

No. 732,881.

PATENTED JULY 7, 1903.

B. H. MUEHLE.  
COLLAPSIBLE CENTERING.  
APPLICATION FILED JAN. 21, 1903.

NO MODEL.

Fig. 1

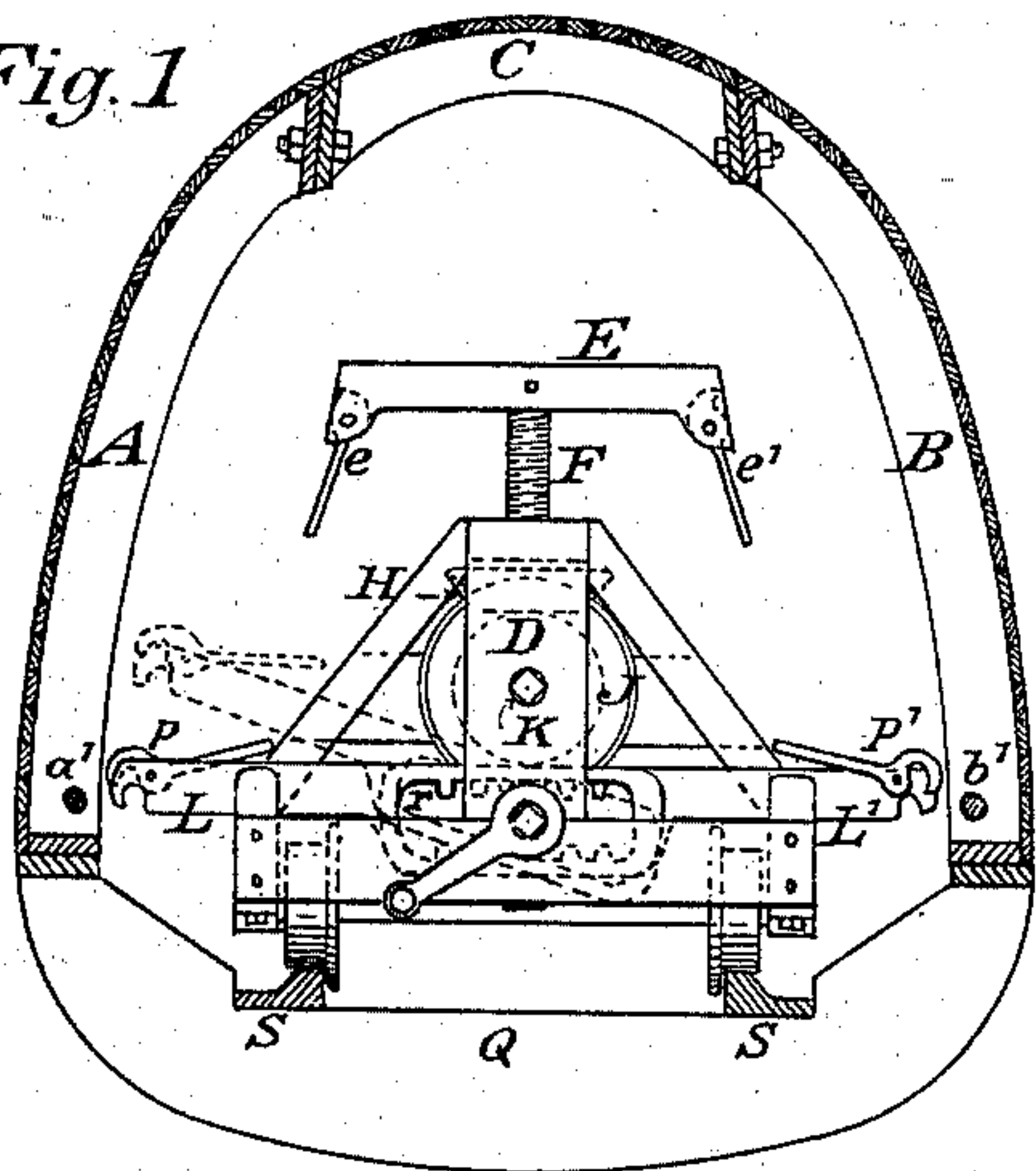


