

(No Model.)

4 Sheets—Sheet 1.

C. & A. LINDEMANN.
MANUFACTURE OF SHEET METAL ELBOWS.

No. 502,044.

Patented July 25, 1893.

Fig. 1,

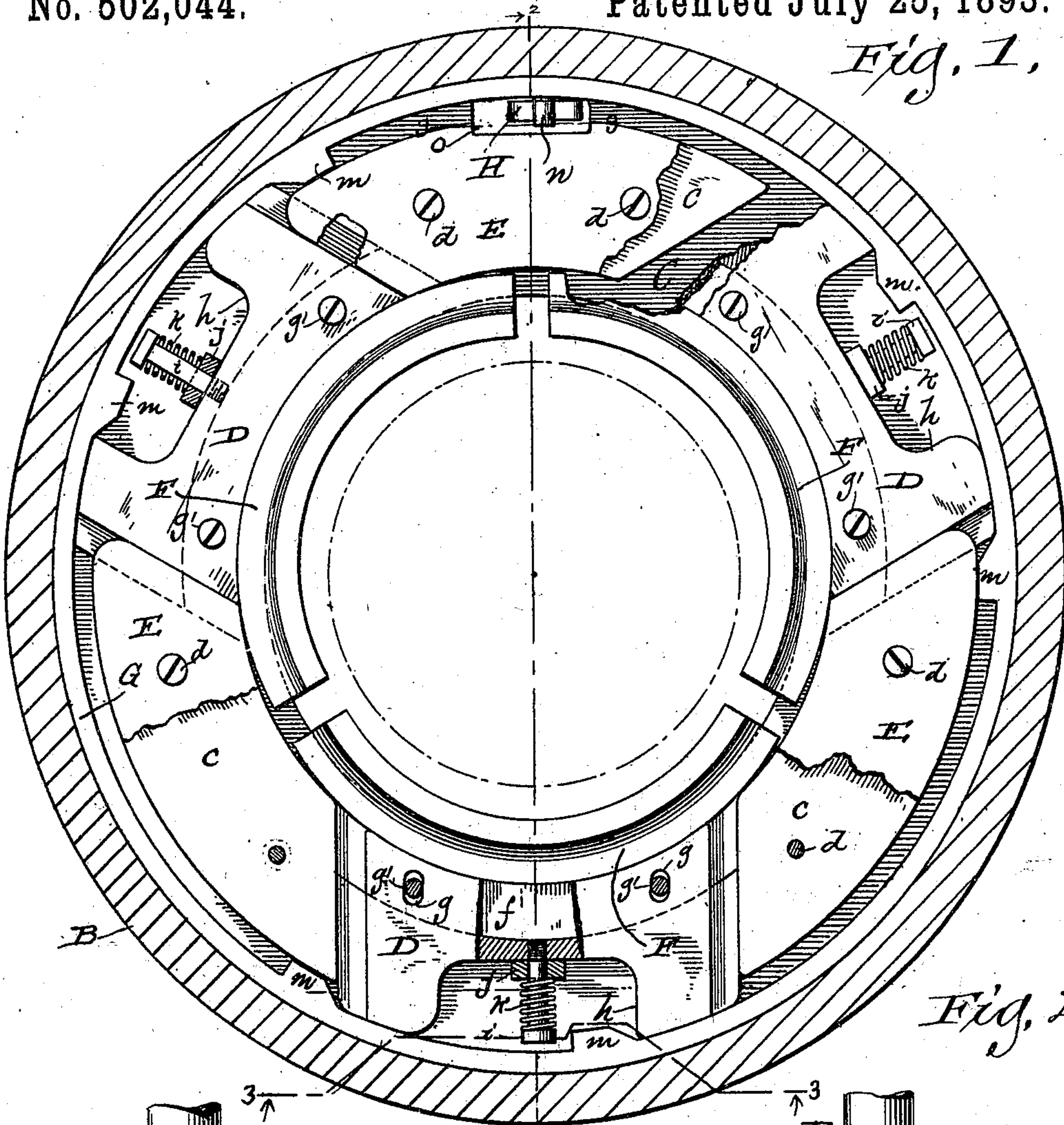


Fig. 2,

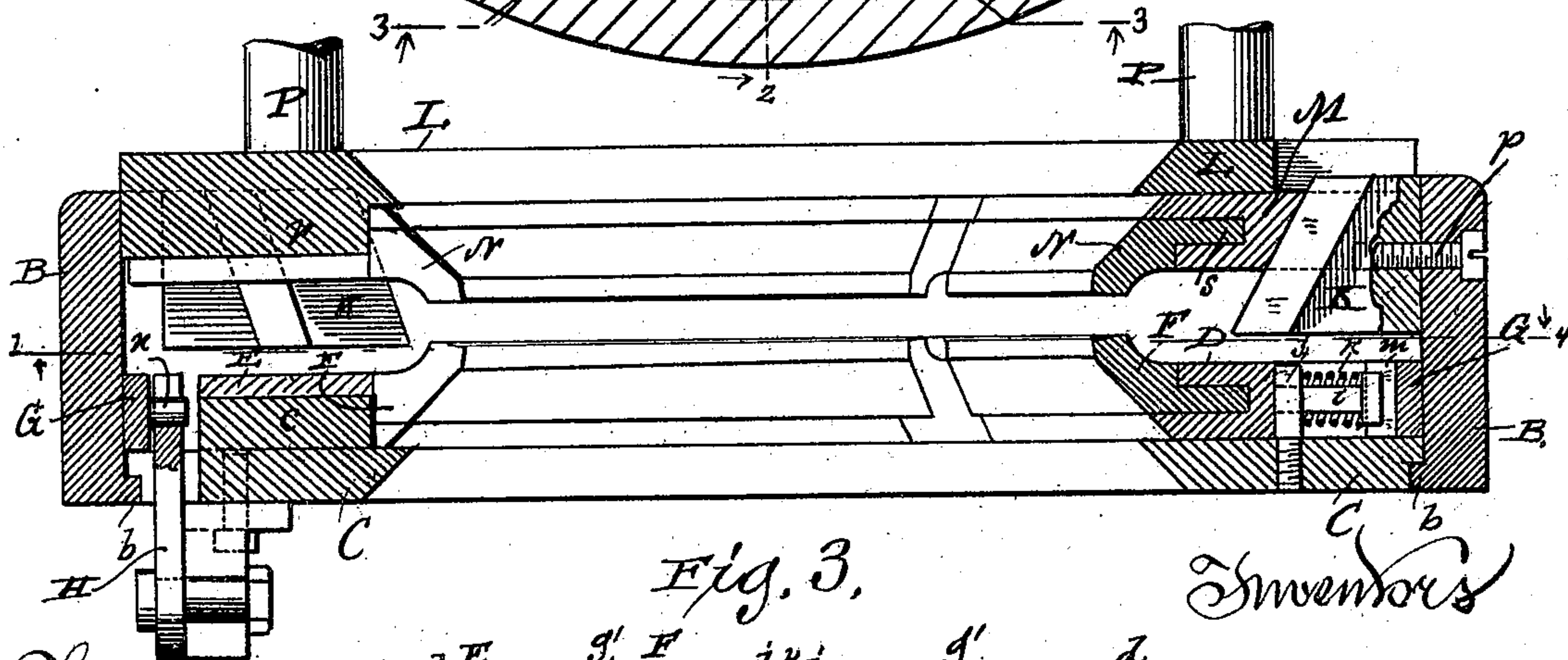
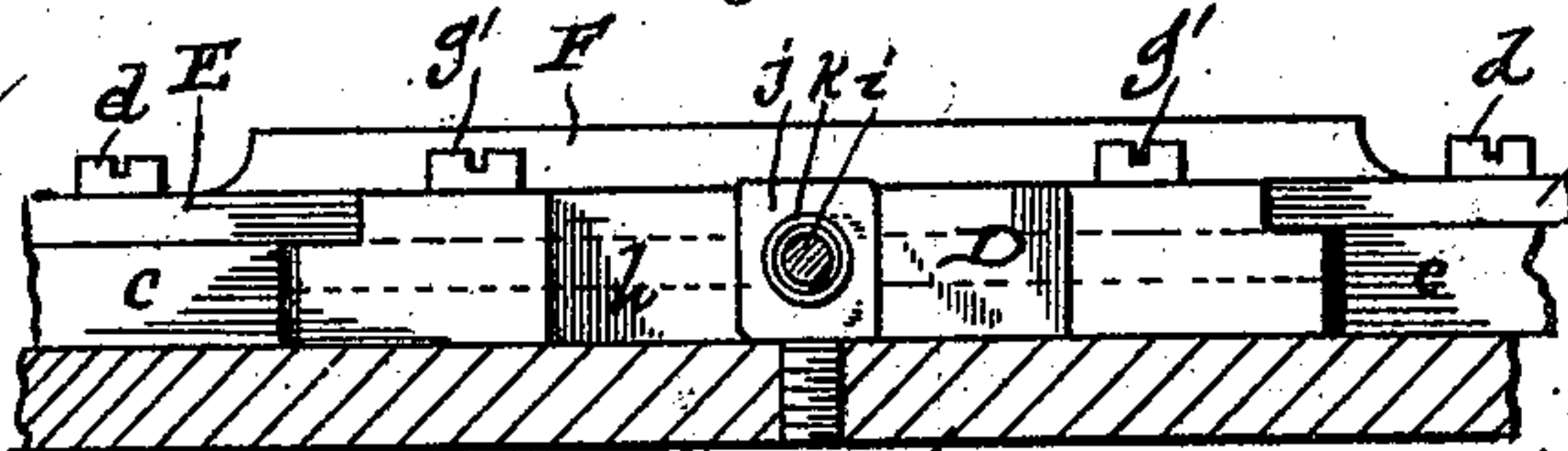


