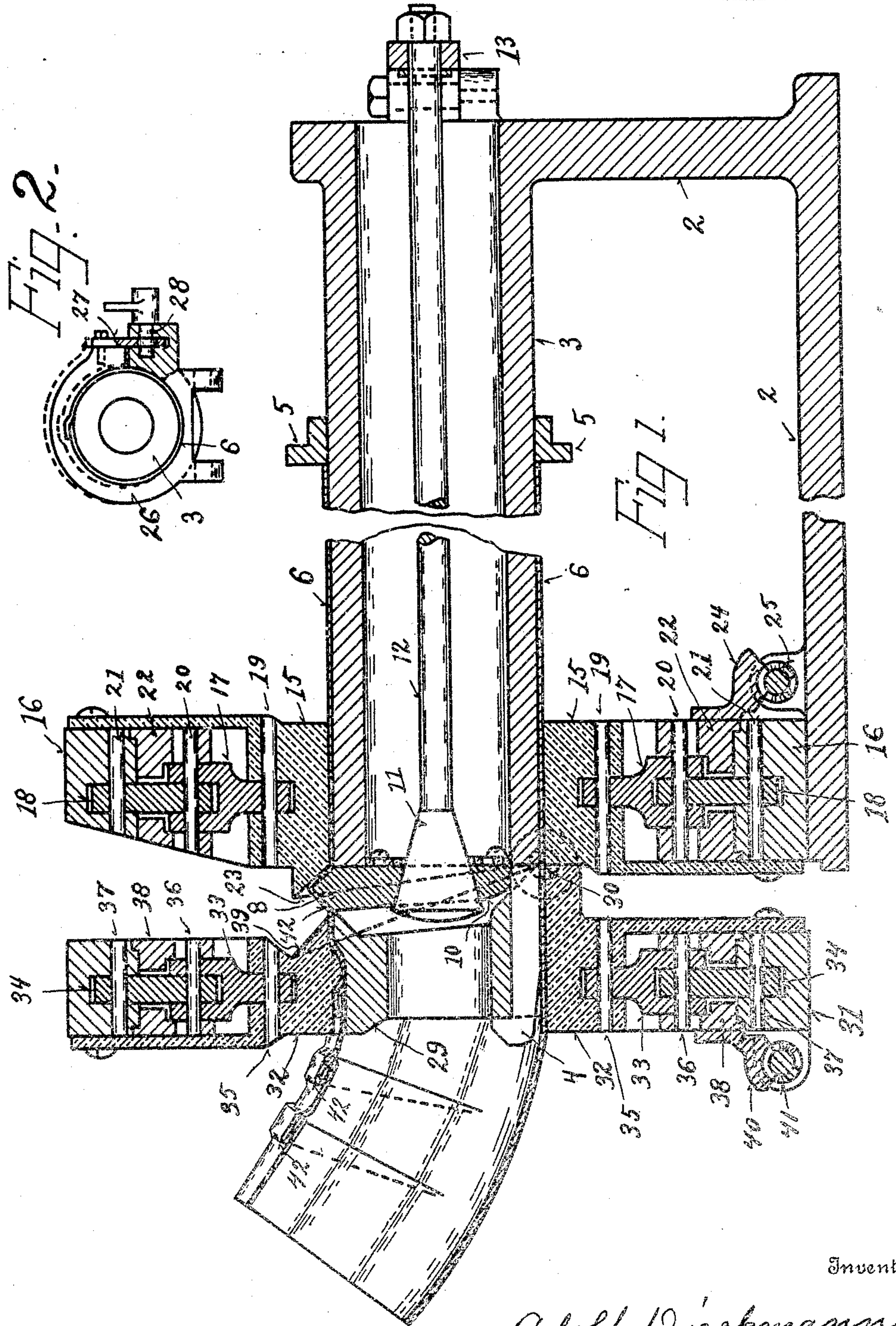


A. DIECKMANN.  
SHEET METAL ELBOW MACHINE.  
APPLICATION FILED DEC. 16, 1909.

959,204.

Patented May 24, 1910.