Fig. 2

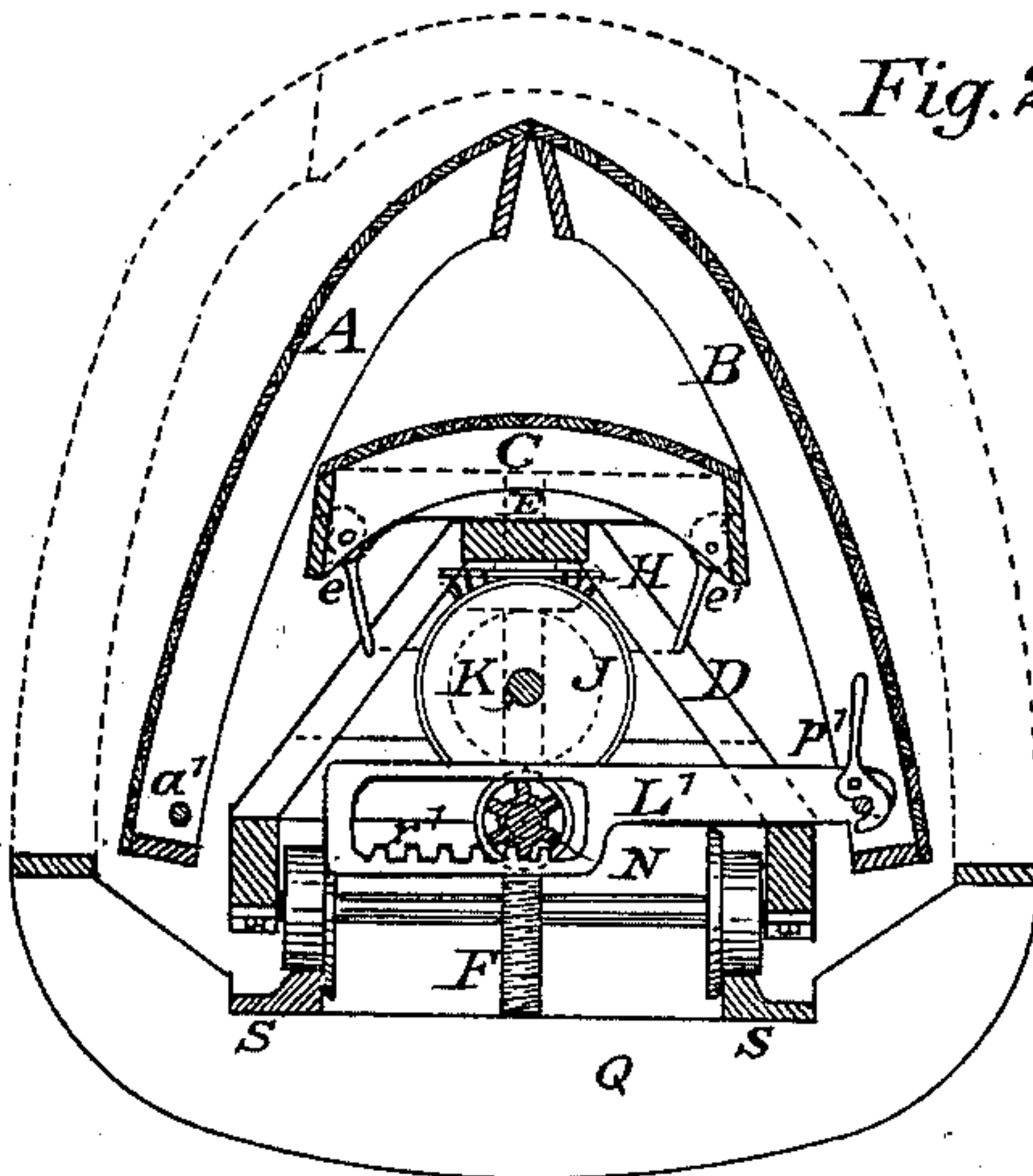


Fig. 3

