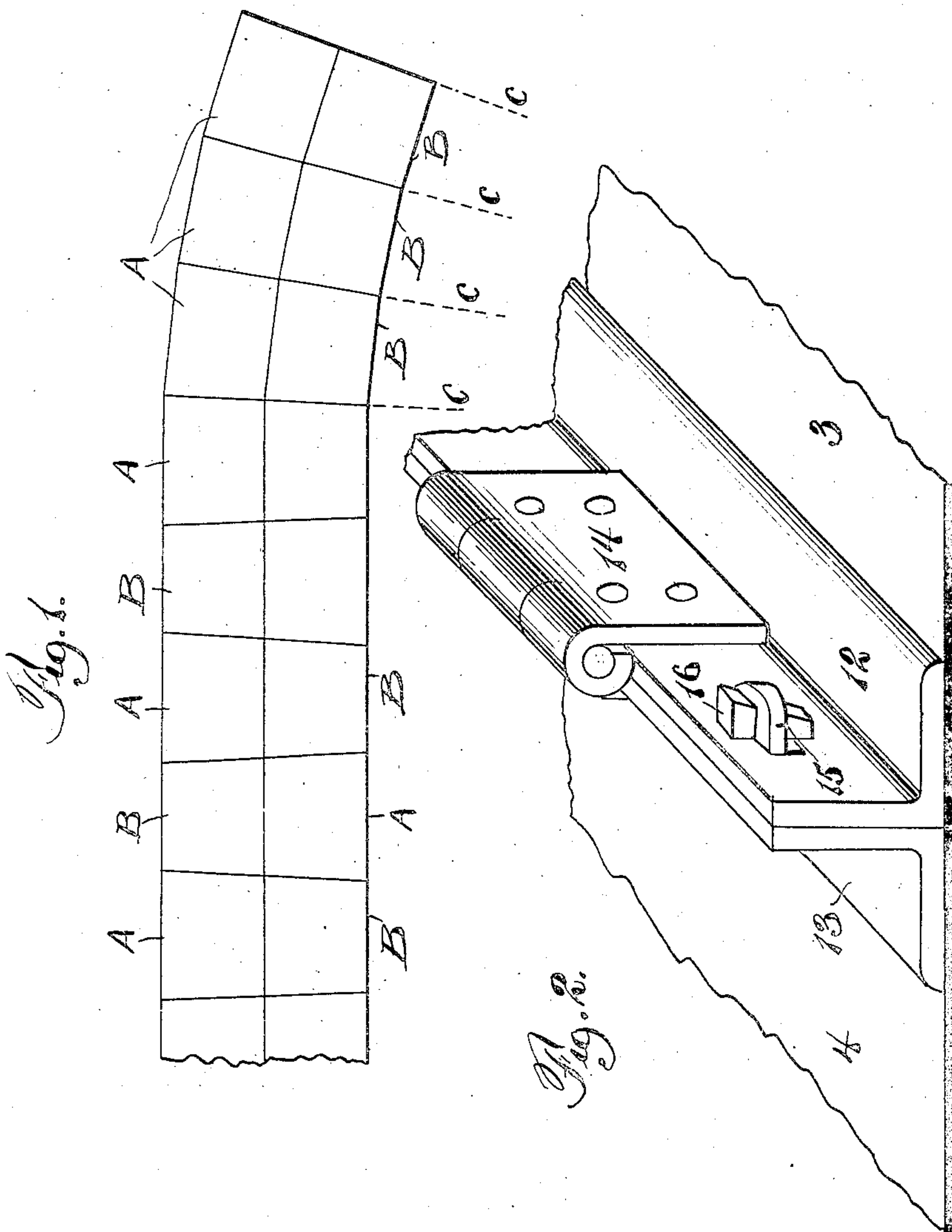


C. D. McARTHUR.
 CENTERING FORM.
 APPLICATION FILED MAR. 18, 1909.

932,993.

Patented Aug. 31, 1909.
 5 SHEETS—SHEET 1.