2 SHEETS—SHEET 1.



Inventor

Adolf Dieckmann

By

C. W. Miles

Attorney

Witnesses

E. M. Callister

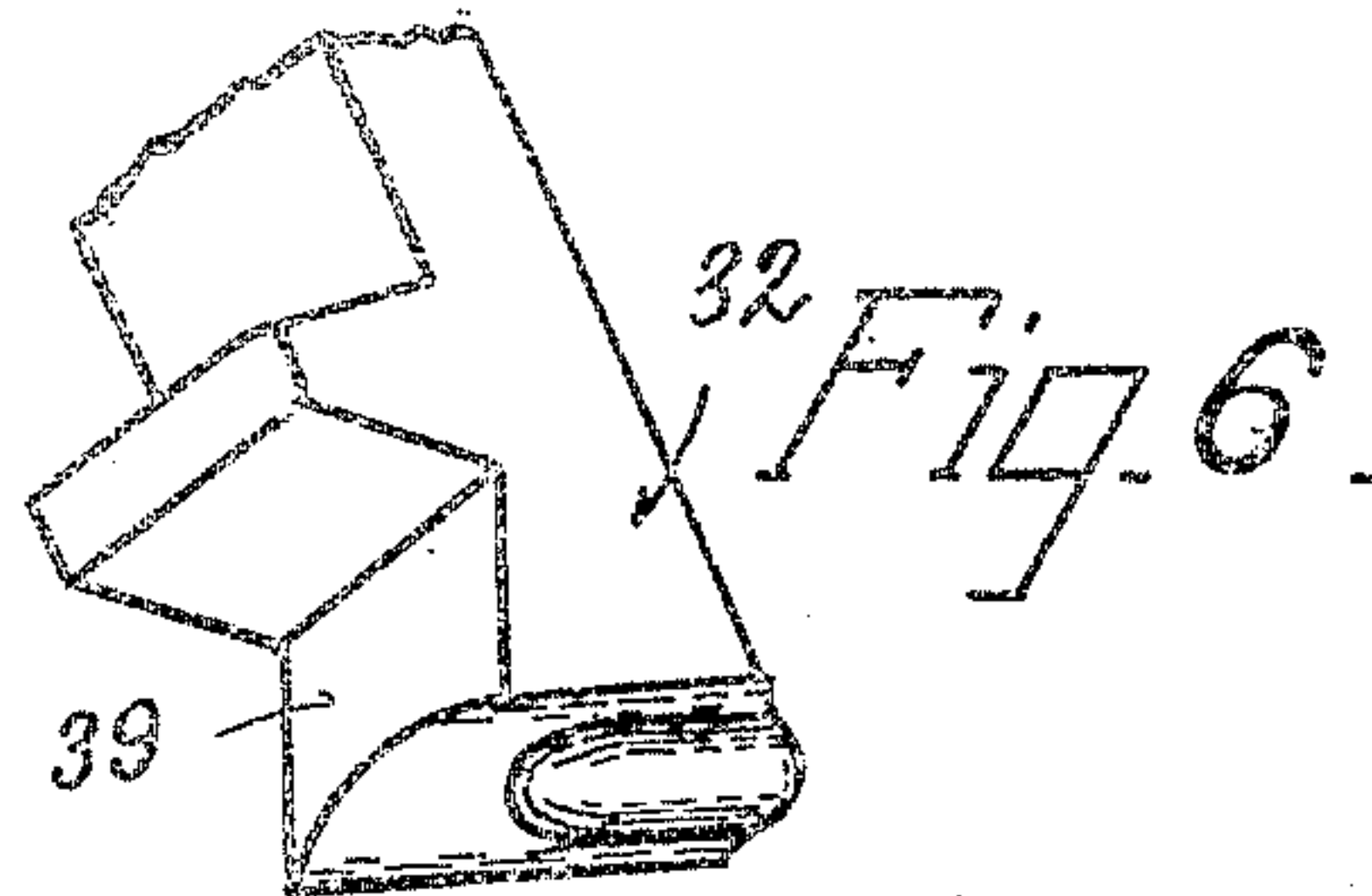