Fig. 3,

Inventors

Witnesses
Geo. W. Young,
H. E. Oliphant



Charles Lindemann
August Lindemann
By H. G. Underwood
Attorney

(No Model.)

4 Sheets—Sheet 2.

C. & A. LINDEMANN.
MANUFACTURE OF SHEET METAL ELBOWS.

No. 502,044.

Patented July 25, 1893.

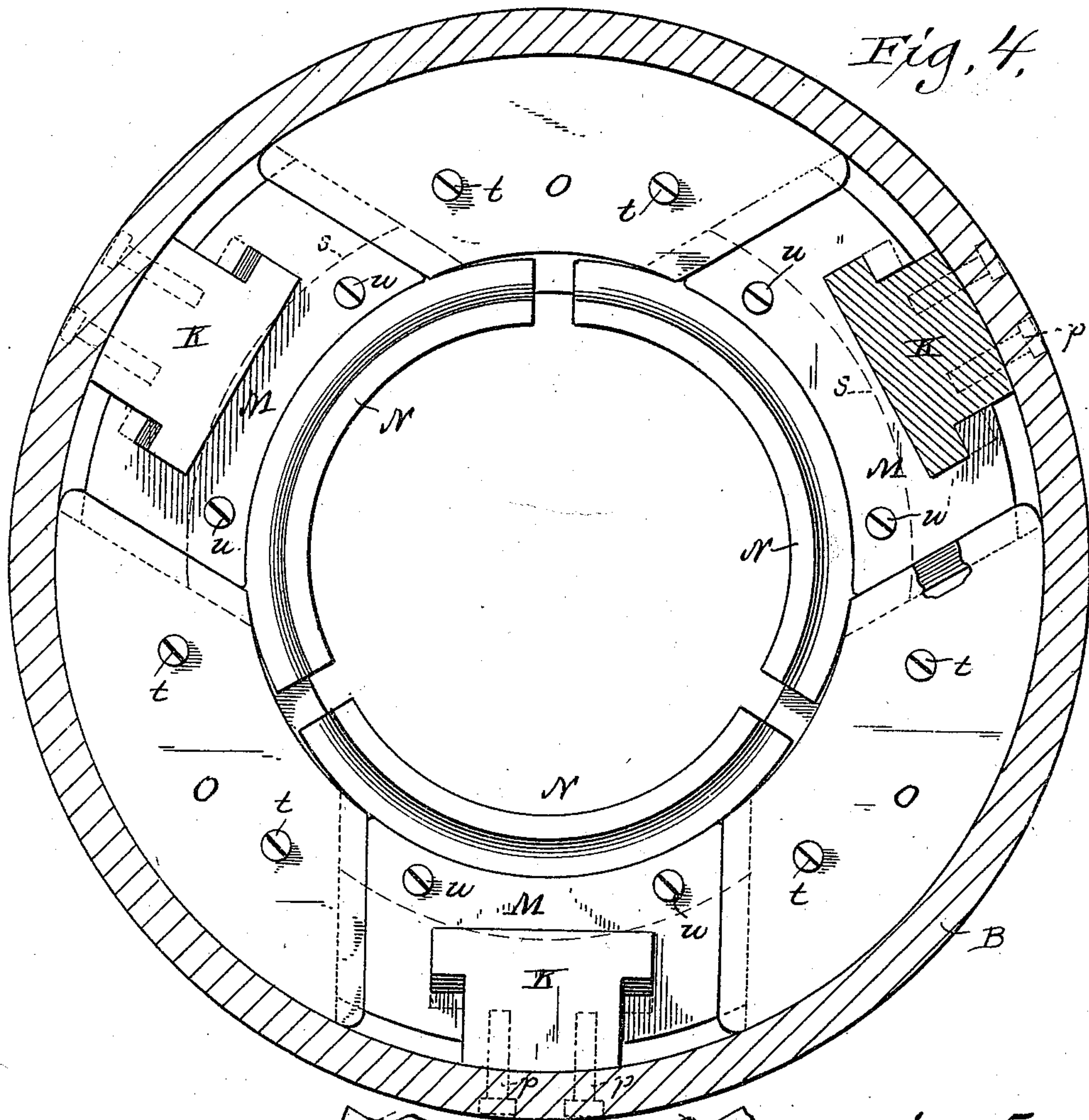


Fig. 4.

