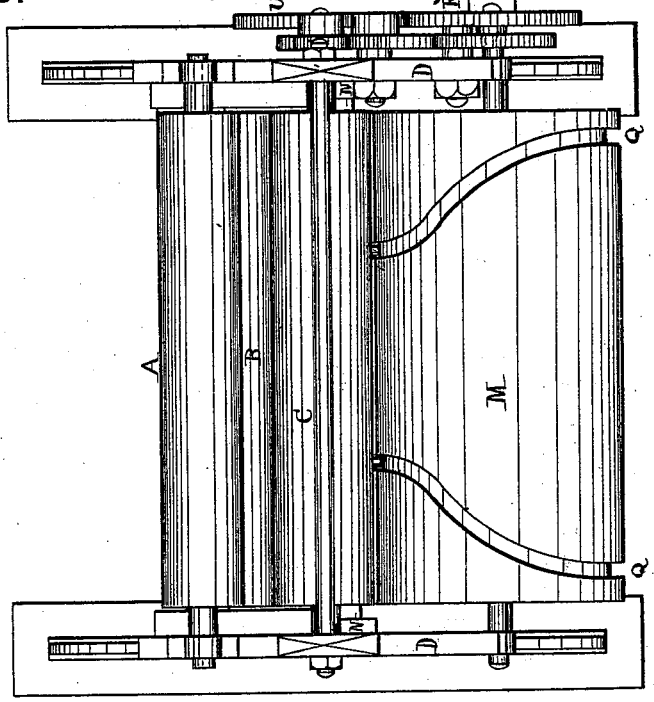
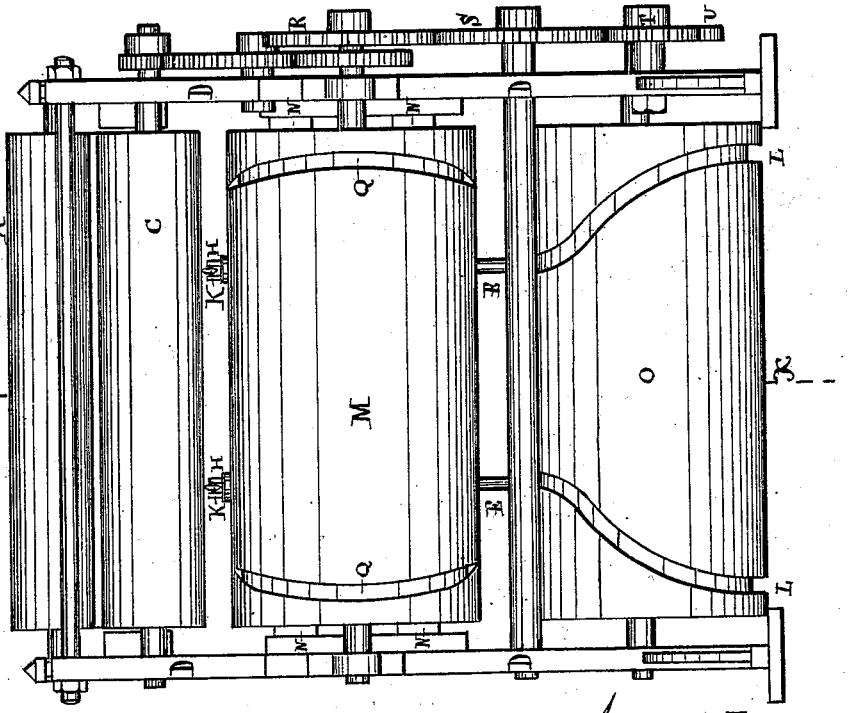


Fig 1.



Witnesses
E. L. Sherman
James McHicks

Inventors.
Charles Ford
Jarvis Morgan Slade
Franklin Baylies
by their atty Wm C Hicks

3 Sheets—Sheet 2.

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Fig 4.