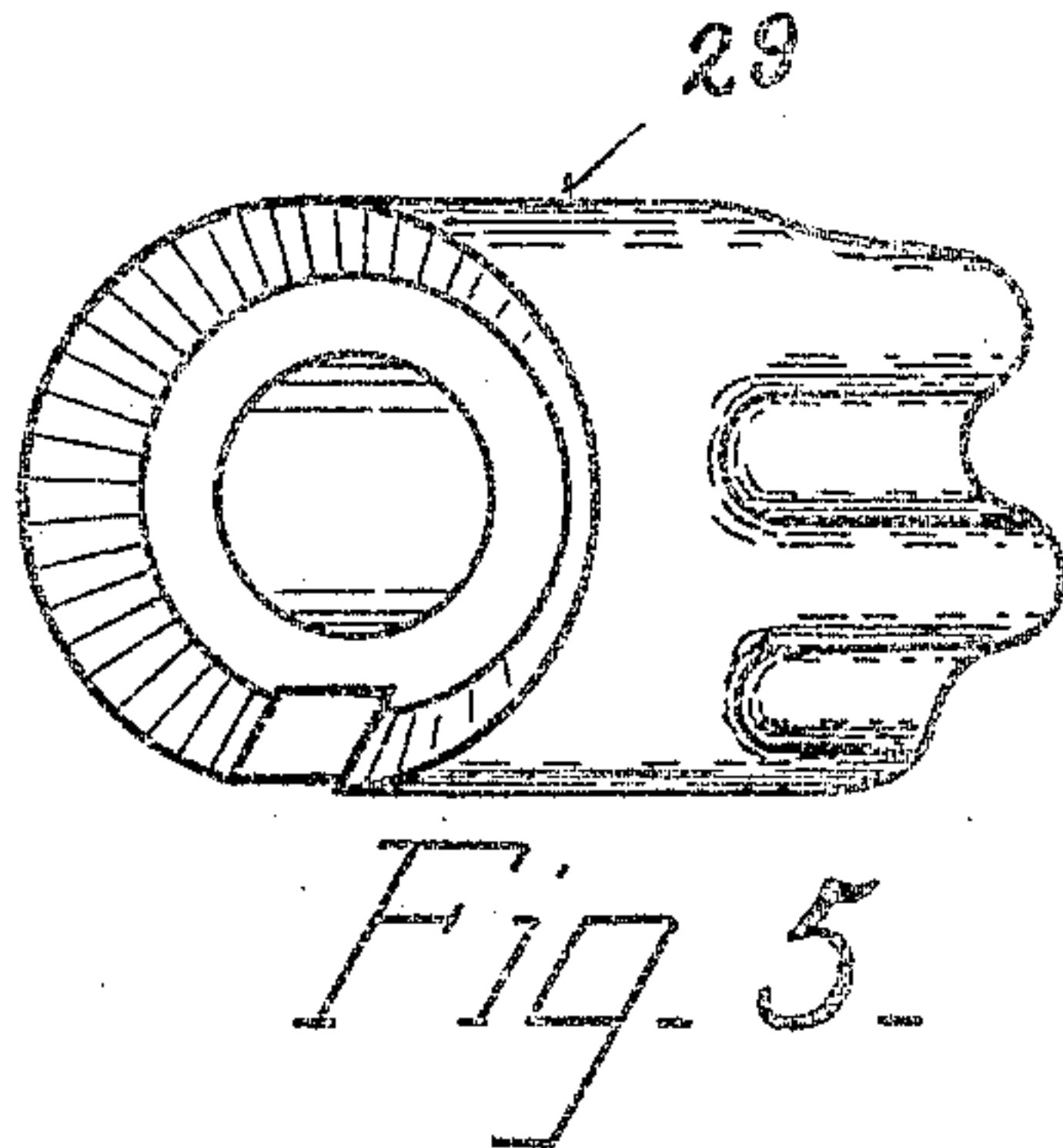
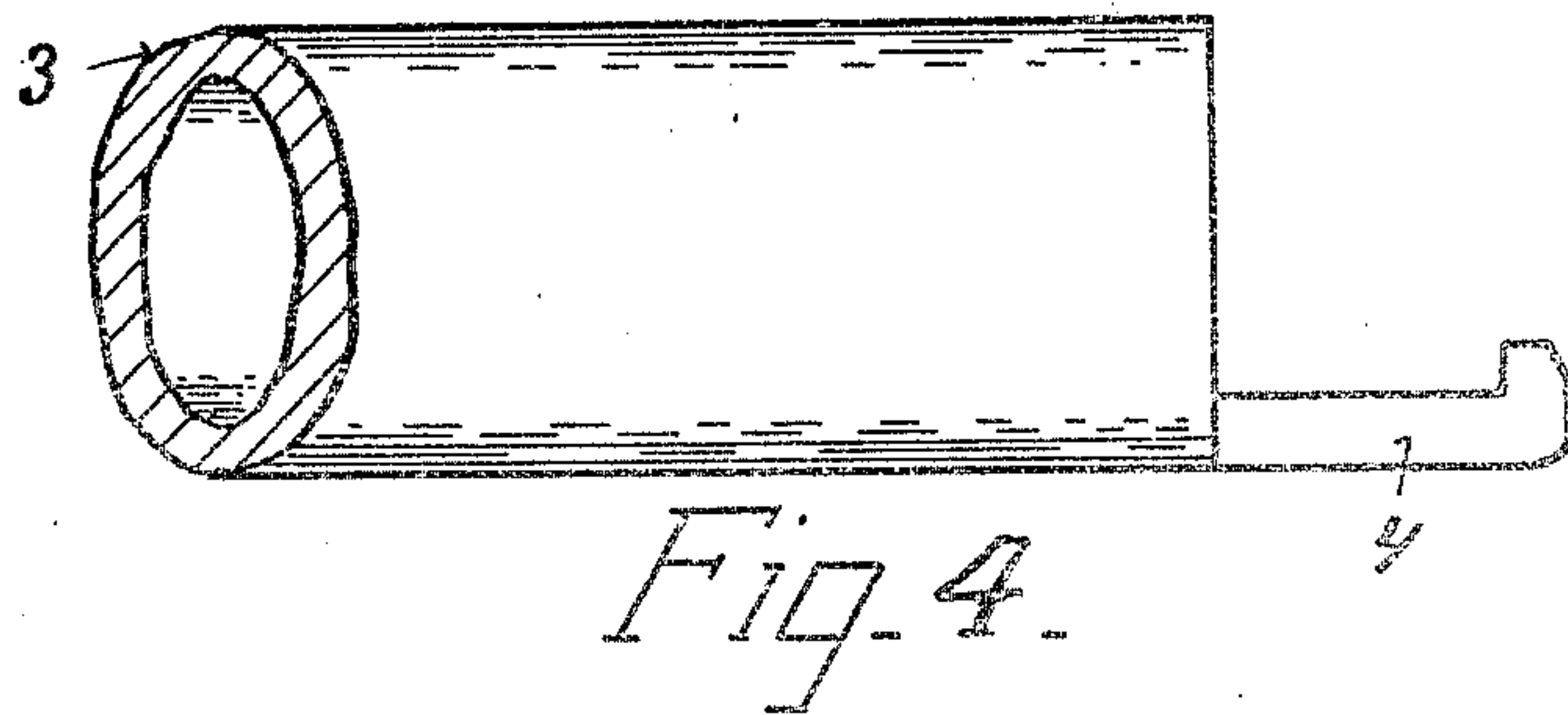