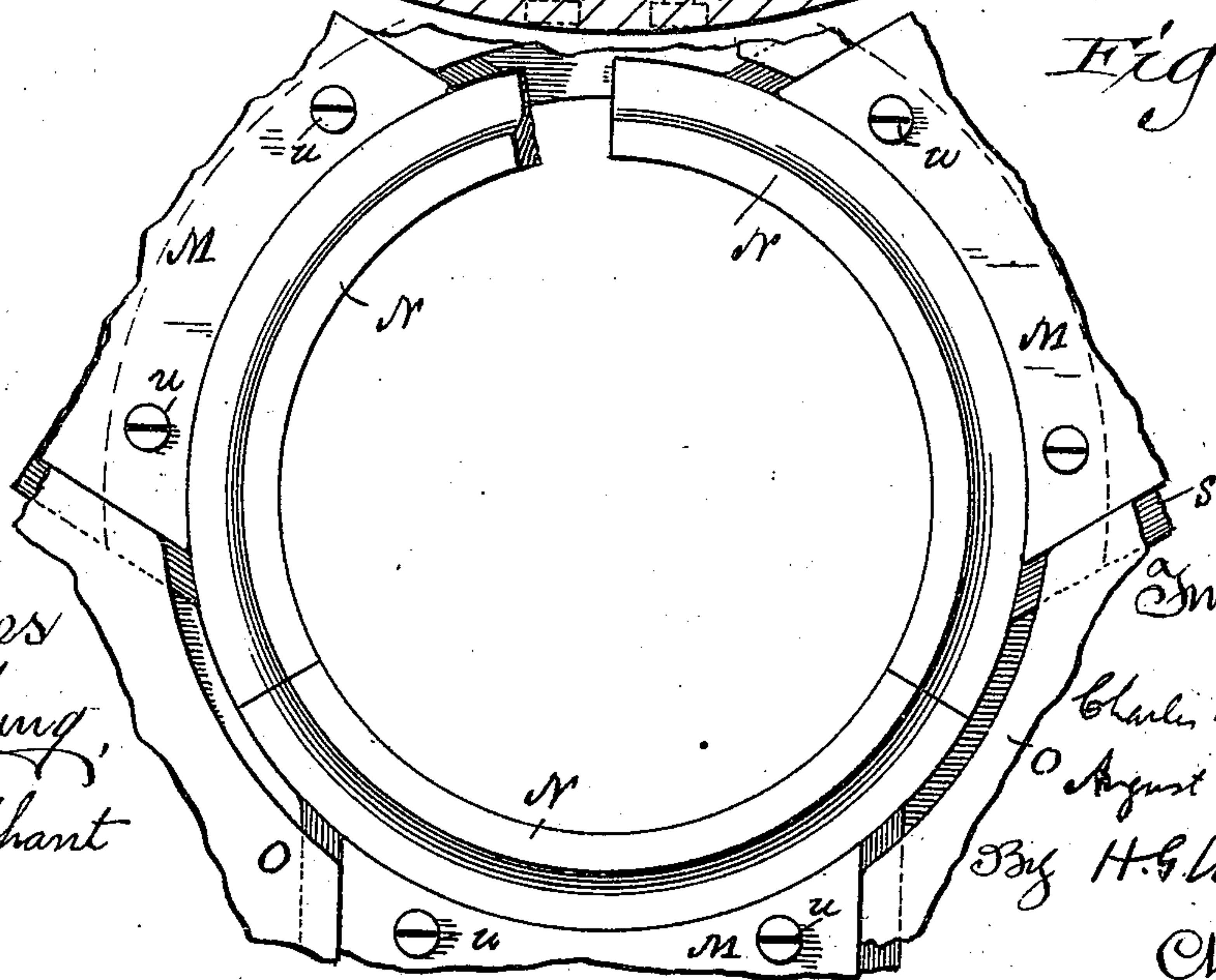


Fig. 5.

Witnesses
Geo W. Young,
N. E. Oliphant

Inventors
Charles Lindemann
August Lindemann
By H. G. Underwood
Attorney

(No Model.)

4 Sheets—Sheet 3.

C. & A. LINDEMANN.
MANUFACTURE OF SHEET METAL ELBOWS.

No. 502,044.

Patented July 25, 1893.

Fig. 6.

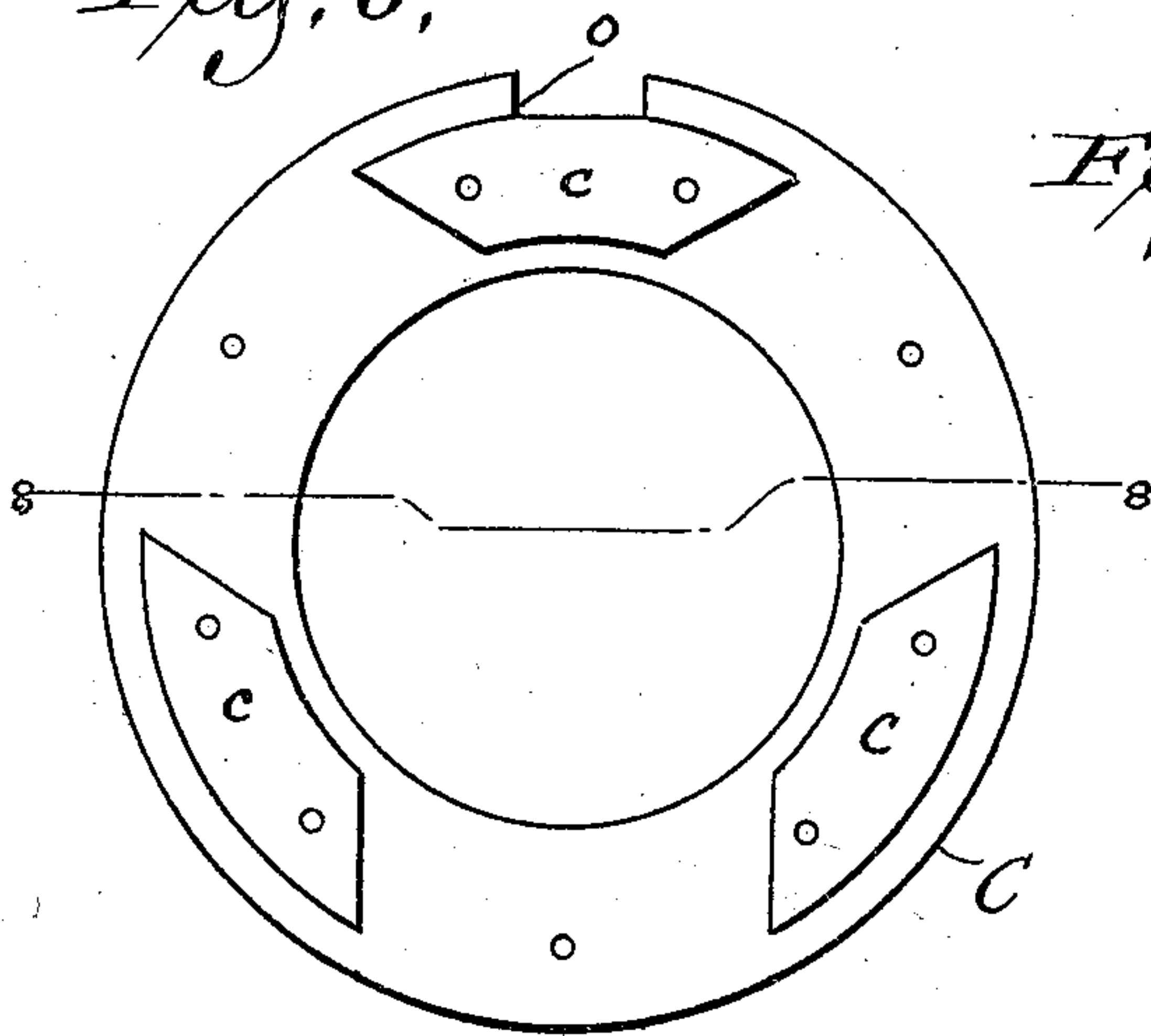


Fig. 7.