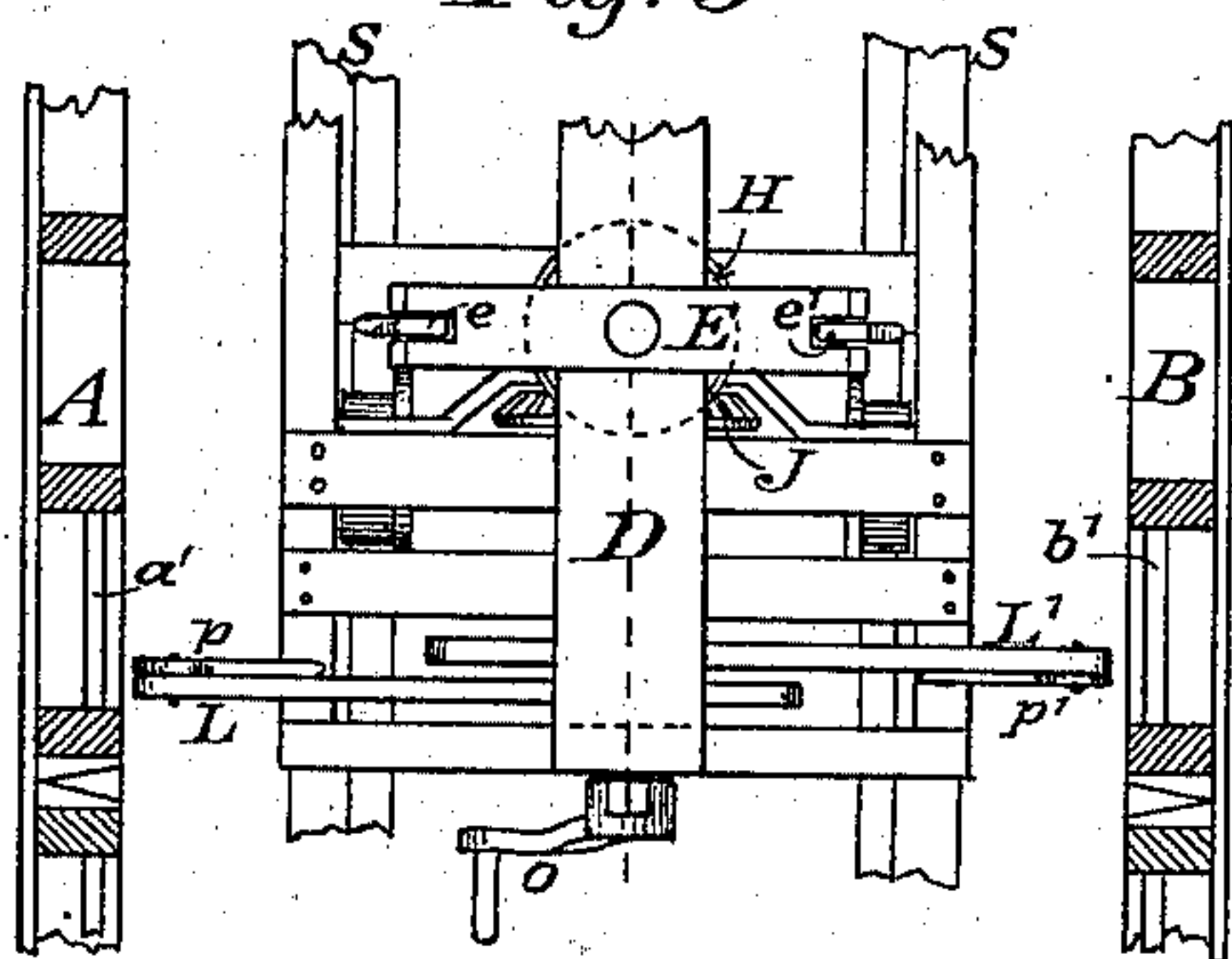


Fig. 5

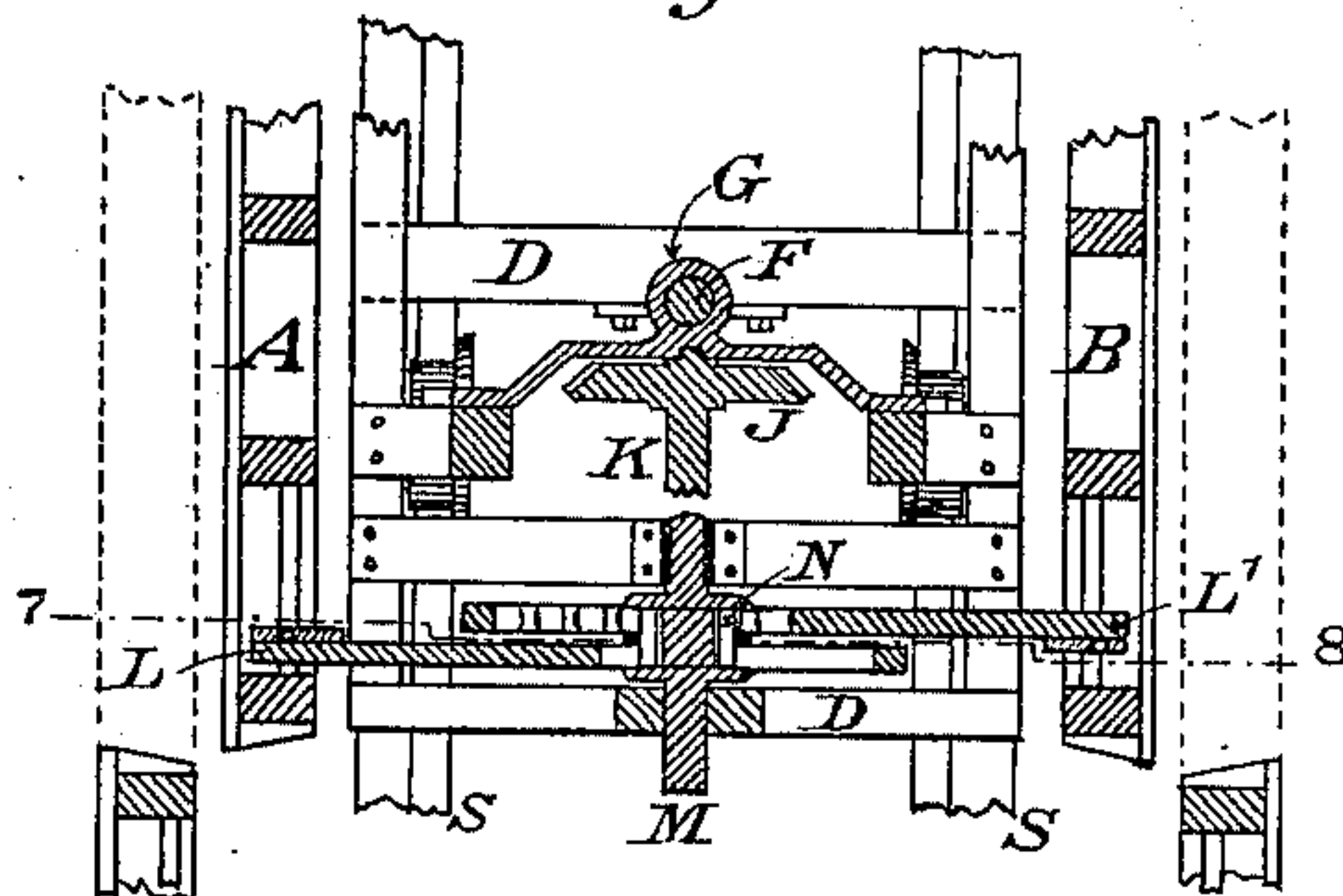


Fig. 4