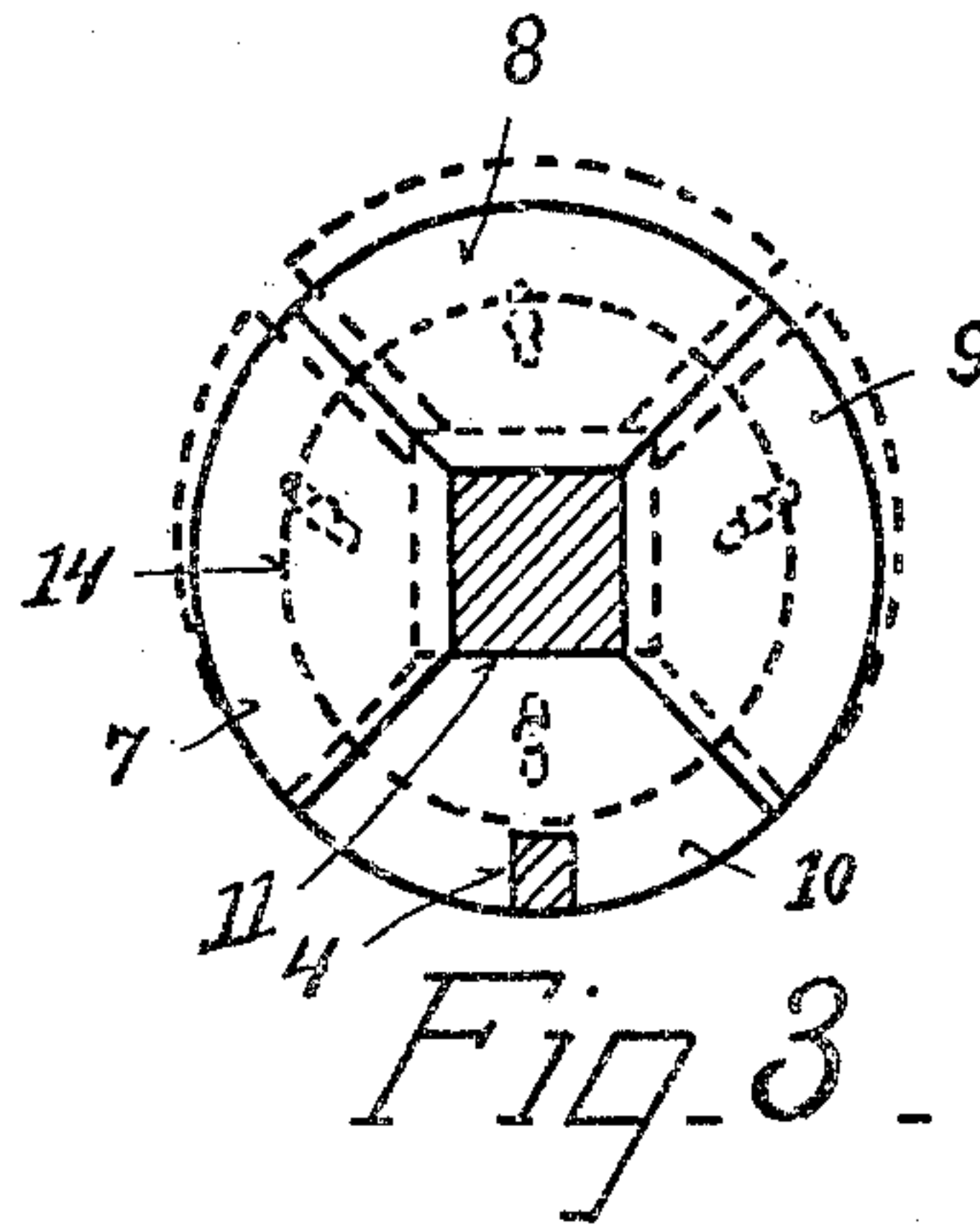
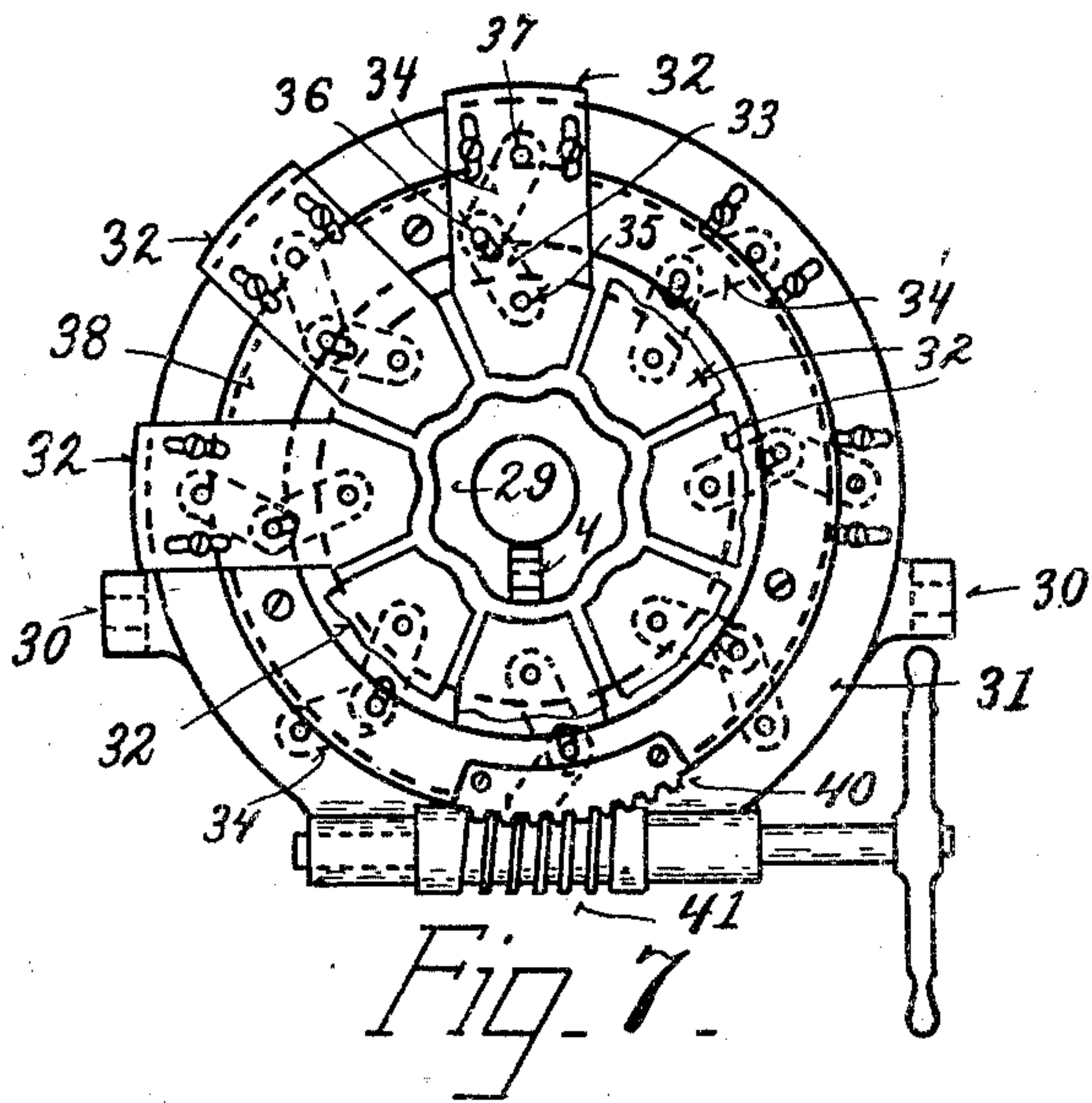
C. P. Kropp

