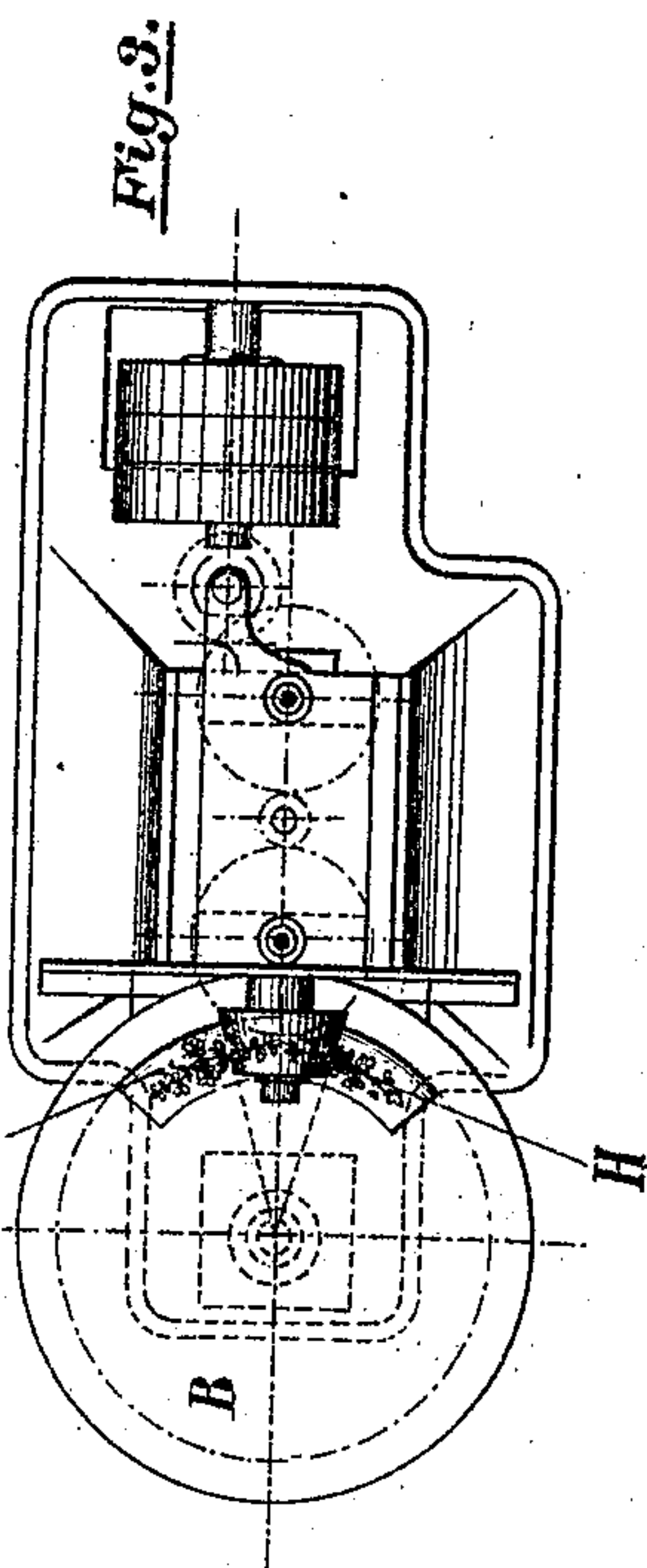