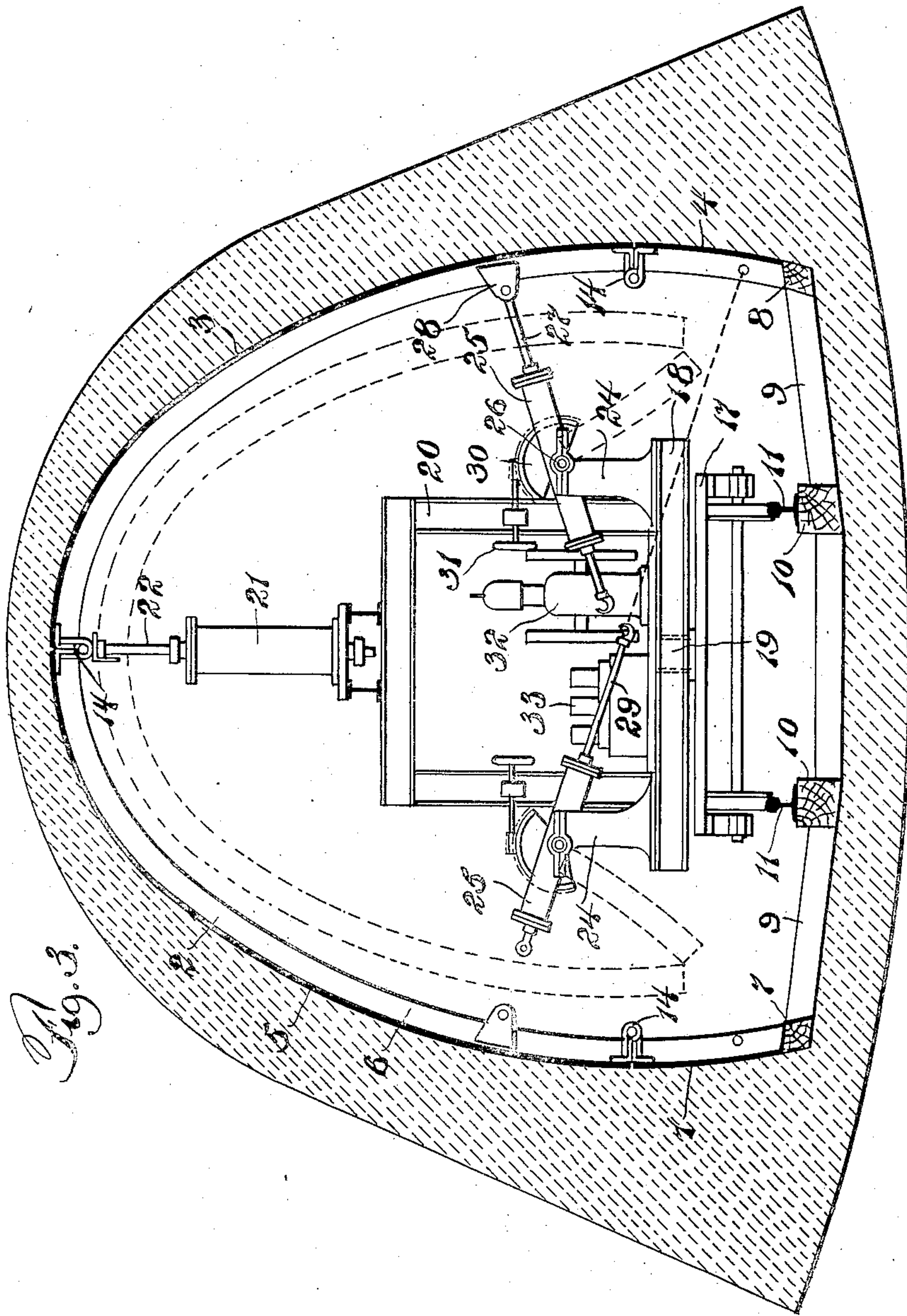
WITNESSES
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WITNESSES

