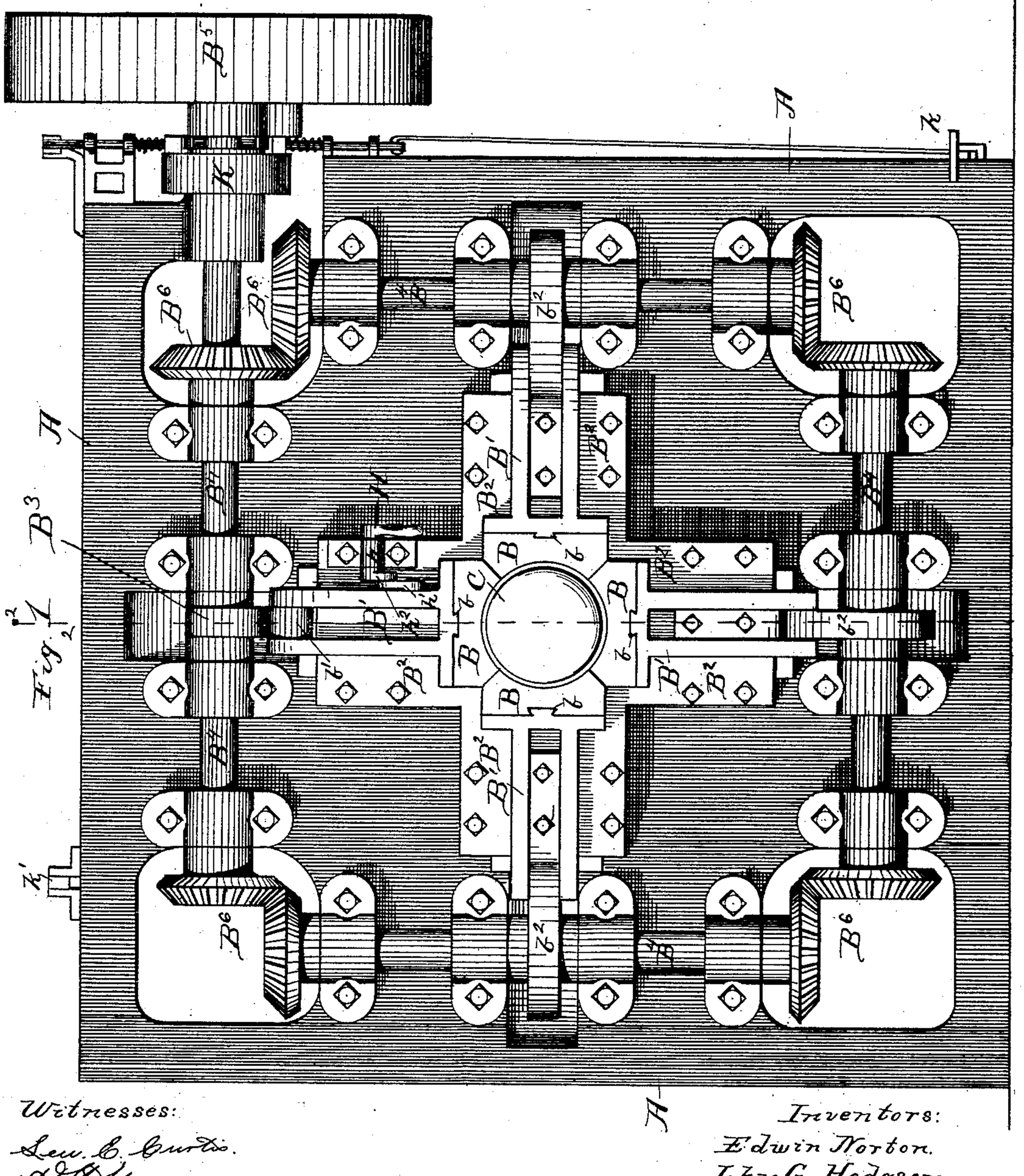
(No Model.) 3 Sheets—Sheet 1.