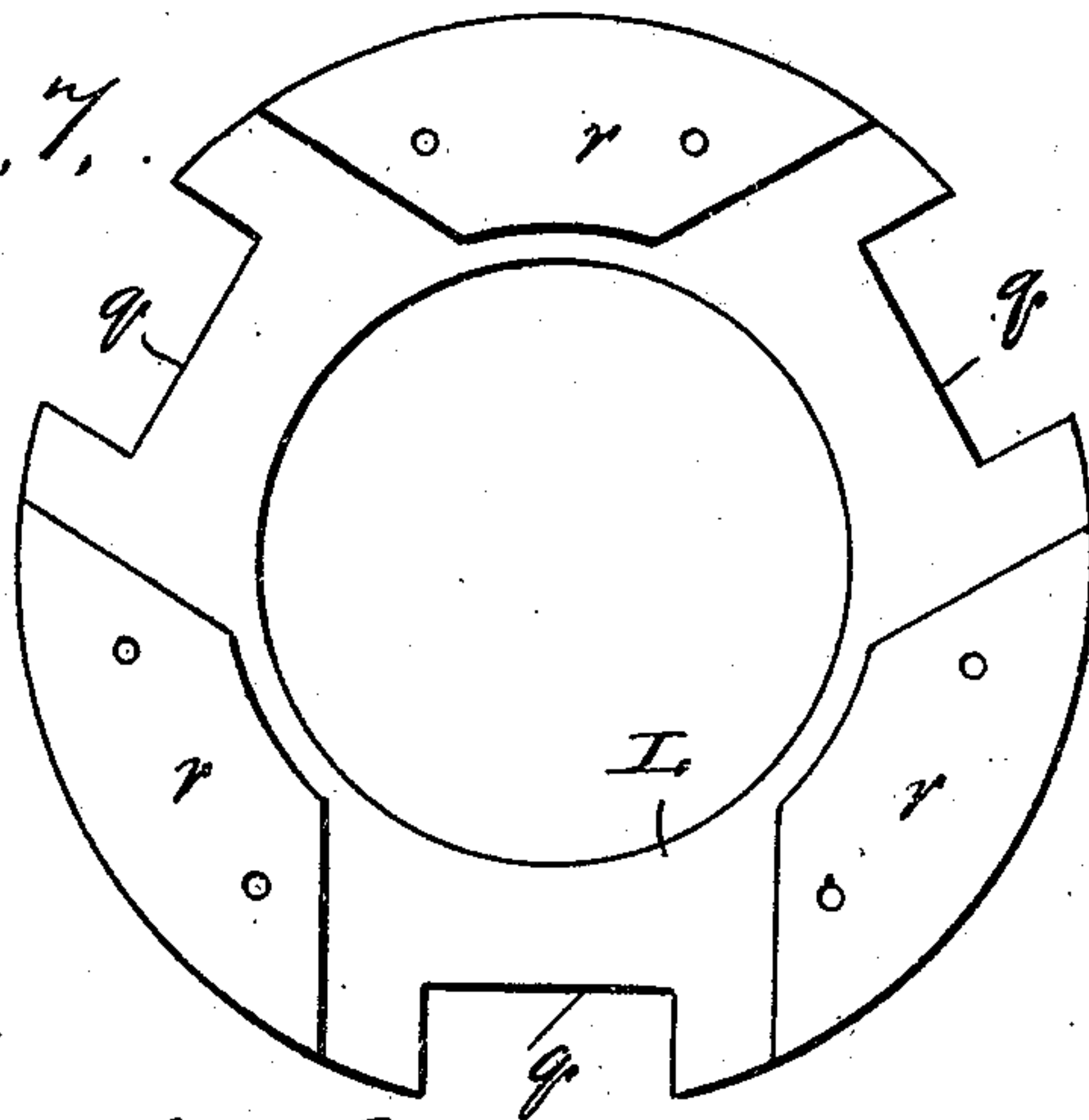


Fig. 8.

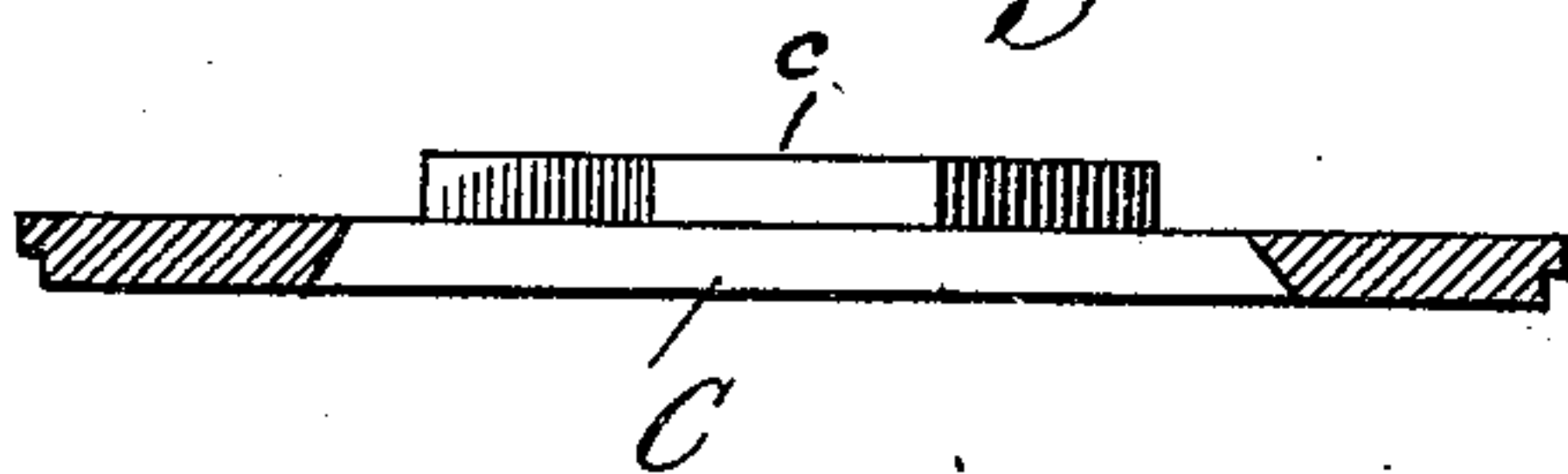


Fig. 9.