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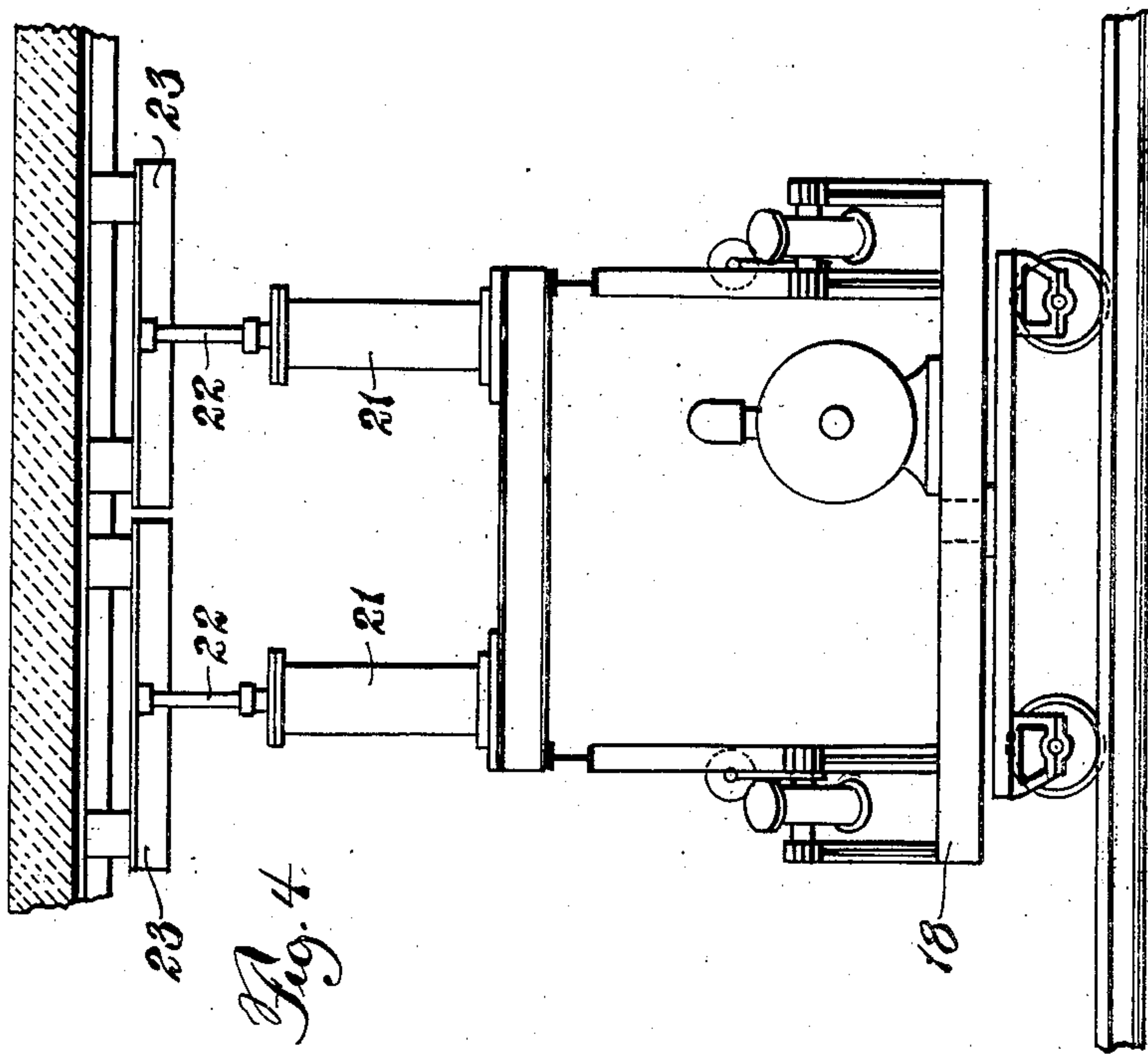
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5 SHEETS—SHEET 3.