E. NORTON & J. G. HODGSON.

SHEET METAL BARREL MACHINE.

No. 354,568. Patented Dec. 21, 1886.



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(No Model.) 3 Sheets—Sheet 2.

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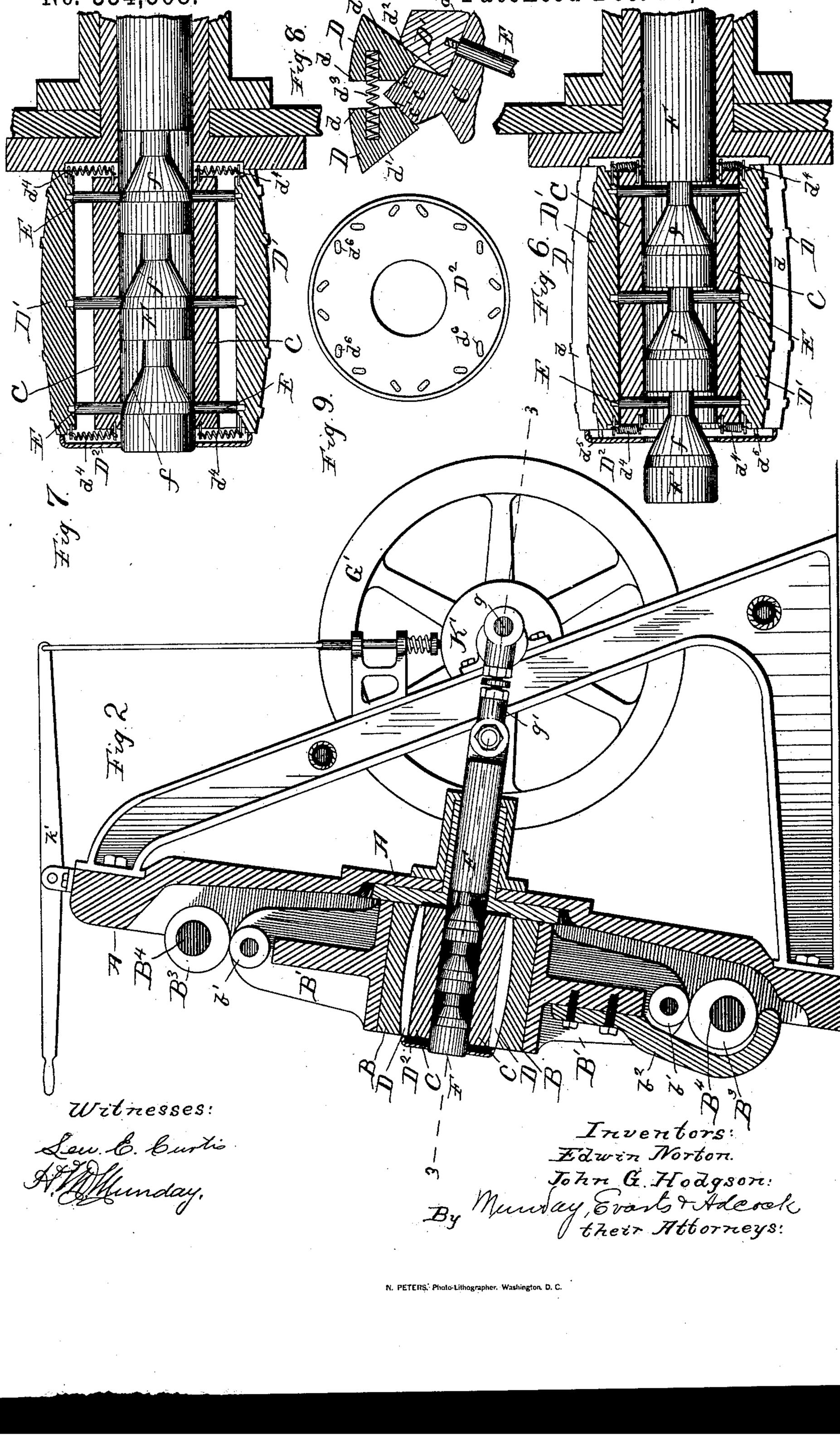

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(No Model.) 3 Sheets—Sheet 3.