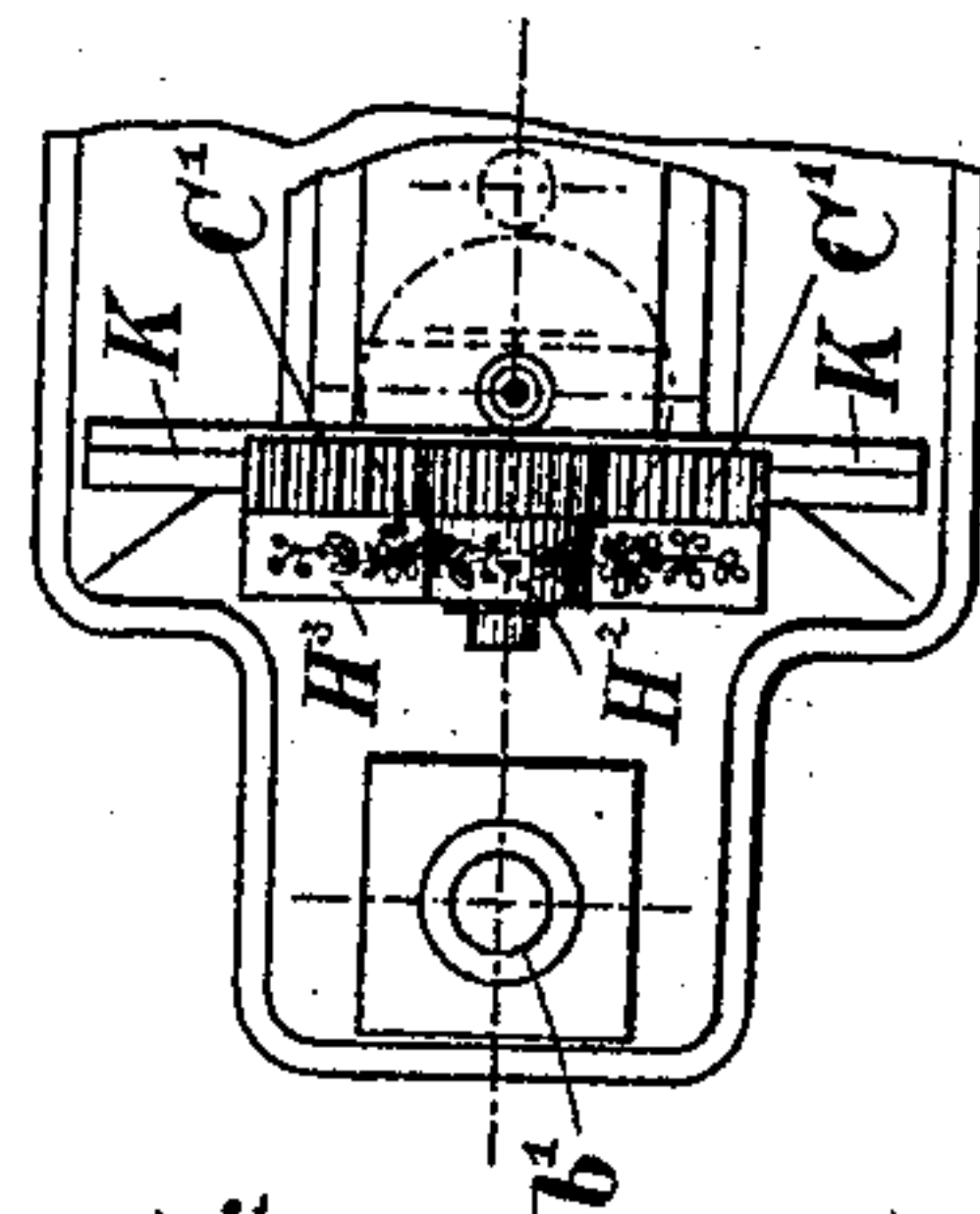