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2 SHEETS—SHEET 2.



Witnesses

E. M. Cullist.  
O. P. Kropp.

Inventor

Adolf Dieckmann

By

C. W. Miles.

Attorney



# UNITED STATES PATENT OFFICE.

ADOLF DIECKMANN, OF CINCINNATI, OHIO.

SHEET-METAL-ELBOW MACHINE.

959,204.

Specification of Letters Patent.

Patented May 24, 1910.

Application filed December 16, 1909. Serial No. 533,474.

*To all whom it may concern:*

Be it known that I, ADOLF DIECKMANN, 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 Sheet-Metal-Elbow Machines, of which the following is a specification.

My invention relates to improvements in sheet metal elbow machinery.

One of its objects is to provide an improved machine in which elbows of cross-sectional pattern other than cylindrical can be formed at a single operation.

Another object is to provide a machine in which the sheet metal of the elbows is not unnecessarily strained or liable to be fractured during the formation of the elbow.

The invention further consists in certain details of form, combination and arrangement, all of which will be more fully set forth in the description of the accompanying drawings, in which:

Figure 1 is a longitudinal vertical section through my improved machine. Fig. 2 is an end view of the stationary mandrel and sheet metal tube illustrating a modified means of clamping the tube upon the mandrel. Fig. 3 is a detail plan view of the crimp former detached. Fig. 4 is a detail side elevation of the free end of the stationary mandrel detached. Fig. 5 is a perspective view of the movable mandrel detached. Fig. 6 is a detail view of one of the clamping and shaping jaws opposite the movable mandrel. Fig. 7 is an end view of the movable mandrel and its clamping jaws and actuating mechanism detached.

In the accompanying drawings 2 represents the base or frame to which is secured a hollow cylinder or mandrel 3. The free end of the mandrel is terminated at right angles to its axis and provided with a projecting hook or key 4. A collar 5 is adapted to slide along the exterior of the mandrel and serves to feed the sheet metal 6 from which the elbow is being formed toward the free end of the mandrel step by step depending upon the number of crimps to be formed and their distance apart.

