

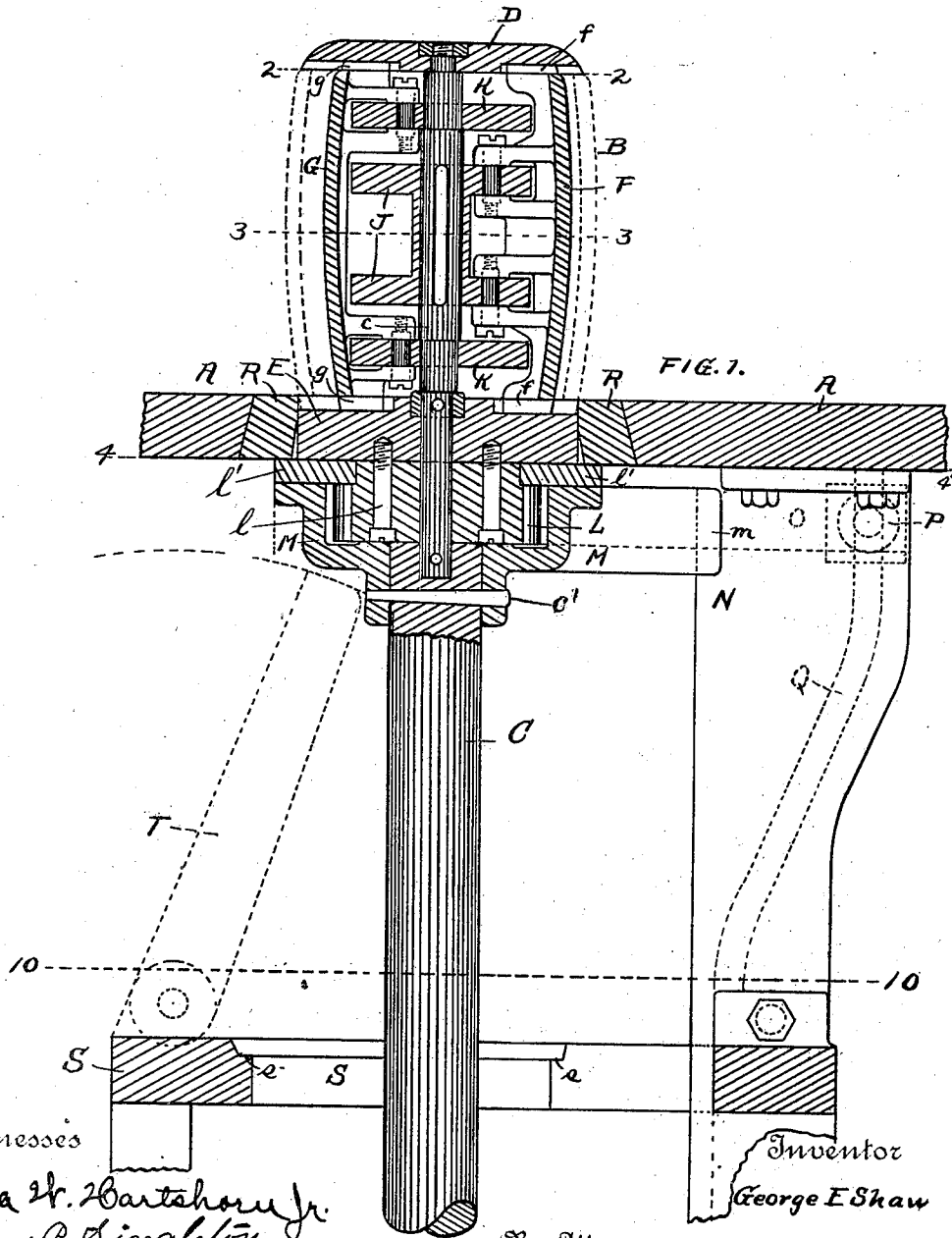
G. E. SHAW.

COLLAPSIBLE MANDREL FOR PULP COMPRESSING APPARATUS.

(Application filed Sept. 9, 1901.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses

Dana H. Bartshorn Jr.
Mary P. Singleton

Inventor

George E Shaw

By Attorneys

Cartinson & Richards.