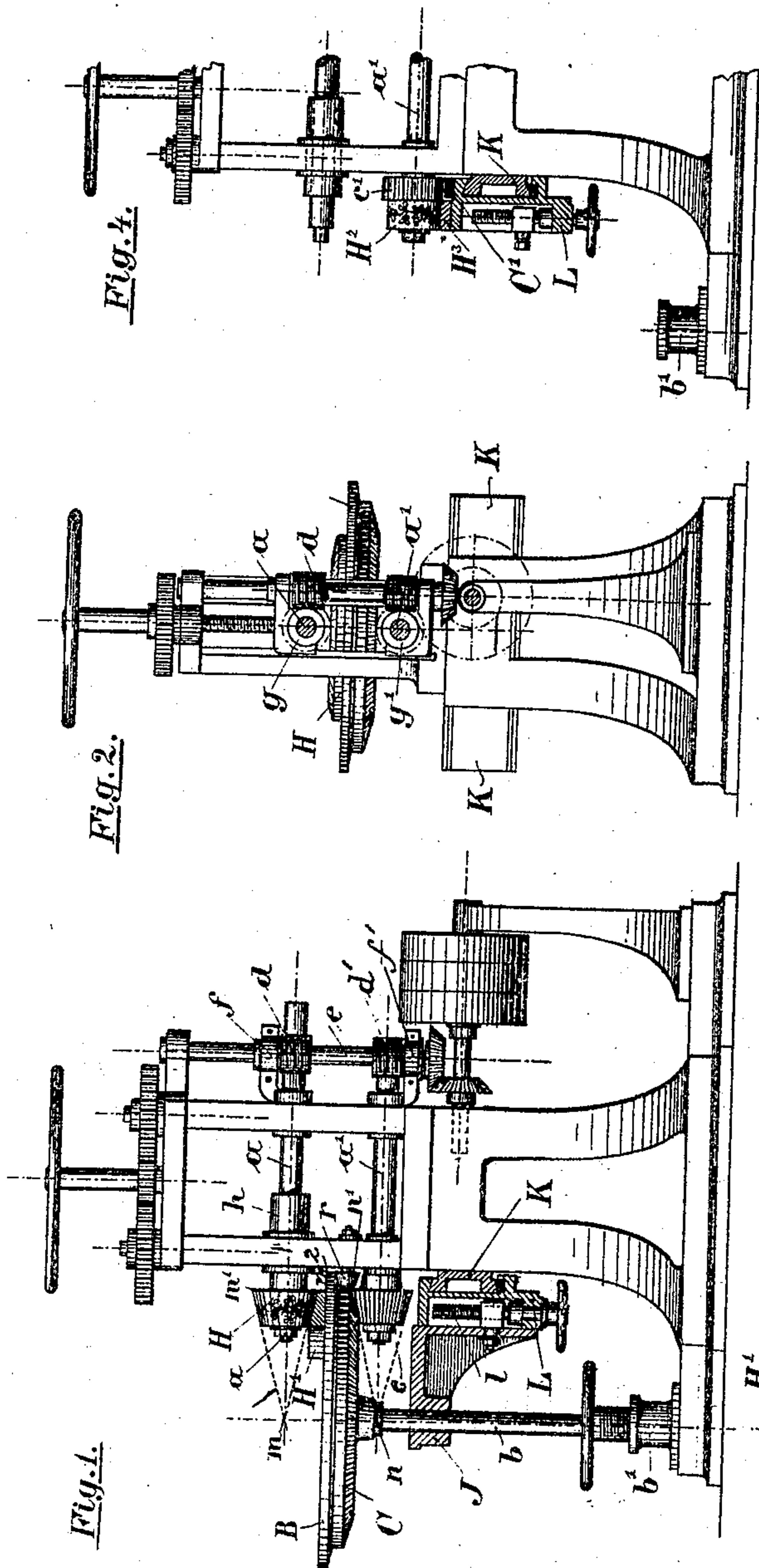