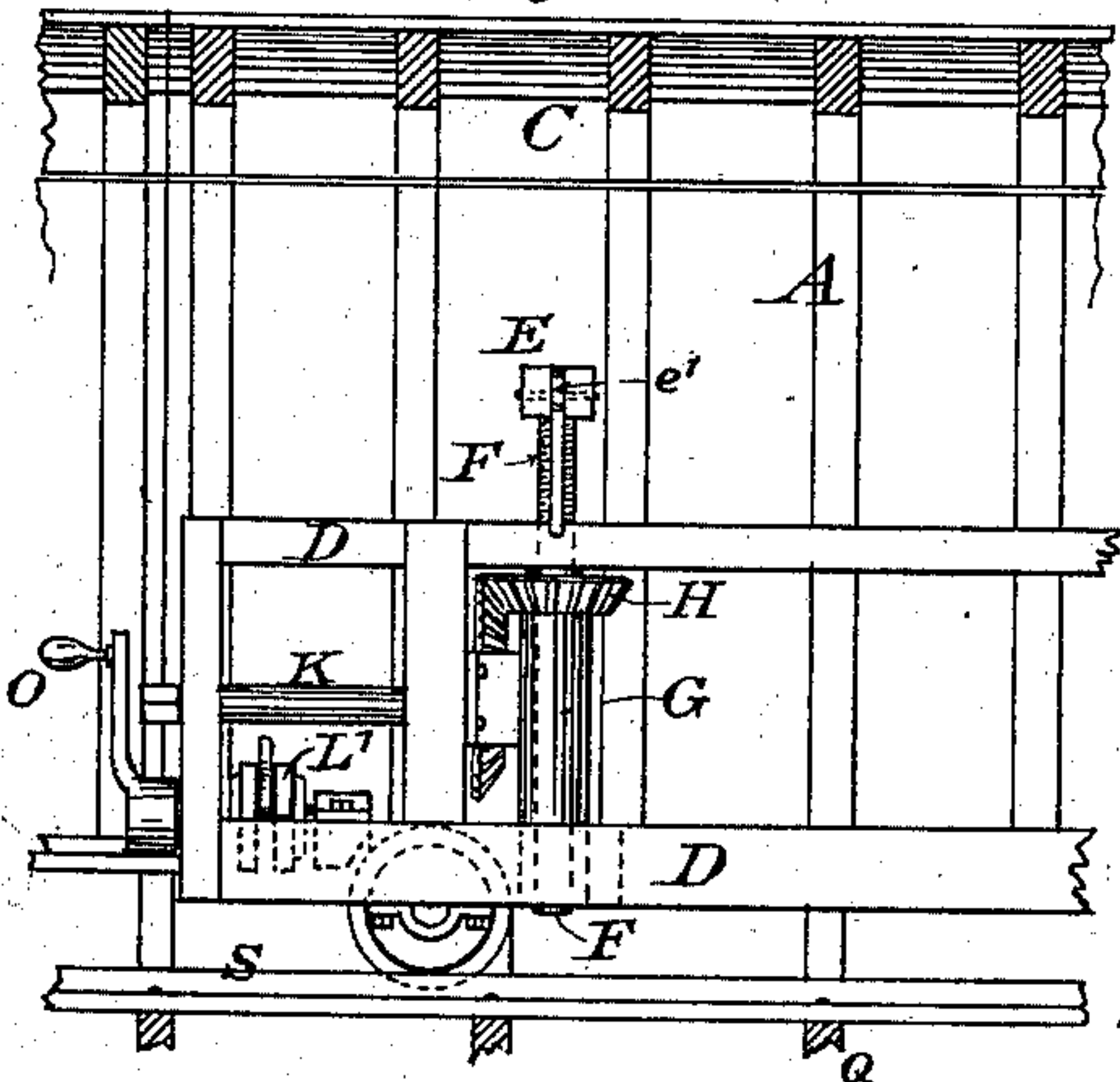
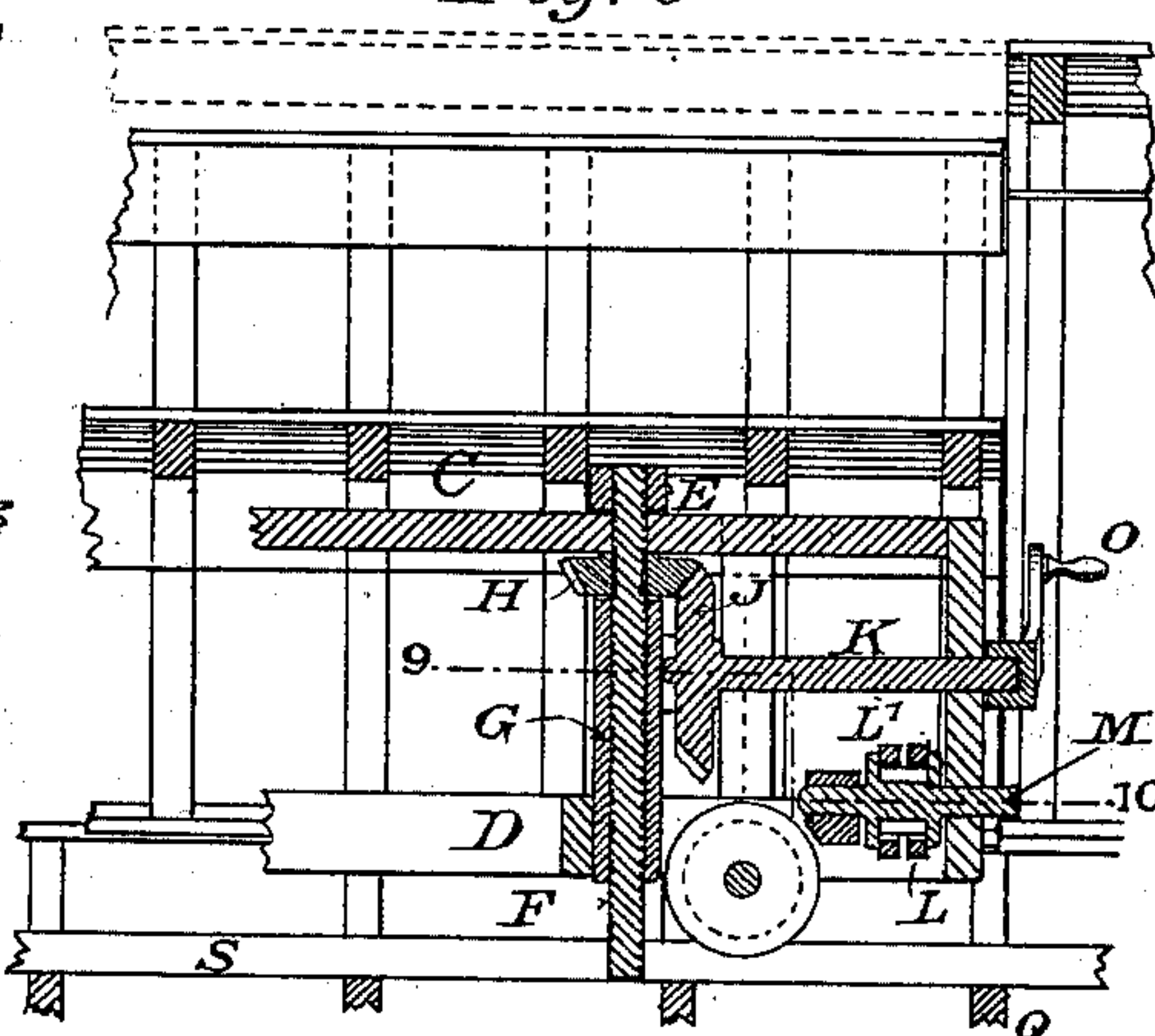