G. E. SHAW.

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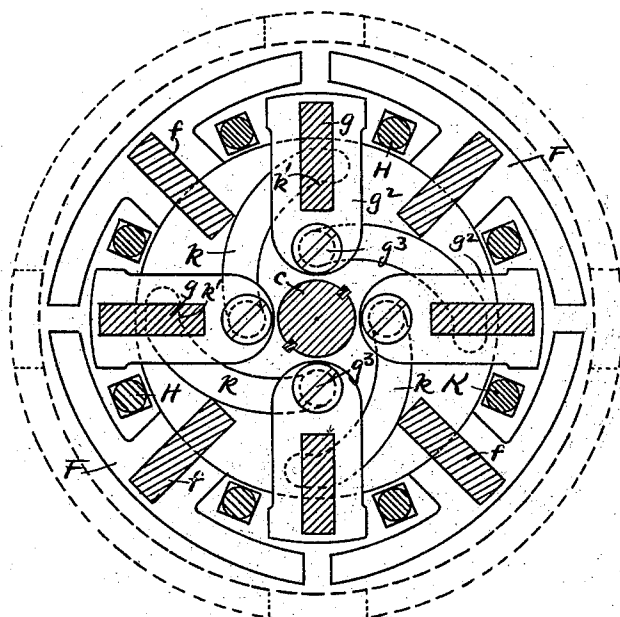


FIG. 2

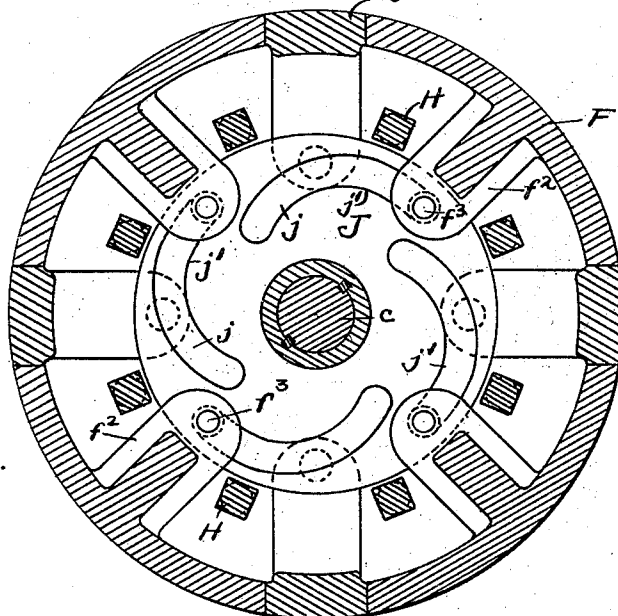


FIG. 3

Witnesses

Dana H. Battsman Jr.
Mary C. Singleton

Inventor

George E Shaw,

By Attorneys

Parkinson & Richards

G. E. SHAW.

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4 Sheets—Sheet 3.

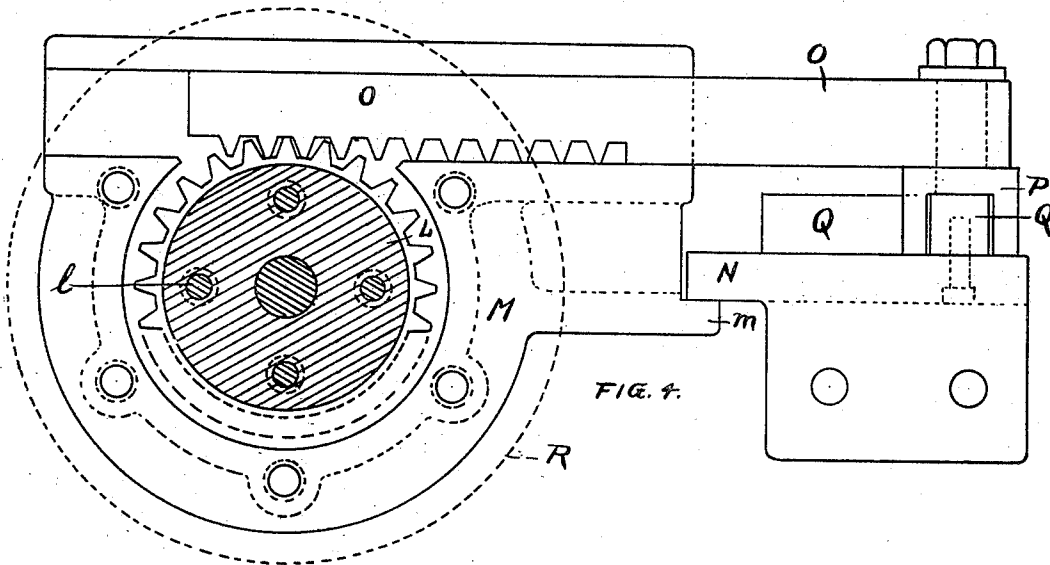


FIG. 4.