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SHEET METAL BARREL MACHINE.

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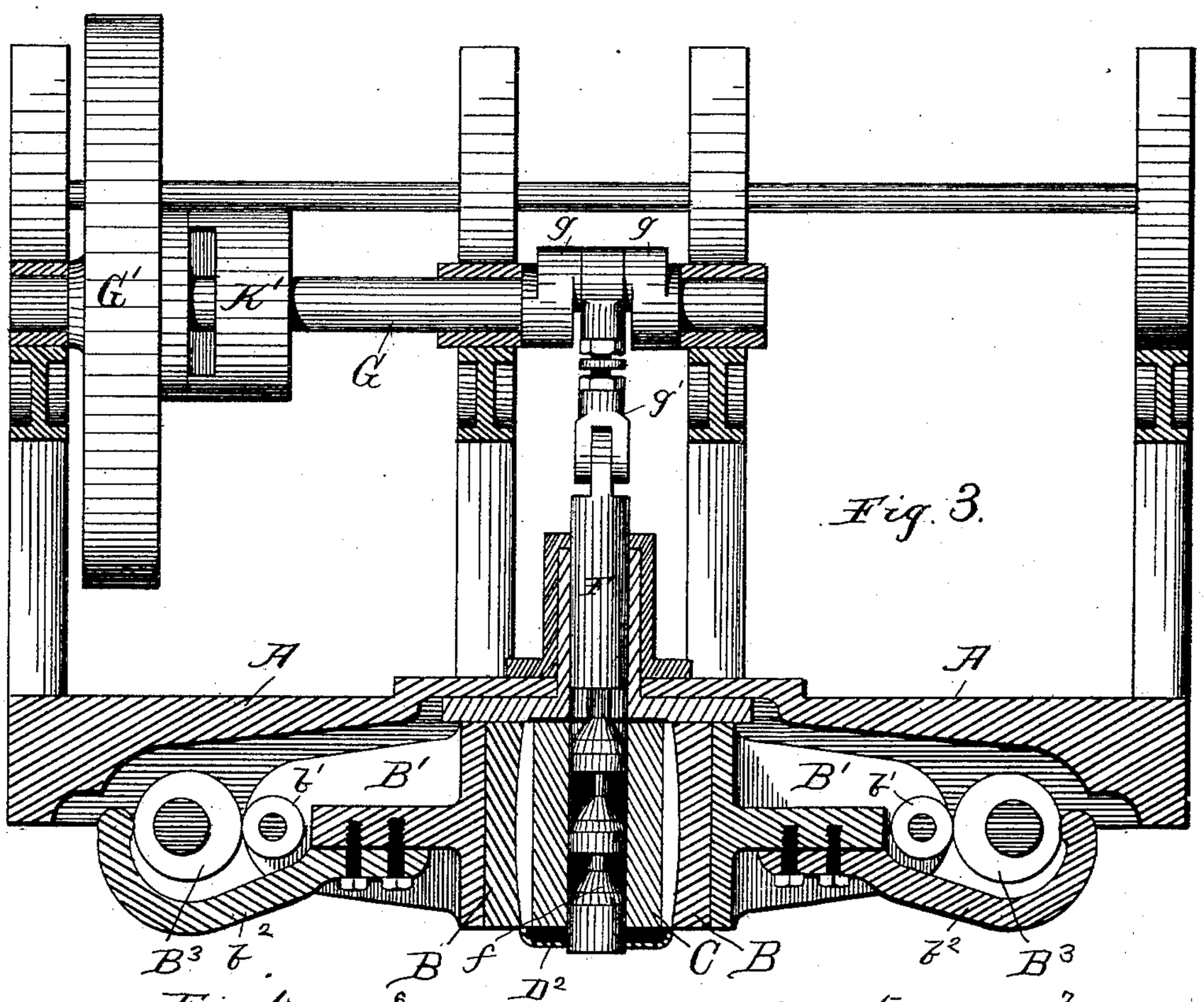


Fig. 3.