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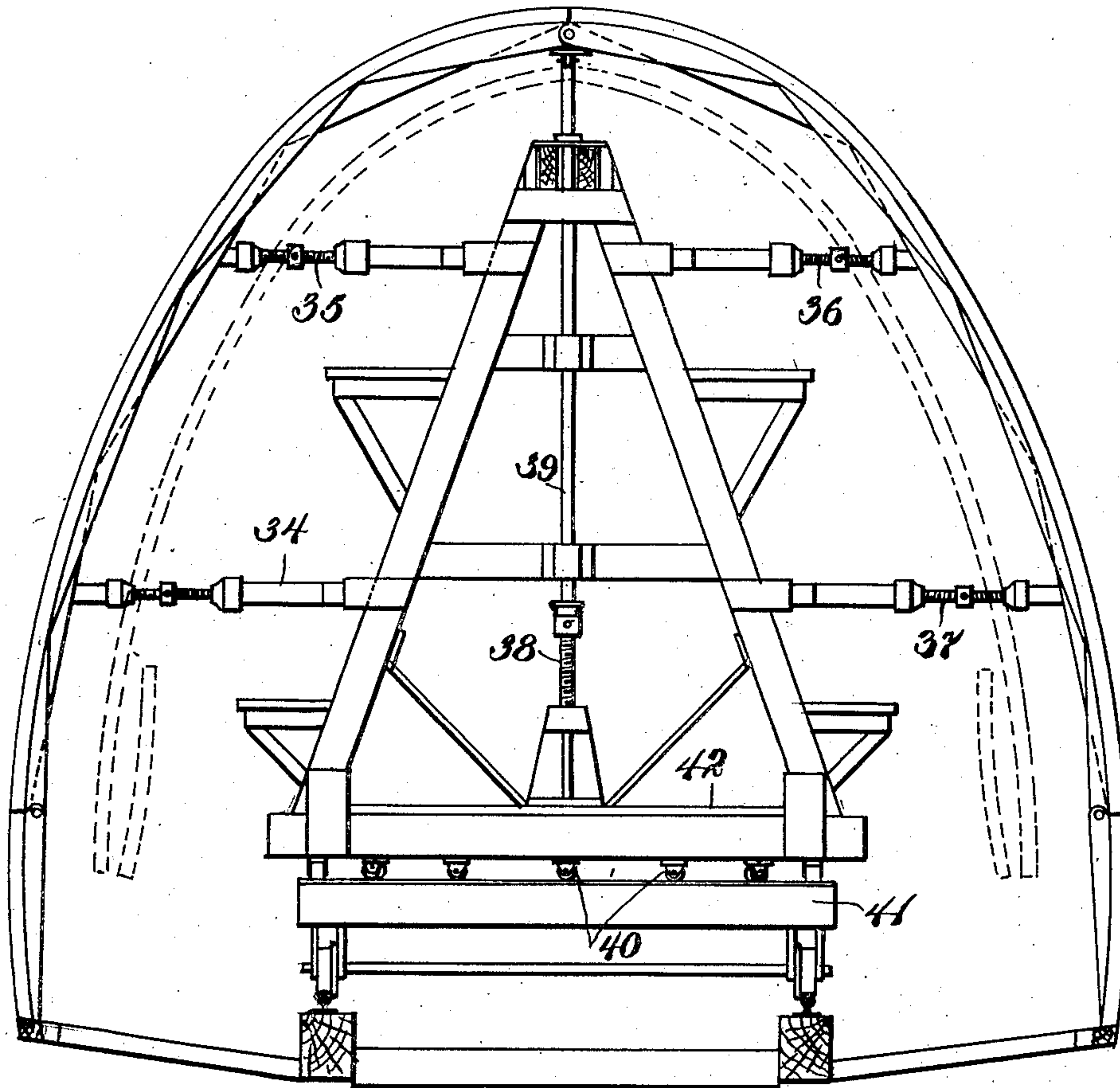
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5 SHEETS—SHEET 4.

Fig. 5.