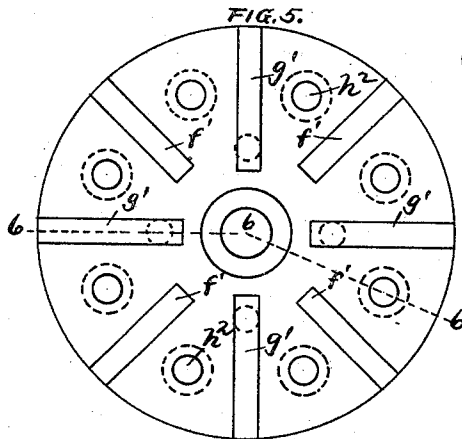


FIG. 5.

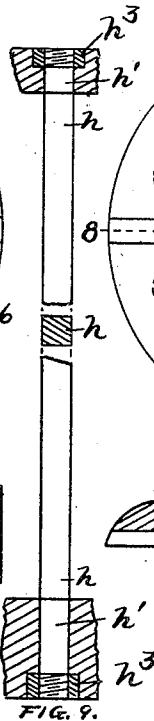


FIG. 6.

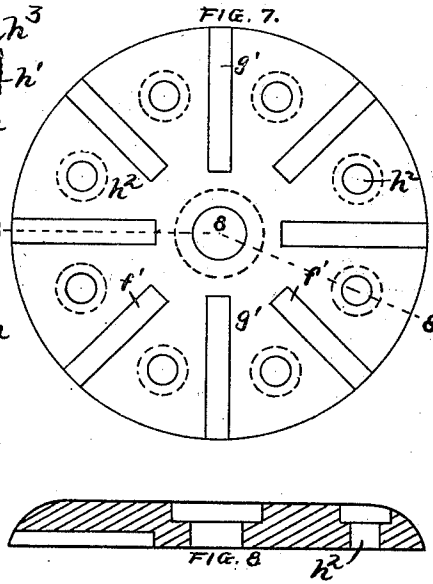


FIG. 7.

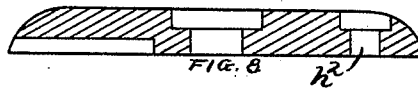


FIG. 8.

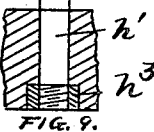


FIG. 9.

Witnesses

Dana H. Hartschorn Jr.
Mary A. Singleton

Inventor

George E Shaw,

By Attorneys

Cartminton & Richards.

No. 693,571.

Patented Feb. 18, 1902.

G. E. SHAW.

COLLAPSIBLE MANDREL FOR PULP COMPRESSING APPARATUS.

(Application filed Sept. 9, 1901.)

(No Model.)

4 Sheets—Sheet 4.

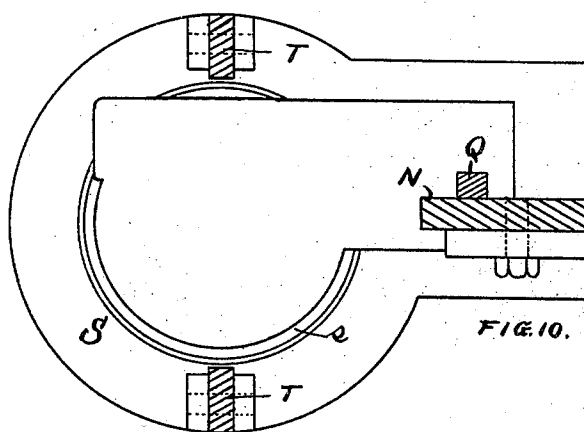


FIG. 10.