Fig. 6



Witnesses:

*Geo. R. Cannon*  
*Alfred Bentley*

Inventor:

*Bernard Hugo Muehle*



# UNITED STATES PATENT OFFICE.

BERNARD HUGO MUEHLE, OF DETROIT, MICHIGAN.

## COLLAPSIBLE CENTERING.

SPECIFICATION forming part of Letters Patent No. 732,881, dated July 7, 1903.

Application filed January 21, 1903. Serial No. 139,914. (No model.)

*To all whom it may concern:*

Be it known that I, BERNARD HUGO MUEHLE, a citizen of the United States, residing at No. 27 East Alexandrine avenue, in the city of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Collapsible Centerings, of which the following is a specification.

My invention relates to improvements in centerings or temporary framework used in the construction of conduits, sewers, and similar structures built of masonry or concrete in surface excavations or trenches; and the objects of my improvements are, first, to provide centering-frames in sections of suitable lengths, each section consisting of several parts which may be separated or taken apart and when in this collapsed condition passed along underneath or through adjoining sections of the centering, which are composed of similar parts which are set up and support the concrete masonry in course of construction; second, to construct sections of centering-frames in three pieces, the middle frame forming the arch or top and the side frames the supports of the arch, all parts firmly connected by means of adjustable bolts, screws, clamps, or other suitable devices, which when removed will permit the middle frame to drop down perpendicularly and the side frames to be folded or drawn toward the center; third, to provide a truck or carriage upon which the several parts of a section of centering-frame may be assembled and carried through adjoining sections which are set up, and, fourth, to provide the truck or carriage with suitable mechanism for taking hold of and moving the several parts of a section of centering from their position when set up to a collapsed or contracted position on the carriage-frame. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a cross-section of a centering-frame when set up and an end elevation of a truck or carriage. Fig. 2 is a cross-section on line 7 8 on Fig. 5 of the centering-frame when collapsed and its parts assembled on the truck or carriage. Fig. 3 is a top plan view of one end of the truck or carriage, and Fig. 4 a side elevation of the same. Fig. 5 is a horizontal section on line 9 10 on Fig. 6, and

Fig. 6 a vertical longitudinal section of one end of the truck upon which the parts of the centering-frame are assembled.

Similar letters refer to similar parts in each of the figures.