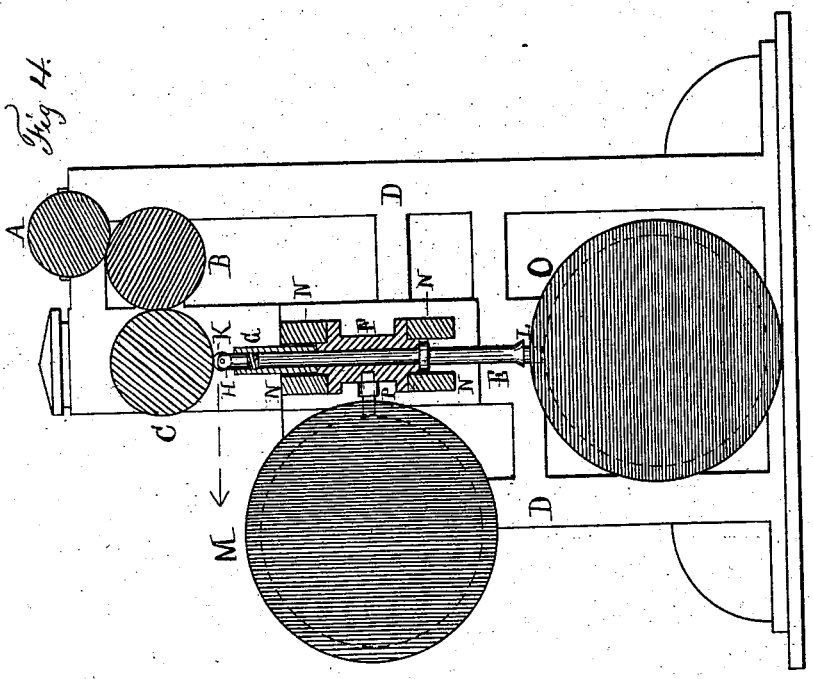
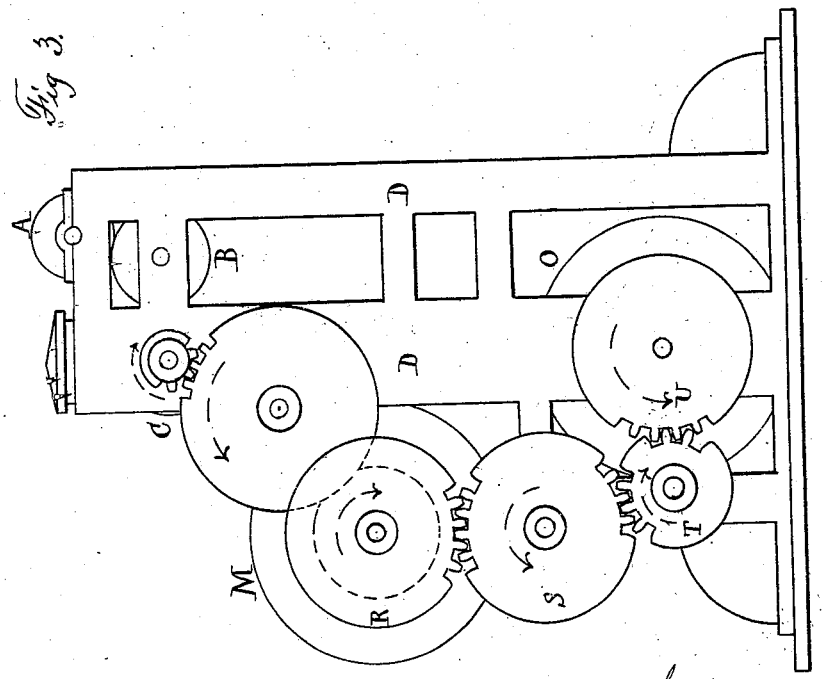


Fig 3.



Witnesses
E. L. Sherman
James M. Hicks

Inventors.
Charles Ford
Jarvis Morgan Slade
Franklin Baylies
by their atty Wm C. Hicks

3 Sheets—Sheet 3.

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Rubber-Cutting Machine

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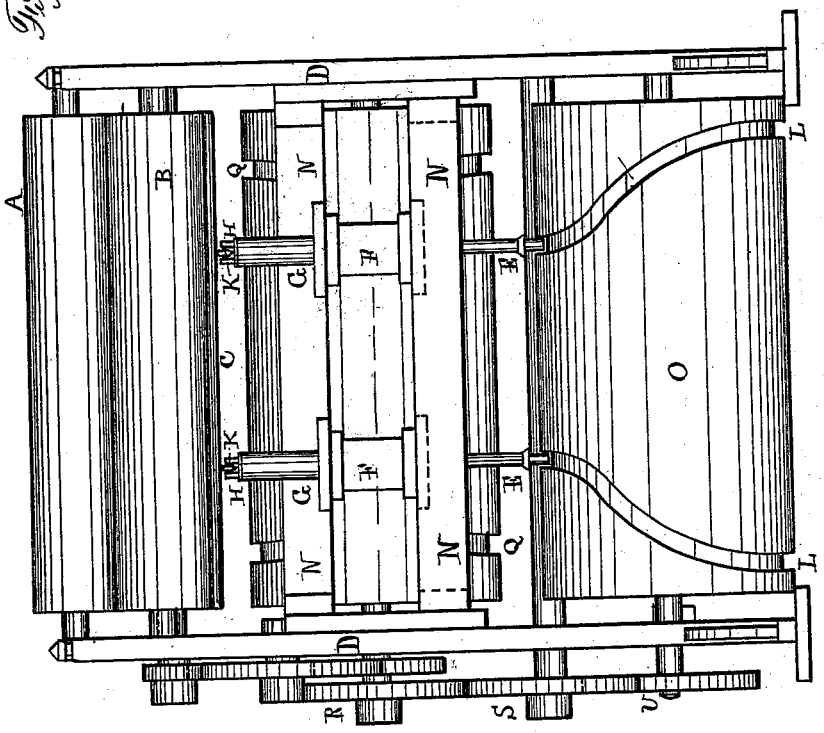
Fig 5.