(No Model.)

G. KLUMPP.
METAL EMBOSSING MACHINE.

No. 502,566.

Patented Aug. 1, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

GUSTAV KLUMPP, OF ESSLINGEN, GERMANY.

METAL-EMBOSSING MACHINE.

SPECIFICATION forming part of Letters Patent No. 502,566, dated August 1, 1893

Application filed October 12, 1892. Serial No. 448,689. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV KLUMPP, a subject of the Emperor of Germany, residing at Esslingen, Württemberg, Germany, have invented a new and useful Improvement in Metal-Embossing Machines, of which the following is a specification.

It is the object of my invention to provide means whereby ornaments of considerable depth, such as it has been heretofore possible to produce only by chasing, may be embossed or rolled into thin-walled bodies spun to any desired profile, such as platters, bowls, vases, &c.

This invention does not have reference to the production of annular endless designs, such as borders or the like, nor of shallow ornaments, such as are produced by the well-known milling-machines, nor of such flat designs as are produced, *e. g.*, by the insertion of wire between the die and counter-die, but to the production of designs in high relief in hollow bodies, which designs may also be arranged helically. The embossing of such designs is under my invention generally carried out by die and counter die, the first of which is generally in the general shape of a cone or a portion of a cone, while the counter-die is an exact development of the profile of the latter upon an annular disk, or a segment of such disk. All attempts to roll or emboss ornaments or designs in prominent relief into platters or hollow bodies of sheet metal, &c., have never gone beyond the aforesaid slight or shallow designs or borders. When employing, *e. g.*, two conical rollers bearing the design the transmission of power by means of friction or cog-gearing is not sufficient, inasmuch as the body to be embossed or ornamented with deep designs must pass such rollers several times. A gradual rocking or rolling in of the designs to their full depth thus takes place, *i. e.*, the two rollers are caused to approach gradually. Notwithstanding this approach the position of one roller with respect to the other, with reference to the coincidence of the designs thereon, must remain accurately the same. This is, however, impossible with cog-gearing, inasmuch as the play between the teeth is more or less, according as the distance between their centers is more or less. Moreover, it is impossible to

transfer the exact design from one conical die roller to the counter-die-roller on account of the differences in the velocity of rotation upon the various parts of the same. Both these difficulties have been removed by my invention. Instead of two rollers I employ one roller in combination with an annular ring or a segment of such ring bearing upon its surface contiguous to the roller an exact development of the surface of the roller, this surface being of course also conical, but having its axis at right angles to the axis of the conical roller, the point of intersection of its beveled side, with its axis being on the axis of the roller. This annular disk or disk segment is mounted on and fastened to a plane disk or turn-table in such a manner that the center of the former coincides with the center of rotation of the latter.

In the drawings accompanying this specification—Figure 1 represents a front elevation, partly in vertical section; Fig. 2, a rear elevation, and Fig. 3 a plan view of an embossing machine embodying my invention, while Figs. 4 and 5, represent a sectional front elevation and a plan, respectively, of a modified form of machine under my invention.

The turn-table B, upon which the embossing ring, H', is mounted, is actuated by beveled gears, C, c, while the shaft, a, of the conical embossing roller, H, and the axle, a', of the bevel gear, c, are actuated by worms d, d', of equal pitch mounted on a common shaft, e, meshing with the worm-wheel g, g', of equal diameter, keyed to the shafts a and a', respectively, the worms, d and d', being adapted to slide on the shaft, e, so as to shift thereon with the journal-bearings, f, f', of the shafts, a, a'. The worm-shaft, e, may be actuated in any suitable manner, *e. g.*, by the belt pulleys and bevel gearing shown in the drawings. The worms, d, d', of which one has a right hand thread and the other a left-hand thread, fit snugly and with perfect accuracy between the teeth of the worm-wheels, g, g', whereby the velocities of rotation of the two axles, a, a', are caused to always remain equal to each other, when the distance between the said axles is changed, and no play occurs between the teeth of the gearing at any time. The conical roller-die, H, is so mounted on the projecting end of the shaft, a, as to be readily

removable and so that its base or greater flat surface, h' , lies in the same vertical plane with the larger pitch line of the bevel gear, c . The diameter of this base, h' , is exactly equal to the diameter of the pitch-line. By virtue of this arrangement its circumferential velocity at this point is exactly equal to that of the corresponding portion of the turn-table and the part of the ring, H' , mounted thereon with which said base comes in contact. In the same way the circumferential velocities of all points on the roller-die, H , are exactly equal to the circumferential velocities of the points on the annular-die or die-ring with which the former come into contact.