A, B, and C are three parts of a section of centering which are connected by means of adjustable bolts, screws, or other suitable devices adapted for the purpose of readily disconnecting the parts when required. A and B form the sides of the centering, and C the crown or arched top of the same. The parts A and B rest upon and may be fastened to the framework of the foundation or bed of the tunnel and should be constructed alike as to length, width, and shape, so as to be interchangeable. The upper ends of the parts A and B are fitted to the sides of the crown part C, which are beveled or flaring from top to bottom, so as to facilitate the removal when disconnected of the part C from between the upper ends of the parts A and B downwardly.

D is a truck or carriage composed of a rectangular frame provided with flanged wheels, by means of which it may be moved back and forth on a track secured to the framework of the tunnel-foundation. The truck-frame should be about the same length as that of each section of the centering composed of the parts A, B, and C and carries at or near each end a mechanism for taking hold of, separating, and assembling within a contracted space the several parts of a section of a centering-frame. Inasmuch as the mechanical devices at each end of the truck or carriage are composed of similar parts and operated in like manner by an attendant stationed at each end, the drawings show but one end of a carriage in elevation, plan, and section, and the following description applies to each end of a carriage.

A cross-head E is supported upon the end of a vertical screw F and may be raised and fitted into a corresponding recess formed by the framework of the crown part C, to which it may then be connected by means of the cam-levers *e'* or similar devices. The screw F is supported in its perpendicular position by the tube or cylinder G, connected with the framework of the truck, and has a free vertical movement within said cylinder. The horizontal bevel-wheel H is provided with a screw-



thread within the bore of its hub, which engages with the screw F, so that by revolving the bevel-wheel in one direction it will raise the screw F and cross-head E and by revolving it in the opposite direction it will lower the cross-head down to the position shown in Figs. 2 and 6. The revolution of the wheel H is effectuated by the bevel-wheel J upon the horizontal crank-shaft K, the end of which projects beyond the framework of the truck.

L and L' are draw-bars, which by means of slots at one end are hung upon a horizontal shaft M, which carries a pinion N. The cogs of this pinion engage with the teeth of racks  $r$   $r'$  on the inside of the slots of the bars L and L', one of these racks gearing with the top and the other with the bottom of the pinion, so that when the shaft M and pinion N are revolved in one direction the bars L and L' will be drawn simultaneously toward the shaft, and when revolved in the opposite direction both the bars will be pushed outwardly, as in Fig. 1. One of the cranks O may be used at each end of the truck or carriage by the attendant for turning both shafts K and M, the projecting ends of which may be rectangular in cross-section and the hubs of the cranks made to fit onto these square ends, similar to keys for winding a clock. The ends of the draw-bars L and L', which rest upon and project from opposite sides of the frame of the truck, have a recess on the under side, forming a hook, which is so shaped as to fit onto and grasp a horizontal bar  $a'$  and  $b'$  near the ends of each of the centering-frames A and B, respectively. By means of the hinged latch-hooks  $p$  and  $p'$  the bolts  $a'$  and  $b'$  may be firmly connected to the ends of the bars L and L', so that when the latter are drawn horizontally toward the shaft M the frames A and B may be held suspended upon the ends of the bars L and L'.

The application and use of my invention in connection with the construction of concrete tunnels or sewers is as follows: A number of sections of centering composed of parts A, B, and C are provided, all of equal length and shape and all the parts A and B interchangeable. The foundation of the tunnel having been completed and provided with bed-frames, as shown at Q, the rails S are laid parallel to and equidistant from the vertical axis of the proposed tunnel. The first section of my improved centering is then placed in position upon and secured to the bed-frames, and the several parts A, B, and C are connected by means of set-screws, bolts, or clamps, so as to form a firm and rigid support for the concrete masonry. While the concrete is laid on this first section of the centering, a second section is erected abutting on the first, the joints being covered with strips of canvas. Additional sections may be set up in continuation of the first and second, the limit in the number of sections to be provided being reached when the concrete has set sufficiently over the first section to