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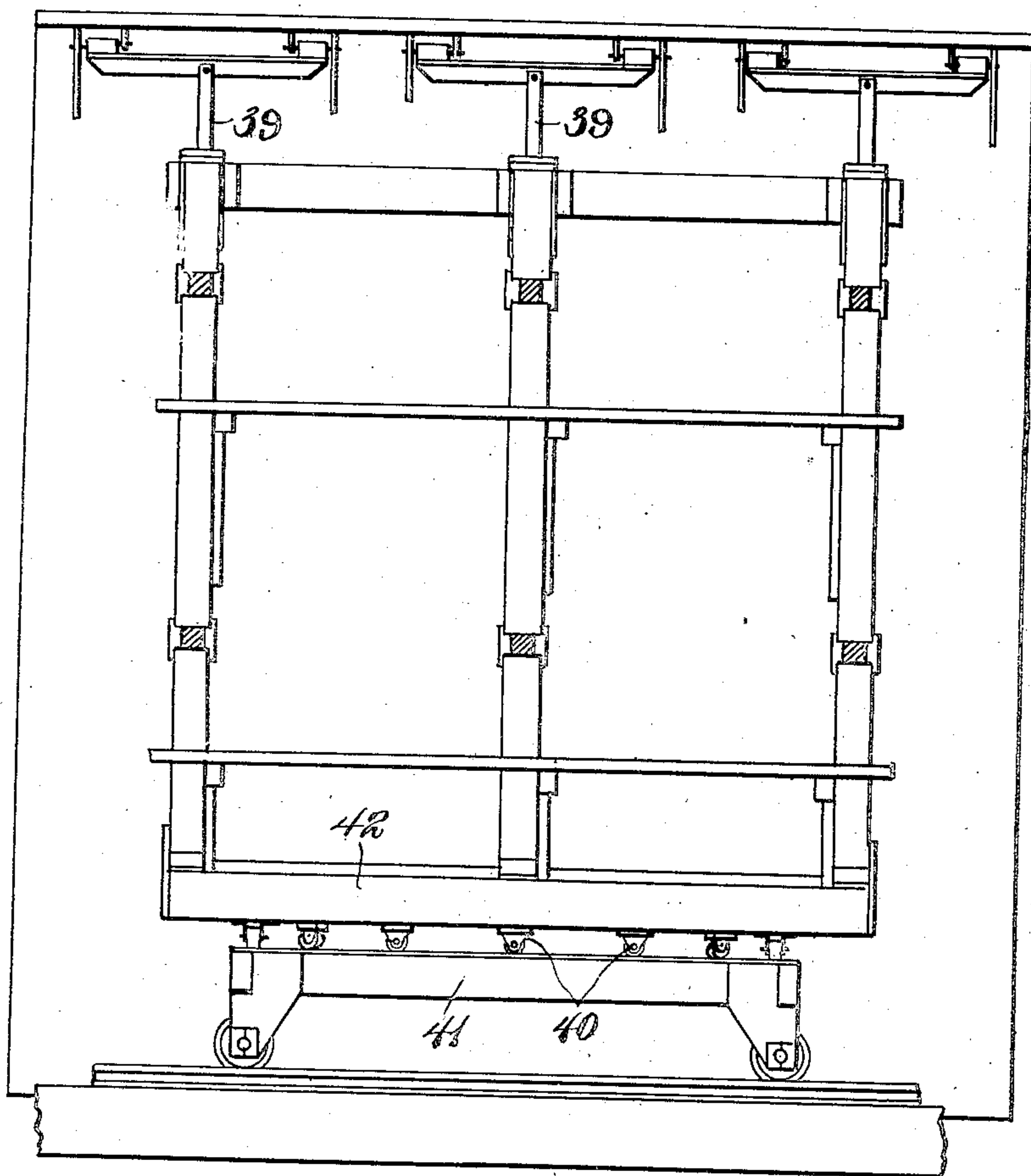
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5 SHEETS—SHEET 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES D. McARTHUR, OF ARLINGTON, NEW JERSEY.

CENTERING-FORM.

932,993.

Specification of Letters Patent.

Patented Aug. 31, 1909.

Application filed March 18, 1909. Serial No. 484,223.

To all whom it may concern:

Be it known that I, CHARLES D. McARTHUR, a citizen of the United States, residing at Arlington, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Centering-Forms, of which the following is a specification.