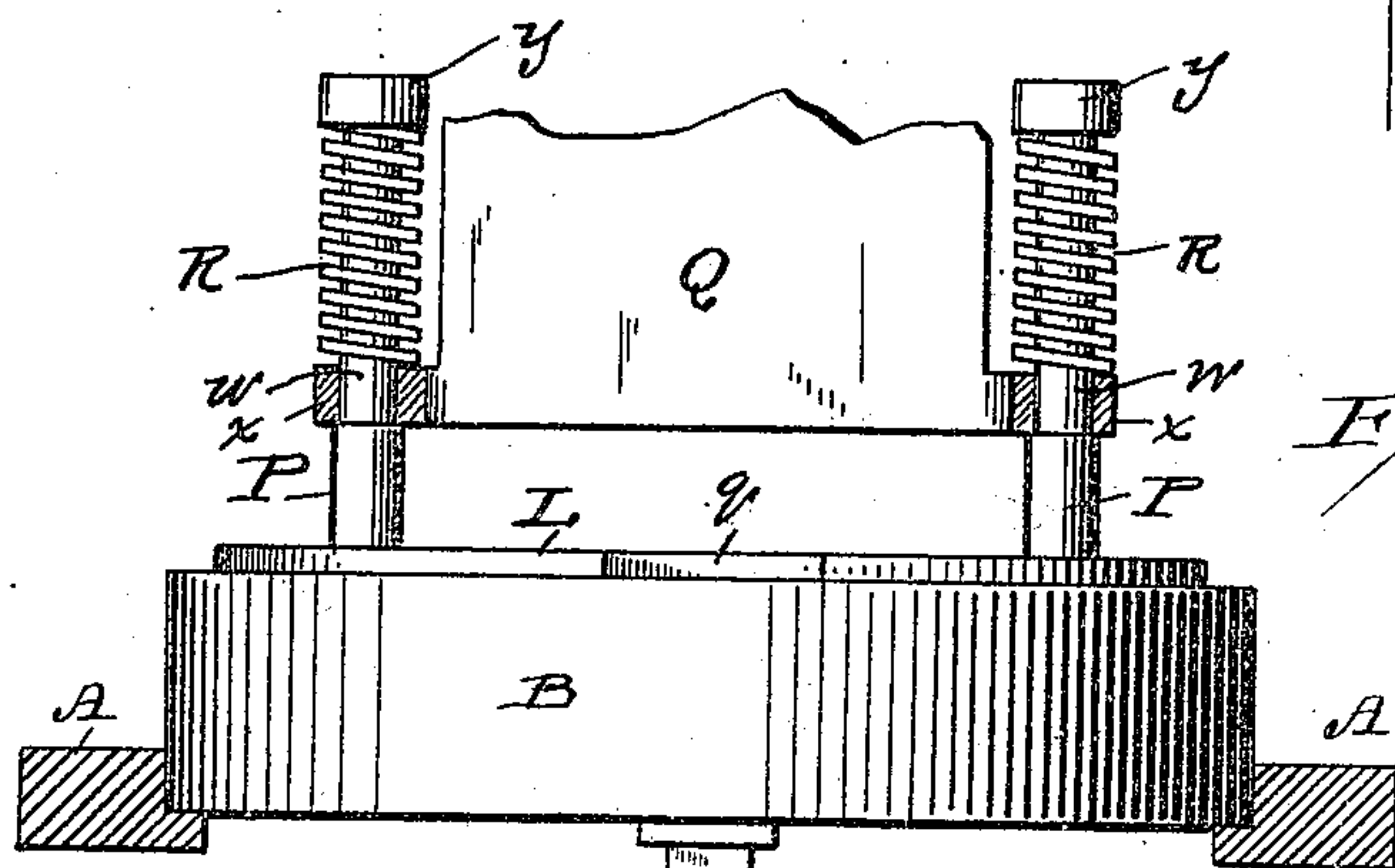
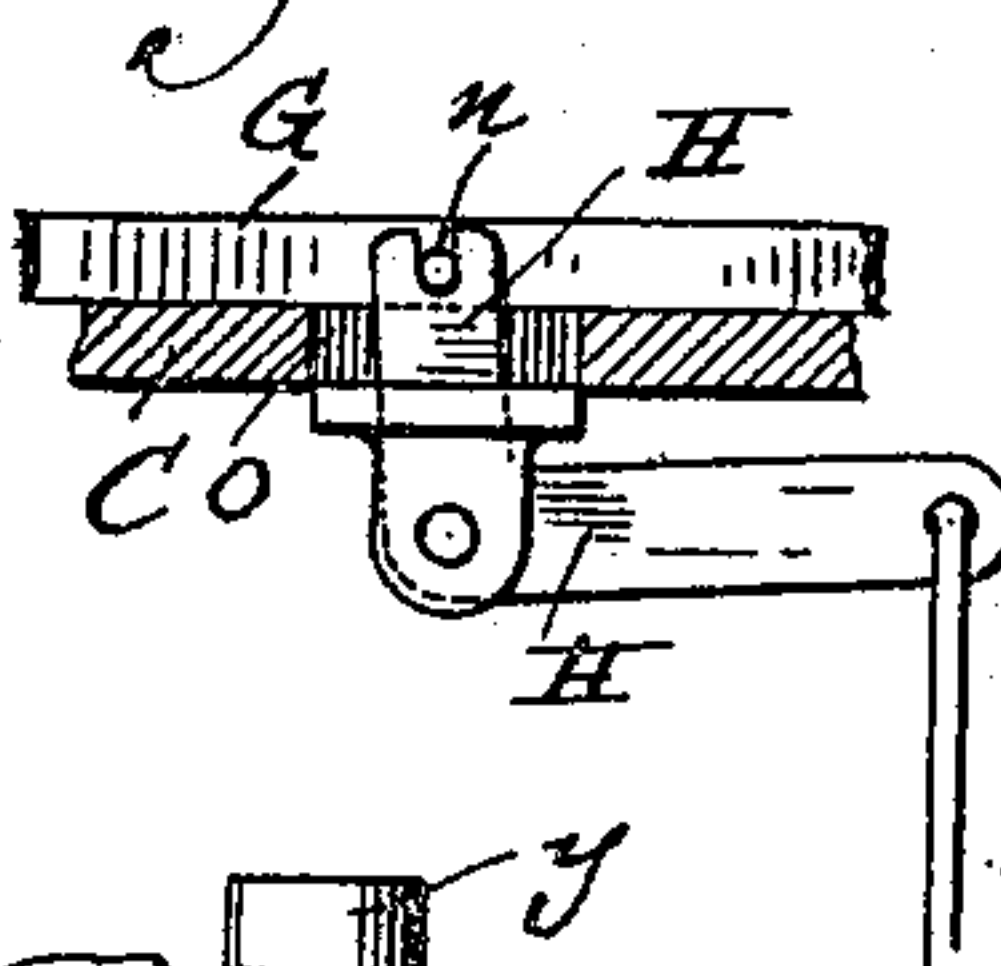