Fig. 4.

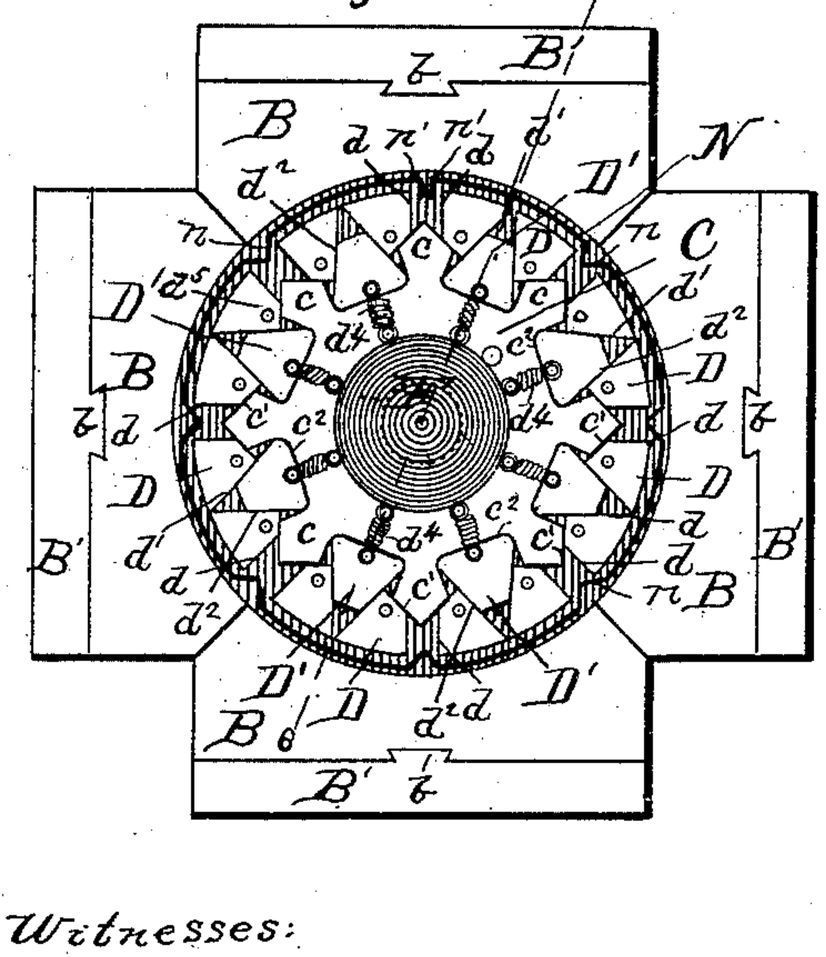
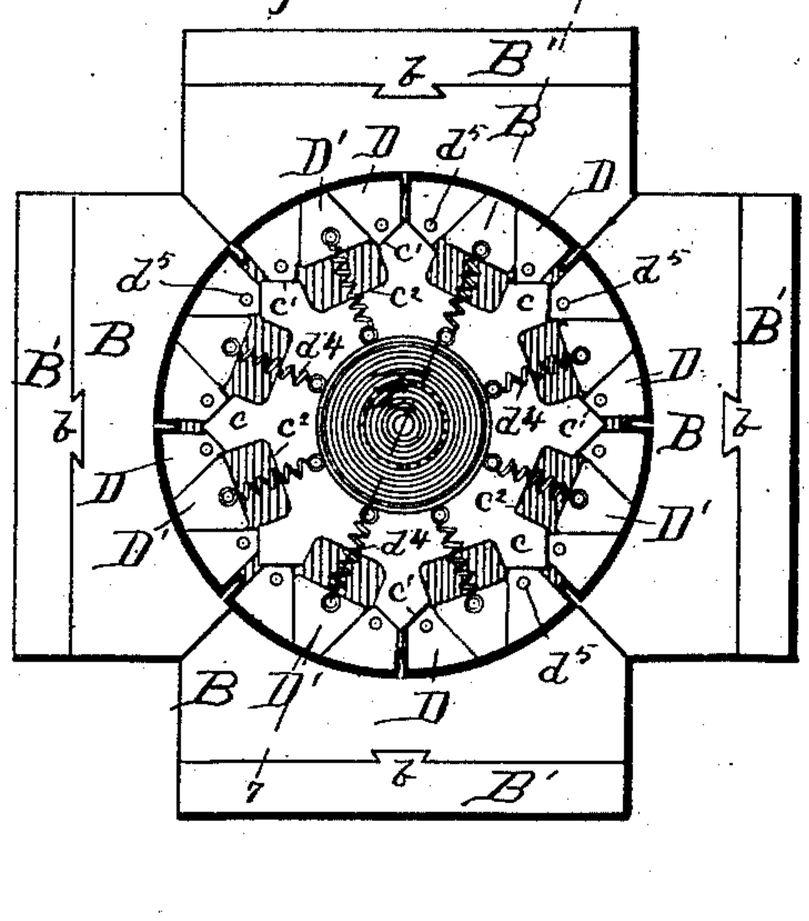


