(No Model.) 2 Sheets—Sheet 1.

A. J. HANKS.

MACHINE FOR FORMING STEEL FELLIES FOR VEHICLE WHEELS.

No. 433,286. Patented July 29, 1890.

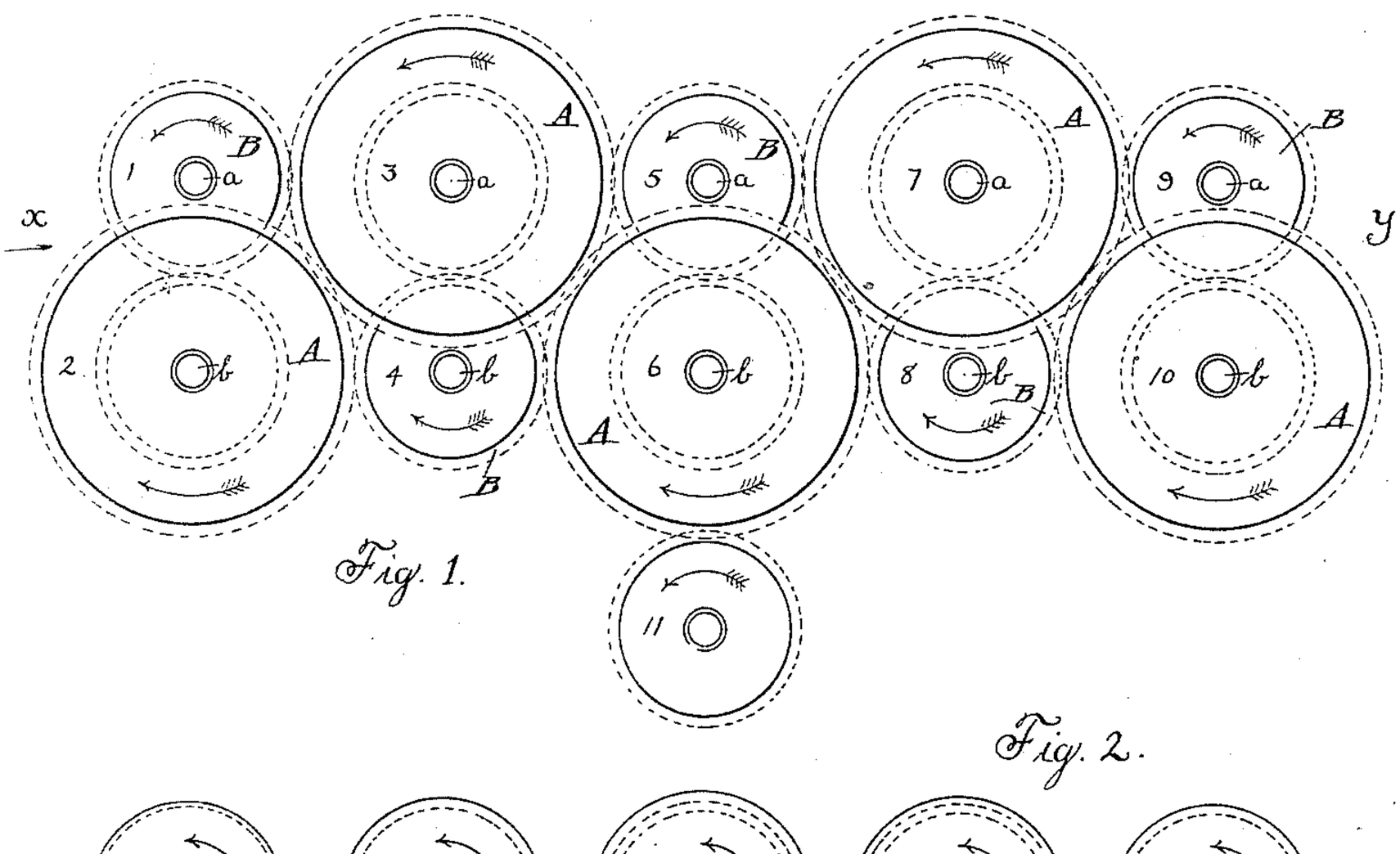
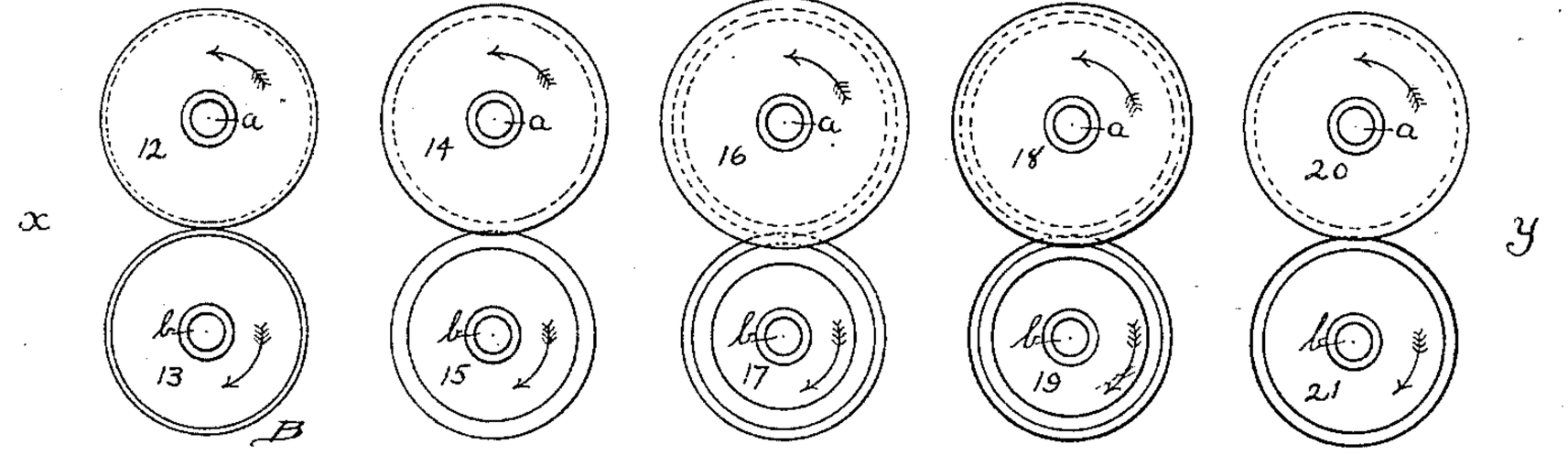