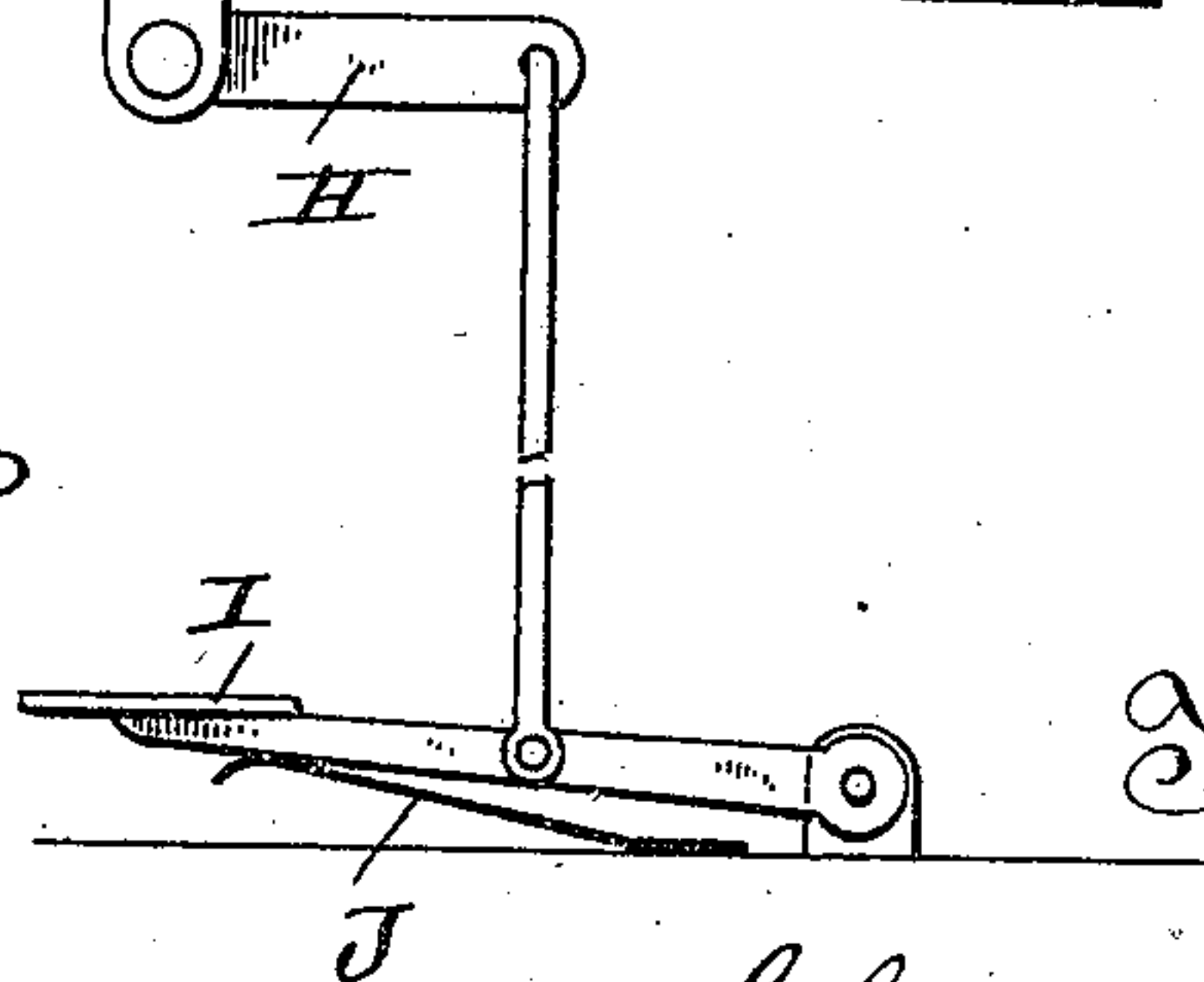
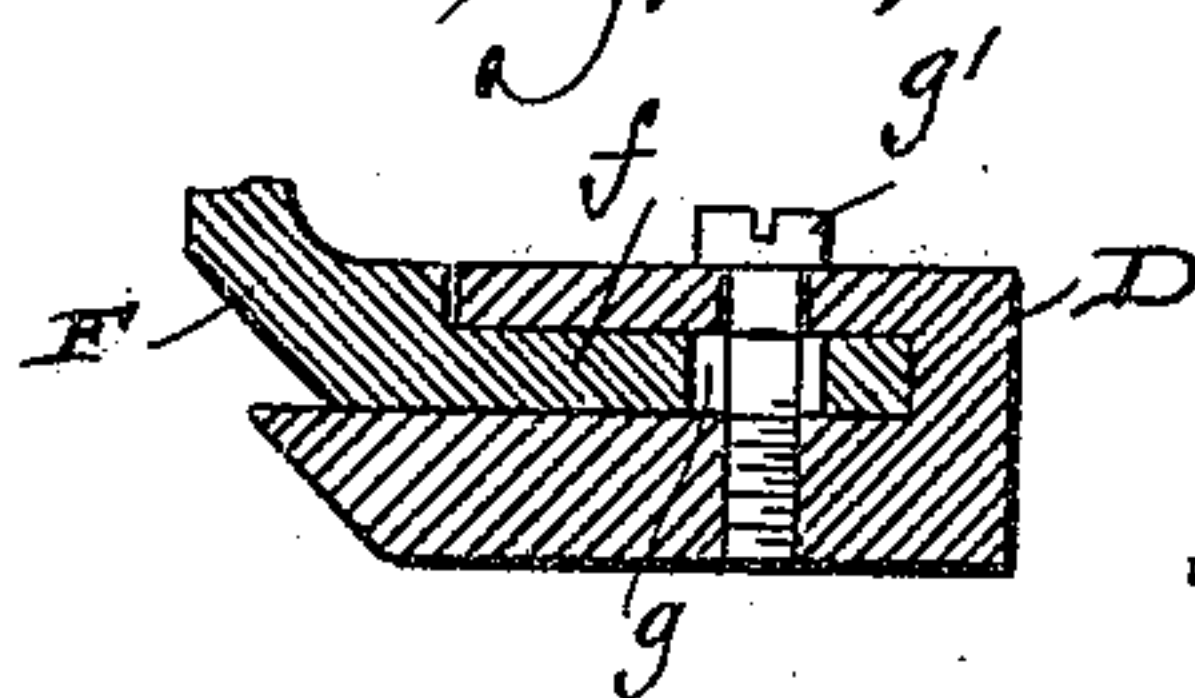