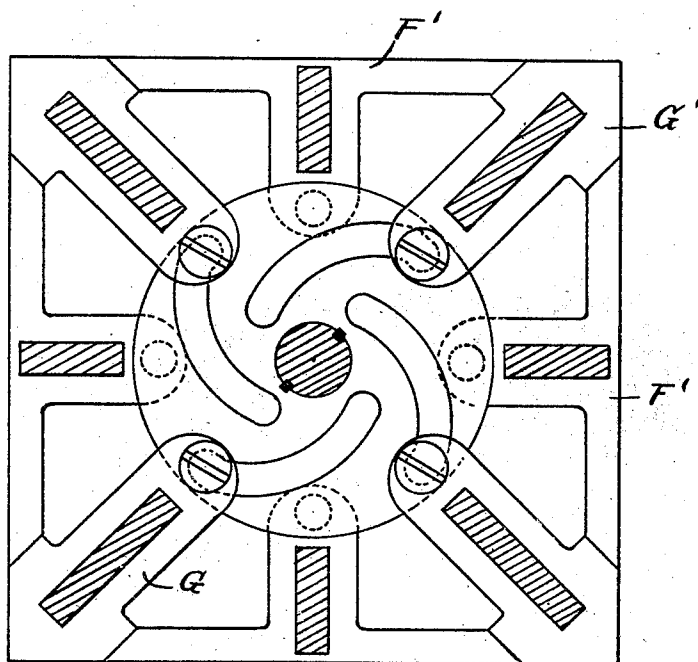


FIG. 11.

Witnesses

Dana H. Hartsough
Mary P. Singleton

Inventor

George E. Shaw.

By Attorneys

Curfison & Richards.

UNITED STATES PATENT OFFICE.

GEORGE E. SHAW, OF CINCINNATI, OHIO.

COLLAPSIBLE MANDREL FOR PULP-COMPRESSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 693,571, dated February 18, 1902.

Application filed September 9, 1901. Serial No. 74,818. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. SHAW, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Collapsible Mandrels for Pulp-Compression Apparatus, of which the following is a specification.

The object of my invention is to provide a collapsible mandrel for pulp-compression apparatus which is perfectly rigid and capable of withstanding intense pressure when in its extended position, which may be easily and readily collapsed, and from which the finished vessel may be removed without injury.

My invention consists in the combinations and arrangements of parts hereinafter described and claimed.

In the drawings, Figure 1 is a vertical section of a mandrel embodying my invention and its operating parts; Fig. 2, a section on line 2 2 of Fig. 1; Fig. 3, a section on line 3 3 of Fig. 1; Fig. 4, a section on line 4 4 of Fig. 1; Fig. 5, a top plan view of the base-plate of the mandrel; Fig. 6, a section on line 6 6 6 of Fig. 5; Fig. 7, a bottom plan view of the top plate of the mandrel; Fig. 8, a section on line 8 8 8 of Fig. 7; Fig. 9, a sectional elevation of one of the posts supporting the top plate; Fig. 10, a section on line 10 10 of Fig. 1, and Fig. 11 a sectional view showing a square mandrel embodying my invention.

Reference-letter A denotes a compressing-table; B, a mandrel mounted on the upper end of piston-rod C; D and E, respectively, top and base plates of the mandrel; F and G, wide and narrow sections, respectively, constituting the sides of mandrel B; H, posts connecting and distancing plates D and E; J and K, cam-plates for operating the wide and narrow sections F and G, respectively; L, a gear or pinion attached to base-plate E; M, a casing for pinion L; N, a guide for preventing rotation of casing M; O, a rack-bar meshing with pinion L; P, a slide-block connected with rack-bar O and guide Q to operate rack-bar O; R, a stripping-ring for removing the finished article from the mandrel; S, a stripping-table which engages ring R to remove it and the finished article from the mandrel, and T swinging props for locking the mandrel in its operative position.