Fig. 5



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UNITED STATES PATENT OFFICE.

EDWIN NORTON AND JOHN G. HODGSON, OF CHICAGO, ILLINOIS, ASSIGNORS TO EDWIN NORTON AND OLIVER W. NORTON, BOTH OF SAME PLACE.

SHEET-METAL-BARREL MACHINE.

SPECIFICATION forming part of Letters Patent No. 354,568, dated December 21, 1886.

Application filed September 3, 1886. Serial No. 212,568. (No model.)

To all whom it may concern:

Be it known that we, EDWIN NORTON and JOHN G. HODGSON, citizens of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Sheet-Metal-Barrel Machines, of which the following is a specification.

This invention relates to the manufacture of sheet-metal barrel-form vessels having longitudinal tapering ribs or folds by which the surplus stock is taken up at the ends and the barrel given its bilge or longitudinal curvature. In one process of manufacturing such vessels the longitudinal folds are first spaced out or partially formed, and then the sides or walls of the tapering folds are squeezed flat together, thus completing the ribs or folds and giving the body its bilge or longitudinal curvature.

The object of the present invention is to provide a machine for simultaneously squeezing the sides or walls of such partially-formed longitudinal folds together and giving the body its true barrel shape; and our invention consists, primarily, in connection with a mold conforming in shape to the barrel or sheet-metal body to be operated upon, of an interior mandrel, also conforming in shape to said body, and composed of a series of radially-expansible and circumferentially approaching or contractible jaws or segments, between which the walls of such partially-formed folds or ribs are grasped and squeezed together while said jaws or segments are expanding radially to cause the body to conform accurately to the outer mold.

It also consists, in connection with such radially-expansible, circumferentially-contractible segmental mandril, of a radially expansible or contractable outer mold.

It also consists in the novel devices and novel combinations of devices herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts, Figure 1 is a front view of a machine embodying our invention. Fig. 2 is a central vertical section on line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 2. Figs. 4 and 5 are end views of the mandrel and mold, showing the position of the parts before and after the folds or ribs are squeezed. Figs. 6 and 7 are central longitudinal sections on lines 6 6 and 7 7 of Figs. 4 and 5. Fig. 8 is an enlarged cross-section of the mandrel; and Fig. 9 is a view of the end plate of the mandrel, which is removed in Figs. 4 and 5.