Fig. 1.

Fig. 2.



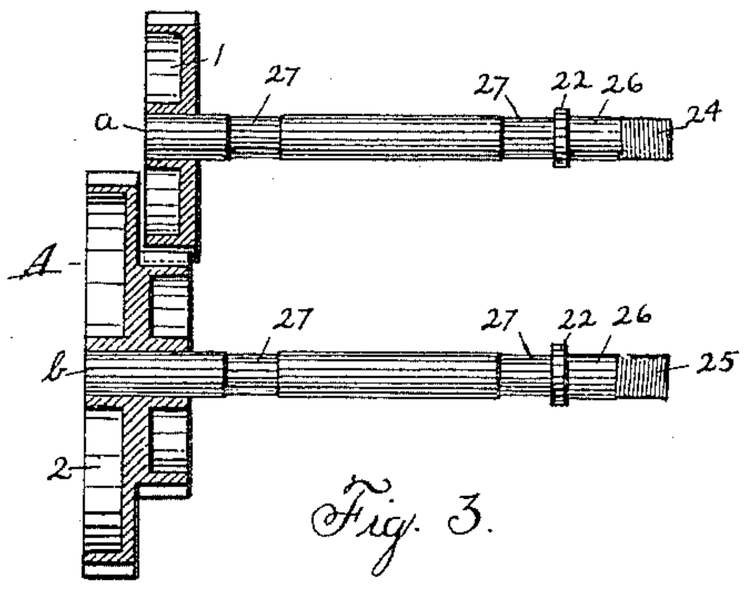


Fig. 3.