The invention relates to collapsible centering forms for use in the construction of aqueducts, sewers, conduits and the like and has for its primary objects; the provision of an improved form which may be used both in the construction of the straight and curved portions of the passages; the provision of an improved carriage capable of transporting, collapsing and reversing the form sections employed; and the provision of improved form supporting and collapsing means upon the carriage. One embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a diagrammatic plan view of a series of centering sections placed end to end, a part thereof being alternately reversed so as to form a straight portion of a conduit, and another part being arranged so as to form a curve in the conduit.

Figure 2 is a perspective view of the hinge connection between the parts of a shell or section, such view being upon an enlarged scale,

Figure 3 is a transverse section through a form showing the truck or carriage in end elevation, the dotted lines indicating the collapsed position of the form,

Figure 4 is a longitudinal section through a form, showing the truck in side elevation, and

Figures 5 and 6 are side and end elevations of a modified form of truck.

Heretofore in the construction of centering for conduits it has been considered necessary to provide specially constructed sections for those portions at which the conduits make a curve, which sections have to be made with great accuracy to fit the required curvature. The purpose of my invention is primarily to provide collapsible shells or sections which may be used either for making the straight portion of the conduit or the curved portion thereof, so that the necessity for special sections constructed to form the curves is done away with. This is accomplished by making the sections in comparatively short straight portions having their

transverse meeting edges beveled, so that each section is slightly longer at one edge or side than at the other. When it is desired to form a curve the short edges or sides are all placed upon the same side of the form, and when it is desired to form a straight portion of the conduits the shells or sections are alternately reversed, so that on each side of the form a short and long side alternate. In order to provide for the proper positioning and the transportation of the sections a truck is used having a turn-table so that any section carried by the truck may be turned end for end and used either to form a straight portion of the conduit or a curved portion thereof. The parts of each shell or section are preferably hinged together, and the turn table on the truck is preferably provided with supporting and collapsing means for engaging the interior of the shell in a manner to be hereinafter more particularly described.

Figure 1 of the drawing indicates in diagrammatic plan view a series of shells or sections having their edges beveled or inclined so that either a straight or curved conduit may be formed therefrom. It will be seen by reference to this figure that each section has a long edge or side A and a short edge or side B, and that in the left hand portion of the figure the shells or sections are alternately reversed so that a straight conduit is formed, and that in the right hand portion of the figure the sections are arranged so that all of their short edges B are upon one side of the conduit, and their long sides or edges A are upon the other side thereof, so that a curved portion is formed. The dotted lines C indicate the extension of the joints between the ends of the shells, and the inclination or bevel is such that if these lines C were produced or extended a sufficient distance they would meet at a common point which is the center of curvature about which the conduit is constructed. The curve formed by the sections is of course not a perfect one, due to the fact that the portions A and B lie upon straight lines, but as the sections are made comparatively short this departure from a true curve is unimportant, and when the sections are arranged to form a straight portion of the sewer as indicated at the left of Figure 1, the sides are in exact alinement forming a perfectly smooth straight conduit.

As indicated in Figure 3 each shell or section is made in four parts, 1, 2, 3, 4, hinged

together along their meeting edges as illustrated. The lagging 5 is preferably of sheet iron of a thickness depending upon the conditions, and this lagging is stiffened and supported by means of the tee irons 6 arranged circumferentially and riveted to the lagging. The lower edges of the form rest upon longitudinally extending timbers 7 and 8 held in position by means of transverse braces 9 which braces at their inner edge take against longitudinally extending timbers 10 upon which the rails 11 for carrying the truck are mounted. The means for hinging the parts constituting the shell together is illustrated in detail in Figure 2, from which it will be seen that the opposing edges of adjacent sections as for instance, 3 and 4 are provided with longitudinally extending angles 12 and 13 whose inwardly projecting flanges abut against each other. The inner edges of these flanges are hinged together by means of the hinges 14 which hinges have their leaves riveted to the flanges of the angles in the manner illustrated. In order to lock the projecting flanges rigidly together, one of the flanges is provided with a series of projecting loop members 15, which extend through slots in the opposing flange, and receive wedges 16. By this means a very rigid yet easily detachable connection is secured.