Witnesses
E. L. Sherman
James McHicks

Inventors
Charles Ford
Jarvis Morgan Slade
Franklin Baylies
by their atty Wm C Hicks

UNITED STATES PATENT OFFICE.

CHARLES FORD, JARVIS M. SLADE, AND FRANKLIN BAYLIES, OF NEW YORK, N. Y.

IMPROVEMENT IN RUBBER-CUTTING MACHINES.

Specification forming part of Letters Patent No. **204,145**, dated May 28, 1878; application filed February 28, 1878.

To all whom it may concern:

Be it known that we, CHARLES FORD, JARVIS MORGAN SLADE, and FRANKLIN BAYLIES, all of the city, county, and State of New York, have jointly invented certain improvements for cutting sheet-rubber and such like materials into shapes or blanks; and we do hereby declare that the following is a full, clear, and exact description and specification of the same, reference being had to the annexed drawings, making part of the same.

Our invention relates, primarily, to the manufacture of rubber shoes, and our improvements are intended to be connected with the rolls now used to make the rubber into sheets.

Previous to our invention rubber had been made into sheets passed through calender-rolls and printing-rolls, to mark out the lines to be followed by the hand in forming the shapes or blanks for rubber shoes or such like articles.

The object of our invention is to dispense wholly or in part with the hand-labor in cutting the rubber sheet into shapes after leaving the printing-rolls, and to cut said sheets into continuous strips shaped and cut ready to be made into blanks by simply separating the duplicated shapes crosswise of the strip.

Our invention is applied close to the calender-rolls, or to the printing-rolls, if such be used; and our invention consists in certain new combinations of mechanism, specifically set forth at the end of this schedule, by means of which we cut the rubber sheet into shapes while the sheet is in motion, thus preparing it for immediate use, and avoiding the expense and a large part of the hand labor in rubber-shoe manufacture.

In order that persons skilled in the art may understand, make, and use our improvements, we will proceed to describe the same as embodied by us, referring to the drawings annexed, in which—

Figure 1 represents a front elevation of our mechanism, with rolls A and B in the upper part of the frame, which represent calender-rolls. Fig. 2 represents a top view of said mechanism. Fig. 3 represents a side elevation of the mechanism, showing the gears for communicating motion from one roll to the other. Fig. 4 is a vertical section at right angles to the axis of the rolls on the line *x x*, Fig. 1. Fig. 5 is a rear elevation of the same.

C is a cutting-roll, under which the sheet of rubber passes after leaving the calender-rolls A and B, the speed of its circumference being that of the rubber sheet. This roll C, as well as all the other rolls of the mechanism, are mounted on shafts provided with bearings in the end frames D D. Under this roll C are two vertical spindles, E E, mounted in bearings in the carriages F F, in such a manner as to enable them to move back and forth in a horizontal direction in a vertical plane passing through the axis of the roll C, and also to rotate on their own axes. Connected to the upper ends of the said spindles E E are sleeves G G, extending above the spindles nearly to the lower surface of the roll C, and they contain short stems H H, which carry the revolving knives K K on horizontal pins, which find bearings in the said stems. The stems H H have a square horizontal cross-section, and fit into square sockets in the upper part of the sleeves, in order to compel them to turn with the spindles and sleeves. Under these stems, in the sockets, are spiral springs resting on the top of the spindles, which serve to continuously press the stems upward, and with them the revolving knives, against the roll C or the rubber sheet under it.