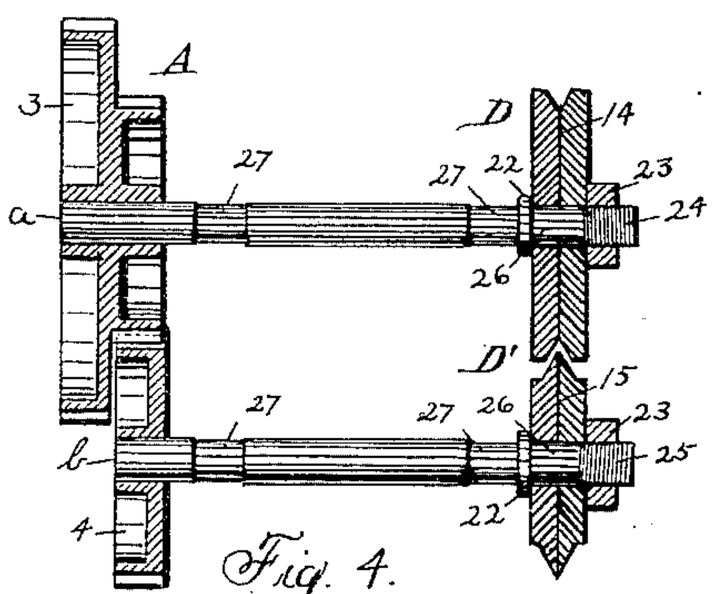


Fig. 4.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

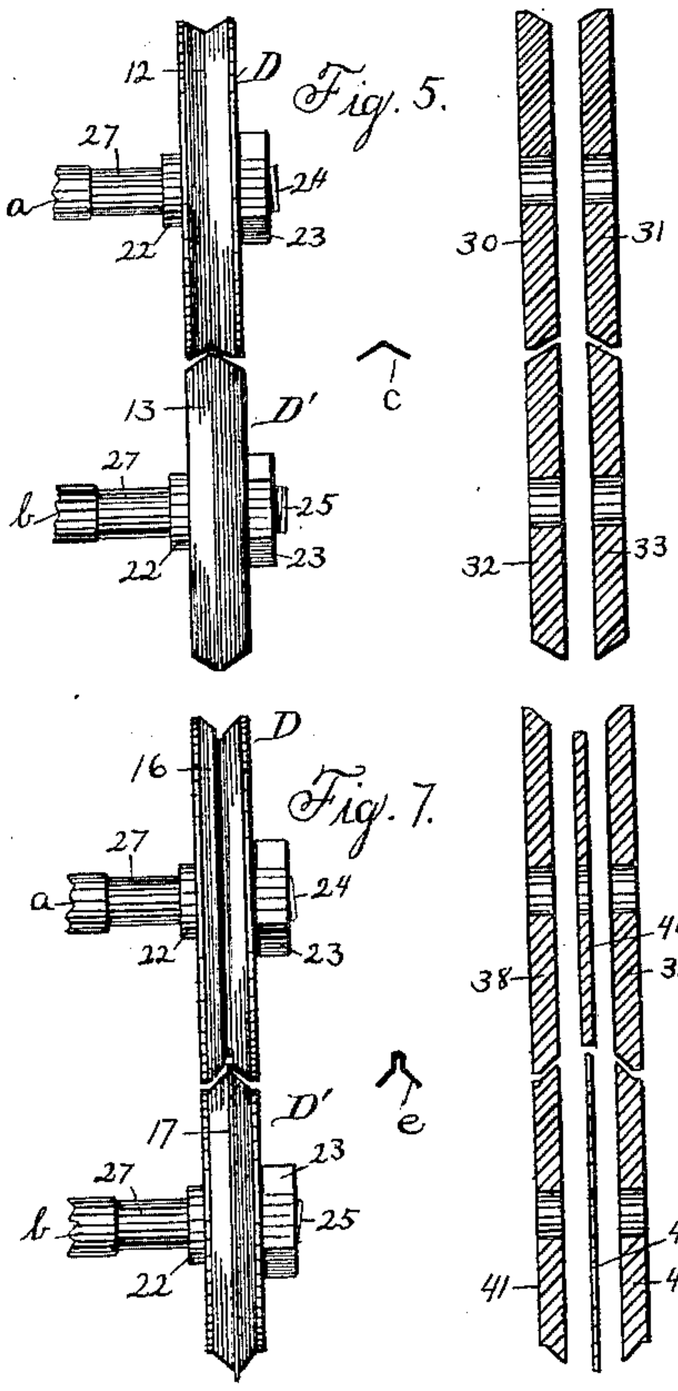
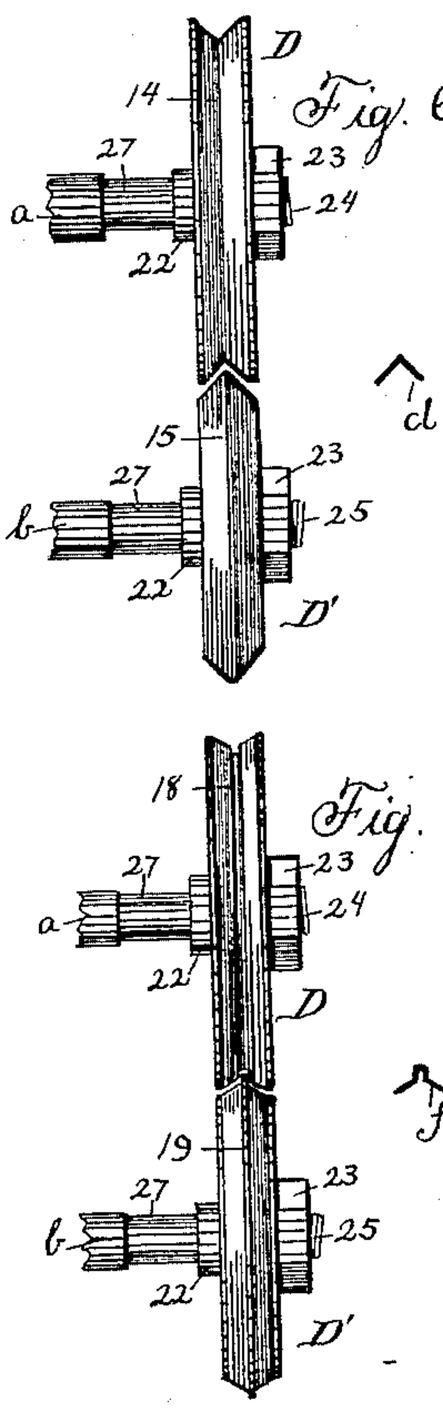


Fig. 6.