In said drawings, A represents the frame of the machine.

B is the mold, consisting, preferably, of four radially expansible or contractible segments. Its interior is barrel shape, or conforms to the shape of the body to be operated upon. The segments B are secured by dovetails *b*, or other suitable means, to radial slides B′, mounted in suitable guides, B^2, on the frame of the machine, and operated by eccentrics B^3 on the shafts B^4. The eccentrics B^3 press directly against friction-rollers *b*′, journaled on the slides B′, when forcing the segments inward and against curved arms b^2, secured to said slides, when moving in the opposite direction.

C is the hollow core or head of the radially-expansible circumferentially-contractible segmental mandrel. This hollow core is furnished with a series of longitudinal ribs or projections, *c*, having inclined or cam faces *c*′ *c*′, on which slide the radially-expansible circumferentially-closing segments or jaws D D of the mandrel. It also has intermediate longitudinal grooves or channels, c^2, in which the intermediate wedging-segments, D′, move radially in and out.

The circumferentially closing or contracting segments D D have radial faces *d d*, between which the walls or slides *n n* of the partially-formed folds are clamped and squeezed flat together. The segments D have also inclined or wedging faces *d*′, which fit against the corresponding faces, d^2, of the intermediate segments, D′. Springs d^3 serve to open or force apart the segments or jaws D D, and springs d^4 to retract the wedging-segments D′. Guide-pins d^5, at the ends of the segments D, fit in inclined guide-slots d^6 in the end plates, D^2, and serve to guide the movement of the segments D, and to hold them in place.

The radially-moving wedging-segments D′ are mounted on or secured to a series of radi-

ally-sliding pins, E, which fit in suitable holes in the hollow core C, and which are simultaneously operated by a pin or wedge, F, having cone-faces *f f f*, there being preferably three slides, E, to each segment D′. The sliding pin or wedge F is operated from the driving-shaft G by a crank, *g*, and pitman *g′*.

The slide B′ of the upper segment, B, of the mold is not furnished with the curved arm b^2 to retract it, but is retracted by hand by means of a lever or arm, H, on the crank-shaft *h*, which is journaled on the frame A and connected with said slide B′ by a pivoted link, *h′*. This crank-shaft also serves to hold this upper section of the mold elevated or retracted by simply turning the crank-arm h^2 past its center, or past a vertical line extending through the axis of the crank-shaft. The object of this is to enable the operator to lower the upper segment of the mold upon the meeting edges of the barrel-body N, and thus hold the flanges *n′ n′* snugly together while the other sections of the mold are being closed around the body.

One of the shafts B^4 (the driving-shaft) is furnished with a driving-pulley, B^5, and the others are connected with it by bevel-gears B^6. The driving-shaft B^4 is furnished with a stop-clutch, K, for starting the shaft and stopping it at the end of each half-revolution. Any ordinary form of clutch for this purpose may be used, and as the construction of such clutches is well known to those skilled in the art it is not deemed necessary to give a detailed description of the same.

G′ is the driving-pulley for the shaft G. The pulleys G′ and B^5 are driven by independent belts from a counter-shaft in the building or factory where the machine is set up. The shaft G is also furnished with a stop-clutch, K′, similar to the clutch K, except that it operates to start said shaft and stop it at the end of each revolution instead of each half-revolution. The clutch K is operated by the treadle *k*, and the clutch K′ by the lever *k′*.