Fig. 10.

Fig. 11.



Witnesses:
Geo. W. Young,
H. E. Oliphant

Inventors
Charles Lindemann
August Lindemann
By H. G. Underwood
Attorneys

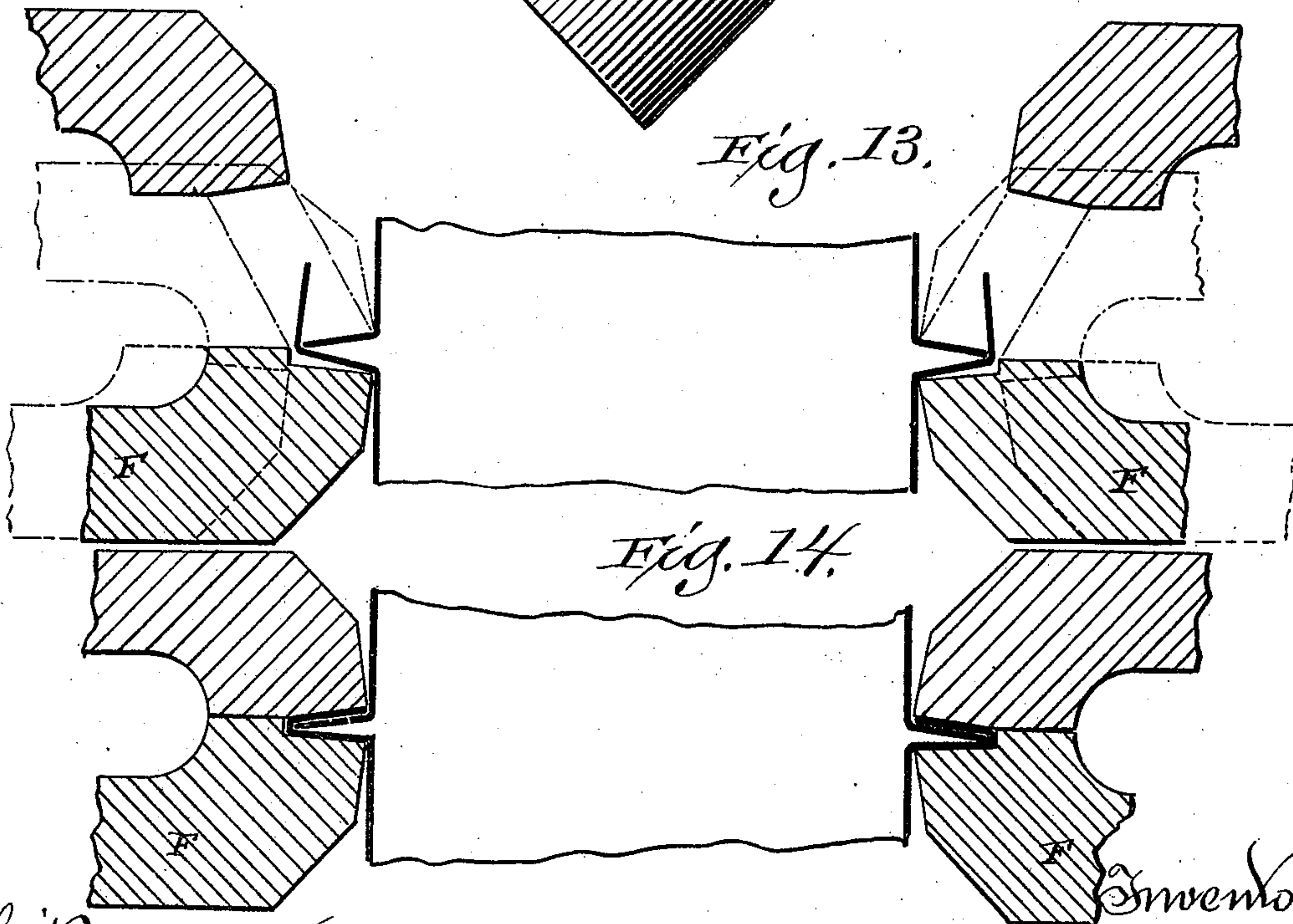
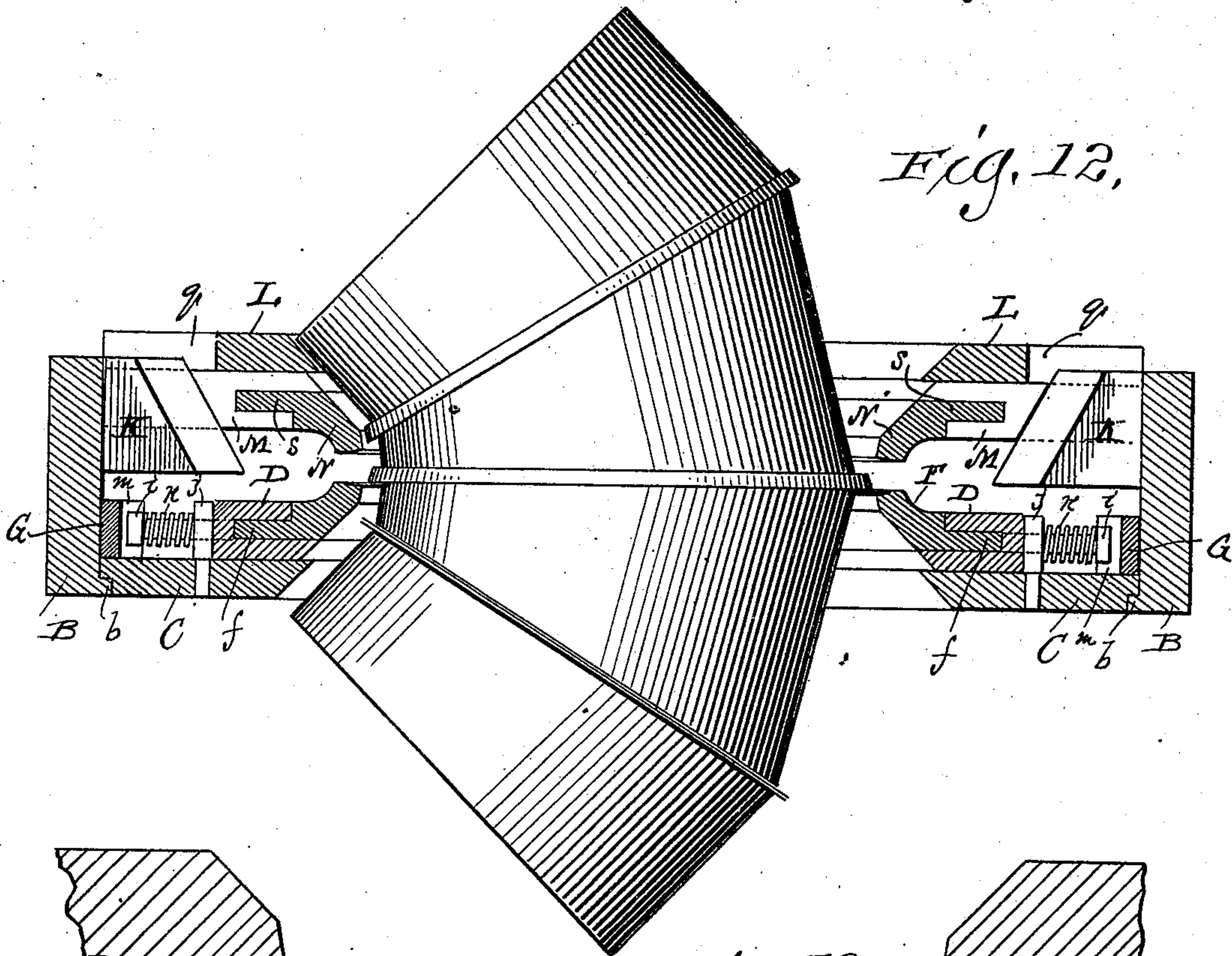
(No Model.)

4 Sheets—Sheet 4.

C. & A. LINDEMANN.
MANUFACTURE OF SHEET METAL ELBOWS.

No. 502,044.

Patented July 25, 1893.



Witnesses
Geo. W. Lundy,
N. E. Oliphant

Inventors
Charles Lindemann,
August Lindemann,
By H. G. Underwood
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES LINDEMANN AND AUGUST LINDEMANN, OF MILWAUKEE,
WISCONSIN.

MANUFACTURE OF SHEET-METAL ELBOWS.

SPECIFICATION forming part of Letters Patent No. 502,044, dated July 25, 1893.

Application filed February 24, 1893. Serial No. 463,578. (No model.)

To all whom it may concern:

Be it known that we, CHARLES LINDEMANN and AUGUST LINDEMANN, citizens of the United States, and residents of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in the Manufacture of Sheet-Metal Elbows; and we do hereby declare that the following is a full, clear, and exact description thereof.

Our invention has for its object to economize in the manufacture of that class of sheet-metal elbows in which each elbow is made from a series of sections united by circumferential seams.

Heretofore so far as we are aware, it has been necessary in the manufacture of sectional sheet-metal elbows to unite and seam the sections together one after another, or in other words the seaming together of two of the sections must be completed before another can be added, and so on for as many of said sections as may be necessary to complete an elbow, all of which requires a certain amount of time and labor we seek to save by making it possible to assemble, at one time, all the sections of each elbow and close the seams by successive operations of a machine to which these assembled sections are fed.

Our invention therefore consists in a method of manufacture, and certain peculiarities of construction and combination of parts necessary to a machine for the carrying out of said method, as will be hereinafter described with reference to the accompanying drawings and subsequently claimed.

In the drawings:—Figure 1 represents a plan view on line 1—4 of the succeeding figure with parts broken away and in section; Fig. 2, a vertical transverse section taken on line 2—2 of the preceding figure; Fig. 3, a detail section on line 3—3 of Fig. 1; Fig. 4, an inverted plan view on line 4—1 of Fig. 2, certain of the parts being broken away and in section; Fig. 5, a similar view on the same line with certain of the parts in a different position from that shown in the preceding figure; Fig. 6, a detail view of a stationary plate having guides for reciprocative dies; Fig. 7, a similar view of a movable plate also pro-

vided with guides for reciprocative dies; Fig. 8, a transverse section on line 8—8 of Fig. 6; Fig. 9, a detail section on line 9—9 of Fig. 1; Fig. 10, an elevation of our machine, with parts in section; Fig. 11, a detail section illustrating one of the reciprocative dies and a clamping-jaw for the same; Fig. 12, a vertical transverse section of the machine in connection with an elbow, the latter being shown in elevation, and Figs. 13 and 14 are diagrams illustrating the operation of closing a seam by said machine.