In order to support, collapse and re-position the mold shells or sections the truck construction shown in Figures 3 and 4 is employed. This truck consists of a body portion 17 upon which is mounted a turntable 18 carrying the supporting and expanding devices and pivoted to move about the vertical axis 19. This turn table 18 is provided with a standard 20 upon which is mounted a pair of upright hydraulic cylinders 21 provided with the piston rods 22 carrying at their upper ends the engaging brackets 23. The turn table is also provided upon each side with a pair of brackets 24 carrying the hydraulic cylinders 25, which cylinders are pivotally mounted at 26, and are provided with the piston rods 27 whose outer ends are provided with loops adapted to be secured to the brackets 28 upon the tee irons 6, and whose rear ends 29 are provided with other loops adapted to be connected by means of cables to the lower sections 1 and 4, in order to move them to the positions indicated in the dotted lines. The cylinders may be turned to any desired position by means of the worm gears 30 operated from the hand wheels 31. The cylinders 21 and 25 are provided with fluid from the pump 32 operated by the motor 33.

In collapsing one of the shells, the timbers 7 and 8 are first removed, and the lower sections 1 and 4 are swung into the position indicated in dotted lines, by means of cable connections to the rear ends of the

operating piston rods 29. The other ends of the piston rods are then attached to the bracket 27, and fluid is admitted to the cylinders 21 and 25 to secure the lowering of the form and its inward movement to the position indicated in dotted lines. After being collapsed the truck may be moved along to a new position, and the cylinders operated to expand the form to its operative position. The form may also when in collapsed position, be turned end for end by rotating the turn-table about its pivot 19. A section may thus be used in the position in which it is originally collapsed, or if a curve is not to be formed and a reversal of the section is necessary this may be readily accomplished in the manner set forth. It will be understood that the invention is not limited to a mold section made in four parts hinged together, or to the use of the particular expanding and contracting means illustrated, but that the invention comprehends the use of any and all varieties of expanding and contracting means, and the use of any and all types of collapsing sections wherein an alternate reversal provides a straight conduit, and wherein the placing of the sections with their short sides upon the same side of the conduit secures a curved conduit section.

In Figures 5 and 6 a modified construction of carrier or truck is shown, turnbuckles 34, 35, 36, 37 and 38 being employed instead of the hydraulic cylinders of the other truck. The rods 39 extending upward from the turnbuckles 38 being freely slidable through the frame. A plurality of rollers 40 are provided to reduce the friction between the platform 41 constituting the lower portion of the turntable and the base of the framework 42 constituting the upper portion of the turntable.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is the following:—

1. In a centering form, a plurality of straight collapsible shells adapted to be placed end to end and open at the bottom, the said shells being tapered transversely whereby a straight form is secured when the shells are alternately reversed and placed end to end, and a curved form is secured when the shells are placed so that their short sides all lie upon the same side of the form.

2. In combination, a centering form for conduits comprising a plurality of straight collapsible shells adapted to be placed end to end, the said shells being tapered transversely whereby a straight form is secured when the shells are alternately reversed and placed end to end, and a curved form is secured when the shells are placed so that their short sides all lie upon the same side of the form, shifting means for supporting the

shells and turning them end for end, and a truck supporting the shifting means for carrying the shells through the conduit.

3. In combination, a centering form for
5 conduits comprising a plurality of straight collapsible shells adapted to be placed end to end, the said shells being tapered transversely whereby a straight form is secured when the shells are alternately reversed and
10 placed end to end, and a curved form is secured when the shells are placed so that their short sides all lie upon the same side of the form, means for supporting and col-

lapsing the shells, means whereby such supporting means may be rotated to turn the 15 collapsed shells end for end, and a truck upon which the supporting means are mounted.

In testimony whereof I have hereunto signed my name in the presence of the two 20 subscribed witnesses.

CHARLES D. McARTHUR.

Witnesses:

JAMES C. BRADLEY,
ARCHWORTH MARTIN.