The operation is as follows: The sheet-metal vessel N, with its longitudinal folds or ribs partially formed, as indicated in Fig. 4, is placed over the mandril D and inside the mold B, (the mold at this time being radially expanded and the mandril radially contracted,) with the segments or jaws D D open or separated circumferentially. The operator adjusts the meeting edges or flanges *n′ n′* together, and first lowers the upper segment, B, of the mold upon the sheet-metal body, to keep said flanges or meeting edges *n′ n′* in position. He then moves the clutch-treadle *k*, thus giving the shafts B^4 a half-revolution and closing the segments B together upon the sheet-metal body. He then moves the clutch-lever *k′*, thus causing the shaft G to make a complete revolution, thereby forcing in the pin or wedge F and expanding the wedges D′ radially, and squeezing the walls *n n* of the partially-formed fold together between the radially-expanding and circumferentially-closing segments or jaws D D. The latter half of the revolution of the shaft G retracts the pin or wedge F, and the springs withdraw the wedges D′ and open the jaws D. By again moving the clutch-treadle *k* the segments of the mold are withdrawn, and the squeezed body may be removed and replaced by another.

Our machine may be used for other purposes than for squeezing together the partially-formed folds of sheet-metal barrel-form bodies. By simply making the segments D D′ to conform to a cylinder instead of a barrel in shape similar partially-formed folds on cylindrical bodies may be squeezed or pressed together.

When the wedging-segments D′ are expanded, as shown in Fig. 5, they should conform to the same circle as the segments D, so as to support the sheet-metal body between the mandrel and the mold at all points.

The segments B of the mold are secured to the slides B by the dovetail guides and grooves, as indicated in the drawings, to enable them to be adjusted individually endwise.

We claim—

1. The combination, with a mold, of a radially-expansible circumferentially-closing segmental interior mandrel, substantially as specified.

2. The combination, with a barrel-form mold, of a radially-expansible circumferentially-closing segmental interior barrel-form mandrel, substantially as specified.

3. The combination, with a radially-contractible segmental mold, of a radially-expansible circumferentially-closing segmental mandrel, substantially as specified.

4. The combination, with a radially-expansible circumferentially-closing segmental mandrel, of a radially-contractible segmental mold, mechanism, substantially as described, for contracting all of the segments of the mold and retracting all the segments of said mold but one, and a hand-crank shaft for retracting one of the segments of said mold, substantially as specified.

5. The combination, with a radially-contractible segmental barrel-form mold, of a radially-expansible circumferentially-closing segmental barrel-form mandrel, substantially as specified.

6. The combination, with hollow core C, having longitudinal ribs *c*, furnished with inclined faces *c′*, of segments or jaws D and wedging-segments D′, and means for expanding said wedging-segments D′, substantially as specified.

7. The combination, with hollow core C, having longitudinal ribs *c*, furnished with inclined faces *c′*, of segments or jaws D, wedging-segments D′, radial slides E, and pin or wedge F, substantially as specified.

8. The combination, with hollow core C, having longitudinal ribs *c*, furnished with inclined faces *c′*, of segments or jaws D, wedging-segments D′, two or more sets of radial slides E, and pin F, having two or more cone-faces, *f*, substantially as specified.

9. The combination, with hollow core C, hav-

ing longitudinal ribs *c*, furnished with inclined faces *c'*, of segments or jaws D and wedging-segments D', springs for opening said segments or jaws D, and springs for retracting said wedging-segments D', and means for expanding said wedging-segments D', substantially as specified.

10. The combination, with a barrel-form mold, of radially-expansible circumferentially-closing jaws or segments D and intermediate wedging-segments, D', said segments D and D' being of barrel form, and means for expanding said wedging-segments D', substantially as specified.

11. The combination, with radially-contractible mold-segments B, of mechanism, substantially as described, for operating said mold-segments, radially-expansible circumferentially-closing mandrel-segments D, radially-expansible wedging-segments D', core C, having ribs *c*, radial slides E, pin or wedge F, and mechanism, substantially as described, for operating said pin or wedge, substantially as specified.

12. The combination, with radially-expansible circumferentially-closing mandrel-segments D, having guide-pins d^5 at their ends, of end plates, D^2, having guide-slots d^6, and means for expanding said wedging-segments D', substantially as specified.

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