Referring by letter to the drawings A represents suitable supports for a stationary annular casing B that is provided at its lower edge with an inturned flange or seat *b* for a circular plate C, which latter has a central opening of any suitable diameter and is shown in detail by Fig. 6. The plate C is provided on its upper surface with segmental guide-blocks *c* for radially disposed segmental jaws D, and held on the guide-blocks, by means of screws *d*, are corresponding plates E that have their extremities loosely engaged with notched ends of said jaws. Engaging the jaws D are tangs *f* of segmental dies F, these tangs being clamped in place by clamp-screws *g'* engaging slots *g* therein, these slots permitting of a radial adjustment of the dies to compensate for wear on the same. The dies are struck on a circle having a radius corresponding to that of a certain size of elbow, and it is to be understood that one set of dies may be readily substituted for another according to the size of elbows to be operated upon. Each of the jaws D has a central recess *h* in its outer side and outwardly extended from the jaw within this recessed portion thereof is a pin *i* that engages a guide *j* on the base-plate C, said pin and guide being preferably held in place by means of screw-threads thereon. Each pin *i* is headed at its outer end, and arranged thereon between the head and adjacent guide *j* is a spiral-spring *k* that is contracted when the relative jaw and attached die are moved inward by means hereinafter specified, the expansion of said spring acting to automatically return said jaw and attached die to their normal position.

Supported on the base-plate C, outside the

guide blocks *c* thereon, is a loose ring *G* interiorly provided with cam-shoulders *m* arranged in pairs. The jaws *D*, held out by the expansion of the springs *k*, are normally in contact with the loose-ring *G* and the cam-shoulders *m* are so disposed as to exert pressure on said jaws when said ring is moved in the proper direction, by the means hereinafter specified, this pressure serving to overcome the power of said springs and cause the aforesaid jaws and the dies *F* to close in toward the center of the machine, said dies forming a true circle and serving as a support for an elbow-seam that is to be closed.

The loose-ring *G* is provided with a stud *n* that engages one arm of a bell-crank *H*, and the other arm of this bell-crank is linked to a foot-treadle *I*, the latter being preferably supported on a spring *J* that serves to automatically return said treadle to its normal position after being depressed. In order to obtain clearance for the ring-stud *n* and the engaging arm of the bell-crank *H*, the base-plate *C* is provided with a notch *o*, as illustrated in Figs. 1, 2 and 6. By actuating the treadle the loose-ring is moved on its support and thus the cam-shoulders on said ring are caused to do their work. By means of screws *p*, bevel-faced blocks *K* are secured to the upper portion of the casing *B* within the latter, and clearing these blocks are corresponding notches *q* in a circular plate *L* that has a central opening of suitable diameter and is provided on its under side with guide-blocks *r*, this plate being illustrated in detail by Fig. 7.

Loose on the plate *L* between the guide-blocks *r* are radially disposed segmental jaws *M*, that receive the tangs *s* of segmental dies *N* and are also notched to engage the bevel-faced stationary blocks *K*, said jaws being retained in their guides by overlapping segment-plates *O* held on said guide-blocks by screws *t*, as shown in Fig. 4. Clamp-screws *u* serve to hold the die-tangs *s* in the jaws *M*, and to compensate for wear on said dies the latter may be adjustable on said screws similar to the lower dies *F* hereinbefore set forth.

Connected to the upper face of the plate *L* are posts *P* having reduced portions *w* loosely engaging guide-lugs *x* on a block *Q*, these reduced portions of the posts being provided with heads *y* and surrounded by spiral-springs *R* interposed between the heads and said guides. Pressure against the post-heads will overcome the power of the springs *R* and run down the plate *L* to thereby cause an inward movement of the upper dies *N*, the latter closing in to form a circle having a radius corresponding to that of a certain size of elbow, and at the same time peening the seam between the two united sections of said elbow, this seam receiving its support from the lower dies *F* previously closed in together in the manner above specified.

In Fig. 13, is shown a partly finished seam positioned to receive the impact of the upper

dies *N* having the movement indicated by dotted lines, while in Fig. 14, the seam is shown as completed by the combined descent and inward movement of said upper dies.

In our method of manufacturing sectional sheet-metal elbows, all the sections of an elbow are assembled at one time and this assemblage of sections run through the machine herein specified. By actuating the treadle *I* the lower dies *F* are run in to form a seat for the first of the partly completed seams and following this operation is an impact of the upper dies *N* to complete said seam. The upper dies are retracted by an expansion of the springs *R* when pressure is removed from the posts on the upper die-plate *L*, and upon release of the treadle *I* the cam-shoulders *m* on the loose-ring *G* are returned to their normal position thereby permitting the springs *k* to expand and retract the lower dies. Both sets of dies being retracted, the seam just finished will be cleared and the partly finished elbow dropped down to have the next one of the incomplete seams come into contact with the lower dies, that in the meantime are run in by another depression of the treadle.

The operation above described is successively repeated as many times as there are seams to be closed, and the elbow leaves the machine a finished article.

While not illustrated, it is merely a matter of mechanical expediency to provide means for exerting pressure on the spring-controlled posts of the upper die-plate each time the lower dies are run in to form a seam support, and we do not wish to be limited to the particular mechanism herein shown for the retraction of said upper die plate.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A method of making sheet-metal elbows, the same consisting in connecting together, by partly finished seams, all the sections necessary to such an elbow, bringing the seams to rest, in successive order, upon a series of movable dies that unite in one direction of their movement to entirely surround the elbow, impacting a supported seam by other movable dies that also unite in one direction of their movement to entirely surround said elbow, and retracting all the dies at the completion of each seam to permit the necessary longitudinal movement of the aforesaid elbow, substantially as set forth.

2. A machine for finishing sectional sheet-metal elbows, said machine comprising a series of reciprocative seam-supporting dies that close in to form a predetermined contour, and a series of reciprocative impact dies that also close in to form a similar contour, both series of dies being retractible a distance sufficient to clear a seam completed by their joint impingement against interposed metal, substantially as set forth.

3. A machine for finishing sectional sheet-metal elbows, said machine comprising a se-

ries of positively adjustable but reciprocative seam-supporting dies that close in to form a predetermined contour, and a series of positively adjustable reciprocative impact dies that also close in to form a similar contour, both series of dies being retractible a distance sufficient to clear a seam completed by their joint impingement against interposed metal, substantially as set forth.

4. A machine for finishing sectional sheet-metal elbows, said machine comprising a series of jaws loose in radial guides, a corresponding series of seam-supporting dies detachably connected to the jaws, suitable means for reciprocating said jaws, a series of stationary inclined guides, another series of jaws that are also loose in radial guides and loosely engage the inclined guides, a corresponding series of impact dies detachably connected to the latter jaws, and suitable means for actuating said latter jaws, substantially as set forth.

5. A machine for finishing sectional sheet-

metal elbows, said machine comprising a stationary annular casing, a centrally open base-plate within the casing, a series of seam-supporting dies connected to jaws that have a radial reciprocation on the base-plate, inclined guides fast in said casing above said base-plate, another centrally open plate having notches that clear the inclined guides, a series of impact dies connected to jaws loose in radial guides on the latter plate and also loosely engaged with the aforesaid inclined guides, and suitable mechanism for imparting a reciprocation to said latter plate, substantially as set forth.

In testimony that we claim the foregoing we have hereunto set our hands, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

CHARLES LINDEMANN.

AUGUST LINDEMANN.

Witnesses:

N. E. OLIPHANT,

JNO. W. LEUENBERGER.