permit the removal of the centering upon which it rests. The first section of my improved centering is then collapsed in the following manner: The carriage D, with an attendant at each end, is pushed along on the track through the space within the several sections of the centering upon which the concrete superstructure is in course of construction. It is stopped and blocked under the first section. The attendants by means of the cranks applied to the shafts K revolve the bevel-wheels H and J in a direction which will cause the screws F to be raised within the cylinders G until the cross-heads E are in contact with the arched frame C, when firm connection is made by means of the cam-levers  $e'$ . Then the fastenings holding the parts A, B, and C together may be removed. The attendants by turning the shafts M will then move the draw-bars L L' outwardly and hook their ends onto the bolts  $a'$  and  $b'$ , the ends of the bars being raised for that purpose, as shown by the broken lines in Fig. 1. By adjusting the hooks  $p$   $p'$  the draw-bars are firmly connected to the lower ends of the frames A and B. All parts of the first section of the collapsible centering being now securely attached to the mechanism on the truck, the attendants at each end simultaneously lower the cross-heads E by turning the shafts K in the opposite direction, thus removing the frame C from between the upper ends of the parts A and B downward as far as it can be moved and to the position shown in Figs. 2 and 6. The upper ends of the frames A and B being released from contact with the frame C will during the downward movement of the latter have gradually inclined toward the axis of the tunnel and now rest against the arched frame C. The attendants then turn the shaft M in the opposite direction, so as to draw the lower ends of the frames A and B, which have previously been disconnected from the bed-frames, horizontally toward the sides of the carriage-frame until they come in contact. The entire first section of the collapsible centering having thus been contracted within a space which permits it to pass through the adjacent sections of the centering, the truck is then pushed along to the end of the last section which is set up, where by reversing the operation of the mechanism above described the collapsed section may be erected in place adjacent to the last section. One by one as fast as the concrete has set sufficiently to permit the removal of each section of centering-frames at the finished end of the tunnel these sections may be collapsed, as above described, passed through the part which is in course of construction, and erected and used in continuation of the work.

The parts A, B, and C may be built of wood or metal, or part of wood and part of metal, in order to insure strength and rigidity when set up in place. The diametric or concentric width of the frames must, however, be



such that the several parts when collapsed and assembled upon the truck or carriage shall occupy less space than the same parts when set up in order to permit the passage of the former through the latter without hindrance, substantially as shown in the accompanying drawings.

What I claim as my invention, and desire to secure by Letters Patent, is—

10 1. A centering made in sections adapted to be located end to end, each section being composed of separable and collapsible parts of such form and proportions that the parts when collapsed occupy less space cross-sectionally than the same parts when set up, substantially as described.

20 2. A centering made in sections adapted to be located end to end, each section being composed of separable and collapsible parts and provided with adjustable fastening devices for connecting and disconnecting these parts for the purpose and substantially as herein described.

25 3. A centering-framework composed of three parts which may be separated and collapsed by moving the arched central part downward and the side frames horizontally, so that the three parts when collapsed occupy less space cross-sectionally than the same parts when set up, substantially as described.

30 4. A section of centering-framework composed of three parts, which may be separated and collapsed by moving the arched central part downwardly and the side frames laterally, so that they may be passed through or underneath similar parts of another adjoining section of centering-framework which are connected, set up and used in the construction of concrete or masonry archways, substantially as described.

40 5. In combination with a centering-frame-

work composed of several parts, a truck or carriage upon which these parts may be assembled and transported through adjoining centerings, set up and used in the construction of concrete or masonry tunnels, for the purpose substantially as described.

6. In combination with a centering-framework composed of three parts, a truck or carriage provided with a mechanism for taking hold of, moving and assembling the three parts of the centering upon said truck or carriage for the purpose of transportation substantially as described.

7. The combination of a section of centering-framework composed of the parts A, B and C with the truck or carriage D, provided at or near each end with mechanism which may be connected with the parts A, B and C for the purpose of moving and assembling the same upon said truck or carriage, substantially as described.

8. The combination of the arched crown part C which is part of a section of centering, with the cross-head E, the vertical screw F within the upright cylinder G, the bevel-wheels H and J and crank-shaft K, all parts of a mechanism on the truck D, arranged and operating substantially as described.

9. The combination of the side frames A and B which are parts of a section of centering, with the horizontal draw-bars L and L' having racks  $r$   $r'$  within slotted ends, a device for connecting the opposite ends with the frames A and B, and the pinion N upon the crank-shaft M, all parts of a mechanism on the truck D, arranged and operating substantially as described.

BERNARD HUGO MUEHLE.

Witnesses:

GEO. R. COMMON,  
ALVA A. BENTLEY.