The spindles E E extend downward below the carriages F F, and their ends are flattened on the sides to fit into the cam-grooves L L in the roll O. This flattening is to prevent the spindles from turning around, and to compel the revolving knives, which are set in a vertical plane parallel with the flattened sides, to assume the same angle in reference to the axis of the roll C as the flattened sides of the bottom of the spindles bear to the axis of the roll O during the changes effected by the shapes of the grooves L L, while the roll O revolves.

The roll O is located in the frame under the roll C, and its axis is in the same vertical plane and parallel to it. Cam-grooves L L are cut in its surface, extending entirely around its entire circumference, and are so shaped that they will give the desired shape to the blanks

cut from the sheet-rubber by the revolving cutters or knives as it passes along in the direction of the arrow, Fig. 4.

The speed of the sheet of rubber and the speed of the circumference of the roll O should be the same, in which case the lines cut on the sheet of rubber extending over a length equal to the circumference of the roll O will exactly correspond with the track of the grooves on the circumference of said roll, and the revolving knives K K will always stand at the same angle as the walls of the grooves at the point of contact between the lower ends of the spindles and said walls.

The carriages F F are arranged to slide in a horizontal direction parallel with the axes of the rolls C and O in slides or ways N N. On the side of each carriage, toward the cam-roll M, is a pin, P, fixed in the carriage, and extending horizontally into cam-grooves Q Q cut in the surface of the roll M, and having the same configuration as the grooves L L in roll O. The grooves Q Q on roll M, however, are connected with the grooves L L on roll O by means of the gears R, S, T, and U, so that they can give the same motion to the carriages through the pin P as is given to the said carriages by the spindles E E and grooves L L. The object of the cam-roll M and its grooves is to give a more positive motion to the carriages and spindles, and to relieve the spindles in part from the duty of driving the carriages, and to depend on the grooves L L only to give the proper angle to the revolving knives.

The operation is as follows: Power, being applied to one of the train of rolls, is communicated to the others of the series by means of gears, and it is desirable that the speed of the surface of all rolls should be alike. The rubber, having been made into a sheet by rolls, (not shown in the drawings, but in the usual way,) and the sheet being passed through between the calender-rolls A and B, is carried under the roll C. The sheet meets the revolving knives K K at a line on the under surface of roll C vertically under its axis, and is cut into any desired form, depending on the shape of the cam-grooves of the rolls M and O. The sheet of rubber thus cut is left in continuous lengths, so that it will pass the rolls when it is discharged from the machine. Then the duplicated blanks are cut apart and made up into the articles for which they are adapted.

We propose, in certain cases, to pass the rubber over the roll C and place the cutters and rolls O and M above; but, as the rubber sheet will adhere to the roll C sufficiently to allow the revolving knives to operate, we have adopted the arrangement herein described, as more convenient in many respects, particularly as to the compactness of the parts.

The cams may be made of any desired form, and four spindles with cutters and cams may be used to give shape to the interior of the blank which forms the upper edge of the rubber shoe or other article, also the shape here shown, being the part of the shoe which is attached to the sole.

If a printing or ornamenting roll is to be used, it should be the roll B. In such case the roll B should be separated from roll C a sufficient distance to prevent roll B from pressing the sheet of rubber hard against roll C.

We are aware that revolving knives have been used to trim the sheet of rubber on its edges; but we are not aware that the said cutters have ever been moved in any manner along the surface of the roll to cut the rubber sheet into shapes or blanks.

Having now fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore set forth, of the cutter-roll, one or more carriages and spindles provided with cutters or knives, and one or more revolving cams, shaped and connected substantially as described, to move the spindles and the cutters or knives along the surface of the cutter-roll parallel with its axis, all arranged to operate in the manner and for the purposes set forth.

2. The combination, substantially as hereinbefore set forth, of the cutter-roll, one or more carriages and spindles provided with revolving cutters or knives, and two revolving cams for each carriage and spindle, one cam presenting the cutters at the proper angle to the rubber sheet, and one for giving the cutter a motion along the surface of the cutter-roll parallel with its axis, all constructed and arranged to operate in the manner and for the purposes set forth.

3. The combination, substantially as hereinbefore set forth, of the cutter-roll and one or more carriages and spindles provided with revolving cutters, arranged to move parallel to the axis of the cutter-roll, substantially in the manner and for the purposes set forth.

CHARLES FORD.
JARVIS MORGAN SLADE.
FRANKLIN BAYLIES.

Witnesses:
W. L. BENNEM,
WM. V. HICKS.