If the line or side, m, m^2 , of the triangle, m, m', m^2 , constitutes the line of contact between the roller-die, H , and the developed die, H' , the size of these two dies may be varied at pleasure, within the limits of side, m, m^2 , that is to say, the same device may serve to ornament or emboss, platters or hollow bodies of various sizes. If the profile of the vessels at the points where the ornaments are to be embossed is not straight, as drawn, but curved or otherwise formed, an intermediate straight line is selected, which is to coincide with line, m, m^2 . The deviations due to the unequal velocities of both dies at the points more or less distant from the intermediate straight line, may indeed not be equalized, but they may be so modified that the deviating forms of designs on the die and counter die (which appear somewhat compressed on one die and somewhat elongated on the other die, as compared with the normal form) will not interfere with correct embossing. If the angle of the vessel at the points to be embossed differs greatly from that of the bevel-gears, C, c , where designs are to be embossed into hollow bodies of a greater or less conical shape, or with larger or smaller platters or basket-shaped sheet-metal bodies, a larger or smaller turn-table, B , with corresponding bevel gears, C, c , is employed, the interchangeable support, J , replaced by another suitable one and the bottom bearing, b' , of the turn-table-shaft, b , adjusted to the proper position. The forward journal-box, h , of the roller-shaft, a , is made shiftable to protect the latter against bending, in case smaller platter-shaped bodies are to be ornamented. In order to take up the pressure exerted by the die, H , upon the turn-table or disk, B , in rolling in the ornaments, an adjustable pressure-roller, r , (or several if necessary) is secured below the latter, as shown.

Where deep designs are to be embossed into cylindrical hollow bodies of sheet metal or the like, the fundamental forms of the die H , and counter-die, H' , are likewise made cylindrical.

By suitably selecting the form of the die, H , this machine may be used for completely changing the original fundamental form of the surface of the hollow body (that of a body of rotation) so that the same is made

prismatic or alternately prismatic and round in shape, the ornamentation of the surface so modified preferably taking place simultaneously.

In order to adapt the machine to emboss or roll designs into straight, plane or profiled strips of sheet metal or the like, the same is modified as shown in Figs. 4 and 5, by removing the rotary disk to turn-table, B , with the counter-die, H' , as well as the bevel-gears, C, c , and moreover, the shaft, b , the bearing support, J , and the pressure-roller, r . The roller-die, H^2 , whose fundamental form has the profile of the sheet-metal strip, is then mounted on the lowershaft, a' , and the straight counter-die, H^3 , having the same profile, is fastened to a supporting-carriage, L , adapted to slide on the guide, K . The roller-die, H^2 , is provided with a cog, c' , meshing with a rack-bar fastened to the carriage, L , the pitch-line of the cog, c' , having the same diameter as the roller-die, H^2 , or, where the latter is profiled, having a diameter equal to the mean diameter of the said roller die, H^2 .

In other respects, the machine embodying my invention is arranged in the manner of an ordinary strong roller embossing machine.

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

1. In embossing machines, a conical die-roller, in combination with a turn-table, provided on its upper surface with a die-ring and on its lower with a bevel-gear and a second bevel-gear meshing with the first, substantially as set forth.

2. In an embossing machine, two parallel shafts, a conical die-roller mounted on one shaft and a bevel-cog-wheel having the same taper as the die-roller, and the diameter of whose pitch line is equal to the diameter of the die-roller, in combination with a turn-table extending between the die-roller and the bevel-cog and provided at its upper face with a die ring whose upper surface is an accurate development of the convex surface of the die-roller, and on its lower face with a beveled-gear meshing with the aforesaid bevel-cog, substantially as set forth.

3. In an embossing machine, two parallel horizontal shafts mounted in sliding bearings, each provided with a worm-wheel, and one shaft provided, moreover, with a roller die while the other shaft is provided with a bevel cog-wheel in combination with a vertical shaft having worms mounted thereon, said worms being adapted to slide with the bearings of the horizontal shafts, and a turn-table bearing a counter-die-ring and a bevel-gear meshing with the bevel-cog aforesaid, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

GUSTAV KLUMPP.

Witnesses:

AUGUST B. BRAUT,
CARL DUSSMANN.