At the forward or free end of the mandrel 3 is provided a crimp lifter comprising a series of segments 7, 8, 9, 10, of circular outline and preferably beveled or V-shaped in cross section. The segments 7 to 10 of which there may be any desired number are

assembled about the wedge shaped head 11 of a rod 12 which is adapted by means of a lever 13 hinged to the frame 2 to be moved endwise within the mandrel 3 to spread the segments 7 to 10 of the crimp lifter as indicated in Fig. 3, the segment 10 remaining stationary while the remaining segments move radially. The segments are preferably secured together by means of a disk or plate 14 to which they are attached by screws and slotted openings, so that when the wedge is retracted the segments will move toward each other by gravity. The segments may be drawn toward each other however by the action of springs if desired.

As illustrated in Fig. 1 a series of radially movable clamping jaws 15 are arranged to clamp the sheet metal blank upon the free end of the mandrel, said jaws being connected by ways or sliding connections to a ring 16 carried by the frame 2, so as to move in a radial direction to and from the mandrel, and also connected to said rings by means of toggle links 17, 18 connected by pivot pins 19, 20, 21. A ring 22 sliding within the ring 16 serves to move the pivot pins of the toggle links of the several jaws to the right or left and thus move the jaws 15 to or from the mandrel. The face 23 of the jaws 15, except on the under side, overhang the free end of the mandrel and are beveled. The ring 22 may be shifted to open and close the jaws by a variety of mechanisms, as shown in Fig. 1 it is shifted by means of a worm wheel segment 24 carried by ring 22, which engages a worm 25, journaled to frame 2. The jaws 15 when closed preferably completely encircle the mandrel. In the modification Fig. 2, a split ring 26 is substituted for the radially moving jaws to clamp the blank upon the stationary mandrel. The meeting faces of the split ring are drawn together by means of a link 27 and an eccentric 28.

Supported upon the hook or key 4 is a tilting or movable mandrel 29, the exterior of which is shaped wholly or partly to correspond to the cross sectional pattern desired in the finished elbow, as for instance, corrugated, or octagonal. The movable mandrel rides upon key 4, and forms a fulcrum or center 30 by the abutment of the lower edge of the mandrel 29 against the end of the stationary mandrel, and upon which fulcrum the mandrel 29 tilts or swings. The mandrel 29 is longer at the bottom than at the top



leaving a wedge shaped opening at the top to permit the tilting of the movable mandrel toward the stationary mandrel. The forward end of the movable mandrel is also recessed to provide room for the crimp lifter.

5 A ring 31 encircles the movable mandrel and is pivotally attached in line with the center 30 either to the ring 16 or by brackets to the frame 2, so that the ring 31 will also swing upon the center 30. Slidably attached  
10 to the ring 31 are a series of clamping jaws 32, which are adapted to move radially to and from the movable mandrel to clamp the sheet metal of the partly formed elbow there-  
15 to. The faces of the jaws 32 which press against the mandrel 29 are shaped to a substantial counterpart of said mandrel so as in conjunction with said mandrel to impress the desired longitudinal or cross sectional  
20 pattern upon the elbow. The jaws 32 are respectively connected to the ring 31 by means of toggle links 33, 34, and pivot pins 35, 36, 37. A ring 38 sliding relative to ring 31 serves to simultaneously shift the central  
25 pivot pins of the toggle links of the respective jaws 32 to move said jaws to or from the mandrel 29. The faces 39 of the jaws 32 at the top and sides are beveled to correspond to the bevel of the clamping jaw  
30 or jaws on the stationary mandrel. The ring 38 is moved relative to the ring 31 to operate the jaws 32 by means of a worm wheel segment 40 carried by the ring 38 which engages a worm wheel 41, journaled to the  
35 ring 31.