The compressing-table A is the usual table for this purpose, having a central opening for the passage of mandrel B and may be equipped with any of the usual plungers and plunger-compartments for compressing the pulp about mandrel B. The piston-rod C, upon the upper end of which mandrel B is mounted, may be actuated by any of the usual forms of piston and cylinder to raise the mandrel into its operative position on table A and lower it to withdraw the mandrel and discharge the finished article. Mandrel B is formed of a top plate D and base-plate E, rotatably mounted upon the upper end of piston-rod C, and wide and narrow side sections F and G, respectively, slidably mounted in plates D and E. To properly distance and secure plates D and E, posts H are provided. Posts H are constructed with square body portions h and rounded screw-threaded ends h' , taking into corresponding openings h^2 , where they are secured by nuts h^3 . The square body portions of posts H serve to properly distance plates D and E, while nuts h^3 prevent their spreading, thus forming a strong and rigid connection between the plates. At their upper and lower ends sections F and G are provided with lugs f and g , respectively, taking into radiating slots f' and g' in plates D and E, and the meeting edges of the sections are cut on planes parallel with the slots g' . The wide sections F are provided with brackets f^2 , carrying pins f^3 , which engage slots j in cam-plates J, and the narrow sections G are provided with brackets g^2 , carrying pins g^3 , which engage slots k in cam-plates K. The cam-plates J and K are keyed to the upper end c of piston-rod C. The outer ends of slots j for some distance are circular, with the axis of piston-rod C for a center; but from point j' they curve inwardly on a spiral, while the outer ends of slots k are circular for a comparatively short distance, curving inwardly from point k' on a sharp spiral, so that their inner ends are considerably nearer to the axis of the piston-rod than the inner ends of slots j .

Base-plate E is carried by the toothed pinion or gear L, to which it is attached by screws l . The pinion L is rotatably mounted in casing M, with the upper end c of piston-rod C for a pivot. The casing M is secured

to piston-rod C by pin c' and is provided with a flange m , engaging guide N to prevent rotation. A loose ring l' is interposed between base-plate E and casing M to facilitate rotation. Rack-bar O is slidably mounted in casing M in engagement with pinion L and has a pivotal connection with slide-block P, which engages inclined guide Q.

The stripping-ring R loosely rests on ring l' and projects out beyond the edges of casing M, the position of its outer edge being indicated by dotted lines in Fig. 4. The stripping-table S is mounted in any suitable manner some distance below table A. It is open centrally to permit the passage of mandrel B and casing M, but is provided with a shoulder s , which engages the projecting edges of stripping-ring R and holds it stationary as the mandrel descends. On opposite sides swinging props T are provided, which engage the casing M and lock it rigidly in its uppermost position.

In operation piston-rod C is raised to its uppermost position, so that mandrel B projects through table A in the correct position for having the pulp compressed about it to form the desired article, and is locked in this position by props T, as indicated in Fig. 1. When the pulp has been sufficiently compressed about mandrel B to form the desired article, props T are swung out from under casing M and piston-rod C lowered till mandrel B passes through stripping-table S. As mandrel B descends, the rack-bar O is caused to slide inwardly through the action of guide Q and slide-block P, thus rotating pinion L and with it plates D and E and the side sections F and G of mandrel B. Since cam-plates J and K are keyed to the upper end c of piston-rod C, which is held from rotation by flange m on casing M, rotation of sections F and G causes pins f^3 and g^3 to travel in slots j and k to draw the sections inwardly, lugs f and g sliding in slots f' and g' for this purpose. As the outer ends of slots j are circular in shape for some distance, while slots k spiral inwardly from near their outer ends, the first effect of the rotation of sections F and G will be to draw narrow sections G inwardly and out of the way of wide sections F, which are later acted upon by the spiral part of slots j and also drawn inwardly, thus collapsing all sides of mandrel B, as shown in Fig. 2. Then as mandrel B passes through table S shoulders s engage the projecting edges of ring R and strip the article from the mandrel, after which the article may be removed by hand or otherwise. To form another article, mandrel B is raised by means of piston-rod C replacing stripping-ring R as it passes upwardly through table S. Further upward movement of mandrel B and casing M causes rack-bar O to be withdrawn, thus rotating sections F and G and causing pins f^3 and g^3 to slide in slots j and k , so as to spread the sections into operative positions. When the sections have reached their outer positions, their respective

pins enter the circular positions of the respective slots, thus forming a positive lock against collapsing under pressure.

It will be noted that when the mandrel is withdrawn from operative position it is automatically collapsed and the finished article stripped therefrom, and when the mandrel is returned to operative position it is automatically expanded and locked in its expanded position. Owing to the fact that the mandrel revolves while its operating-cams remain stationary the finished article adhering more or less to the surface of the mandrel and being supported by the stripping-ring will rotate with it, causing the relative movement between the sections and the finished article to be directly away from the latter, thus preventing any wiping action and consequent abrasion between the sections and the inside of the article.

In Fig. 11 I have illustrated a mandrel for forming square-shaped articles, in which the wide and narrow sections have been lettered, respectively, F' and G', the operation of which is identical with that of the mandrel shown in the other figures.