The operation is as follows: A straight cylinder or tube of sheet metal with an open lapped seam is slipped over the mandrel when the jaws are opened and the crimp  
40 lifter collapsed or retracted. The tube is then fed forward by the collar 5, and both sets of jaws clamped thereon, which action of the jaws 32 gives the corrugated or other cross sectional pattern to the extreme end  
45 of the tube, while the part over the crimp lifter and stationary mandrel retains its cylindrical cross section. The wedge 11 is then actuated to spread the crimp lifter sections 7 to 10, which serves to lift or expand  
50 the metal outwardly in an eccentric outwardly projecting rib or crimp 42 as indicated in Fig. 1. The segments 7 to 10 are then retracted by moving the wedge in the opposite direction, and the swinging mandrel  
55 29 with the jaws 32 holding the tube thereto moved toward the stationary mandrel, which collapses the rib or crimps 42 between the beveled faces 23, 39, of the jaws, leaving said crimp projecting at an angle to the face of  
60 the tube and of cylindrical pattern. The jaws 32 then move back and open, and jaws 15 are opened sufficiently to permit the tube to be fed forward by the collar 5 into position to form another crimp, which brings  
65 the inclined crimp just formed together with

a further section of the tube beneath the jaws 32 which are again closed pressing the inclined crimp against the face of the elbow and giving their pattern to the crimp and new section of the elbow. The jaws 15 are  
70 also closed and the crimp lifter segments again projected to form another crimp. The desired number of crimps being successively formed as above described.

The several movements may be performed  
75 separately by hand, or may be connected to a common source of power so as to be successively and automatically timed and operated.

It will be noted that the operations of lifting and collapsing the crimps are performed  
80 on a cylindrical blank, and that the pattern desired is afterward imparted which avoids all strains and complications incident to crimping subsequent to impressing a corrugated or other pattern, and facilitates the  
85 ready change from one pattern to another, as it is only necessary to substitute a different movable mandrel and set of dies, which can be readily and quickly done.

As illustrated in Fig. 1 the dies 32 have  
90 male dies or faces 39 and the dies 15 have corresponding female dies or faces 23, these dies may be reversed in position however, if desired so as to tip the crimp in the opposite direction.

The mechanism herein illustrated and described is capable of considerable modification without departing from the principle of my invention.

Having described my invention what I  
95 claim is:

1. In a mechanism of the character indicated a cylindrical stationary mandrel, a crimp former of circular outline located at the free end of said mandrel, means to clamp  
100 the elbow blank upon the free end of said stationary mandrel, means to actuate said crimp former, a secondary movable mandrel located on the opposite side of said crimp former, the exterior of said secondary mandrel having a pattern other than cylindrical, and a series of substantially radially moving  
105 jaws shaped to the counterpart of said movable mandrel and acting in conjunction with said movable mandrel to clamp the elbow upon said movable mandrel and shape the elbow to a cross sectional pattern other than cylindrical.

2. In a mechanism of the character described a cylindrical mandrel, a circular crimp former at the free end of said mandrel, a series of jaws movable in substantially radial directions to and from said mandrel to clamp the blank thereto, a secondary movable mandrel located on the opposite side of  
110 said crimp former, the exterior of said secondary mandrel having a pattern other than cylindrical, and a series of jaws moving in substantially radial directions and shaped to the counterpart of said secondary mandrel



to clamp the elbow upon said movable mandrel and shape the elbow to a cross sectional pattern other than cylindrical.

3. In a mechanism of the character described, a cylindrical mandrel, means to clamp the elbow blank upon said cylindrical mandrel, a crimp lifter of circular outline located at the free end of said cylindrical mandrel, and adapted to lift crimps from cylindrical sections of the elbow blank, a secondary movable mandrel having on its exterior a pattern other than cylindrical, a series of jaws movable to and from said secondary mandrel and having a pattern similar to that of said secondary mandrel, said jaws being adapted to clamp the elbow blank upon said secondary mandrel and to shape the elbow to a pattern other than cylindrical.

4. In a mechanism of the character described, a cylindrical mandrel, means to clamp the elbow blank upon said cylindrical

mandrel, a crimp lifter of circular outline located at the free end of said cylindrical mandrel, a crimp lifter of circular outline at cylindrical sections of the elbow blank, a secondary movable mandrel having on its exterior a pattern other than cylindrical, a series of jaws movable to and from said secondary mandrel and having a pattern to co-act with the pattern of said secondary mandrel to clamp the elbow blank upon said secondary mandrel and to shape the elbow to a pattern other than cylindrical, said secondary mandrel and its clamping jaws being movable to and from said cylindrical mandrel to collapse the crimps.

In testimony whereof I have affixed my signature in presence of two witnesses.

ADOLF DIECKMANN.

Witnesses:

C. W. MILES,

WALTER F. MURRAY.