While I have shown and described the preferred mechanism for carrying out my invention, it is obvious that it is capable of many mechanical changes without departing from the spirit of the invention, and I do not wish to be limited to the exact construction shown; but

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

1. The combination in a collapsible mandrel of sections forming the sides of the mandrel and mounted to move toward and away from the center; stationary internal cams for operating the sections toward and away from the center and means for rotating the sections to cause the cams to draw the sections in or expand them, substantially as specified.

2. The combination in a collapsible mandrel of top and base plates connected together; radiating slots in the plates; side sections of the mandrel mounted to slide under the influence of said slots; stationary internal cams for moving the sections toward and away from the center upon rotation of the sections and means for rotating the sections, substantially as specified.

3. The combination in a collapsible mandrel, of top and base plates connected together; radiating slots in the plates; side sections of the mandrel mounted to slide under the influence of said slots; stationary internal cam-plates having substantially spiral-shaped slots; pins carried by said sections engaging said slots, and means for rotating said sections, substantially as specified.

4. The combination in a collapsible mandrel, of top and base plates connected together; radiating slots in the plates; side sections of the mandrel mounted to slide under the influence of said slots; stationary internal cam-plates having substantially spiral-

shaped slots; pins carried by said sections engaging said slots; a pinion attached to the base-plate; a rack-bar engaging said pinion; a guide adapted to reciprocate the rack-bar upon reciprocation of the mandrel; and means for reciprocating the mandrel, substantially as specified.

5. The combination in a collapsible mandrel, of top and base plates connected together; radiating slots in the plates; side sections of the mandrel mounted to slide under the influence of said slots; stationary internal cam-plates having slots circular in shape at their outer portions and curving inwardly at their inner portions; pin connections between the mandrel-sections and the slots, and means for rotating the mandrel-sections, substantially as specified.

6. The combination in a collapsible mandrel, of top and base plates connected together; radiating slots in the plates; side sections of the mandrel mounted to slide under the influence of said slots; stationary internal cam-plates having slots circular in shape at their outer portions and curving inwardly at their inner portions; pin connections between the mandrel-sections and the slots; a pinion attached to the base-plate of the mandrel; a rack-bar meshing with the pinion; a guide connected with the rack-bar and adapted to reciprocate it upon the reciprocation of the mandrel; and means for reciprocating the mandrel, substantially as specified.

7. The combination in a collapsible mandrel, of top and base plates connected together; narrow and wide side sections of the mandrel having lugs sliding in radiating slots in the top and base plates, and having their meeting edges cut in planes parallel to the slots of the respective narrow sections; means for drawing the narrow sections inwardly; and means for drawing the wide sections inwardly after the narrow sections have been drawn out of the way, substantially as specified.

8. The combination in a collapsible mandrel, of top and base plates connected to-

gether; narrow and wide side sections of the mandrel having lugs sliding in radiating slots in the top and base plates, and having their meeting edges cut in planes parallel to the slots of the respective narrow sections; a cam-plate having slots circular in shape for a short distance at their outer ends and substantially spiral-shaped at their inner ends, and having a comparatively long throw; pin connections between the narrow sections of the mandrel and the slots; a cam-plate having slots circular in shape for a considerable distance at their outer ends and substantially spiral-shaped at their inner ends having a comparatively small throw; pin connections between the wide sections and the latter slots, and means for actuating the cam, substantially as specified.

9. The combination in a collapsible mandrel, of top and base plates connected together; narrow and wide side sections of the mandrel having lugs sliding in radiating slots in the top and base plates and having their meeting edges cut in planes parallel to the slots of the respective narrow sections; a cam-plate having slots circular in shape for a short distance at their outer ends and substantially spiral-shaped at their inner ends having a comparatively long throw; pin connections between the narrow sections of the mandrel and the slots; a cam-plate having slots circular in shape for a considerable distance at their outer ends and substantially spiral-shaped at their inner ends having a comparatively small throw; pin connections between the wide sections and the latter slots; a pinion attached to the base-plate of the mandrel; a rack-bar meshing with the pinion; a guide connected with the rack-bar and adapted to reciprocate the rack-bar upon reciprocation of the mandrel; means for reciprocating the mandrel, and means for preventing rotation of the cams, substantially as specified.

GEORGE E. SHAW.

Witnesses:

MARY P. SINGLETON,
BRAYTON G. RICHARDS.