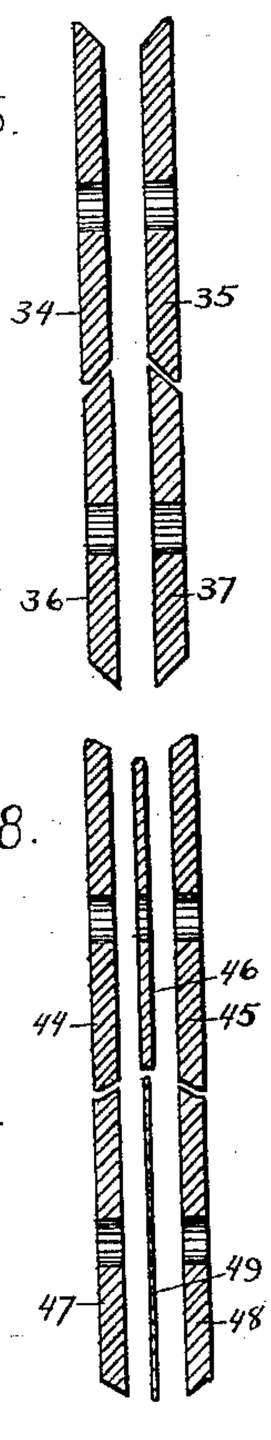
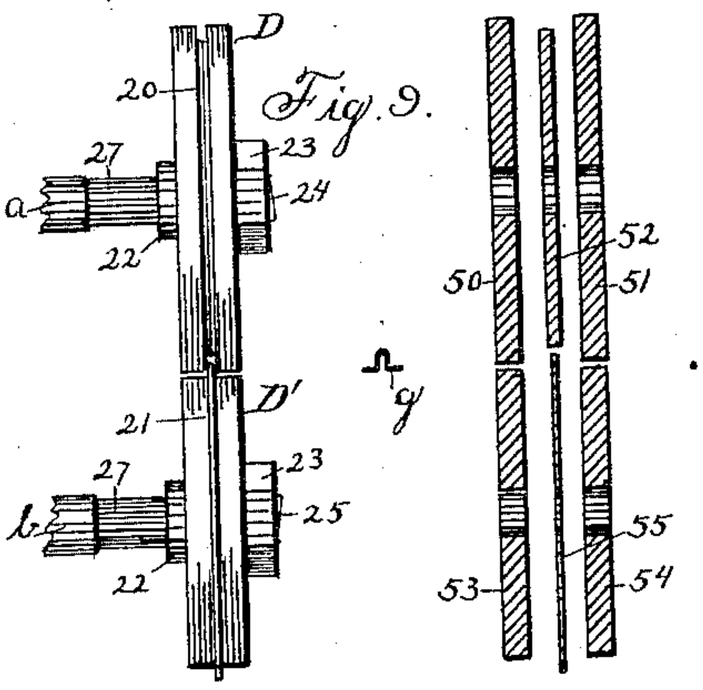


Fig. 7.

Fig. 8.

Fig. 9.



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UNITED STATES PATENT OFFICE.

AUSTIN J. HANKS, OF WILMINGTON, OHIO.

MACHINE FOR FORMING STEEL FELLIES FOR VEHICLE-WHEELS.

SPECIFICATION forming part of Letters Patent No. 433,286, dated July 29, 1890.

Application filed December 3, 1889. Serial No. 332,476. (No model.)

To all whom it may concern:

Be it known that I, AUSTIN J. HANKS, of Wilmington, in the county of Clinton and State of Ohio, have invented a new and Improved Machine for Forming Steel Fellies for Vehicle-Wheels, of which the following is a full, clear, and exact description.

My invention relates to improvements in machines for forming steel fellies for vehicle-wheels, especially that class of machines known as a "rotary crimper," and has for its object to construct such a machine in a simple and durable manner; and to that end the invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters and figures of reference indicate corresponding parts in all the views.

Figure 1 is a diagrammatic side elevation of the gearing of the machine; and Fig. 2 is a similar view of the opposite side, illustrating the forming-rolls in elevation. Fig. 3 is a vertical section through one vertical set of gearing, the shafts being in elevation and the forming-rolls detached therefrom. Fig. 4 is a similar view illustrating the application of the forming-rolls to the shaft; and Figs. 5, 6, 7, 8, and 9 represent edge views of the several forming-rolls between which the blank is to be passed, vertical sections through said forming-rolls, and transverse sections of the blank after it has passed between the several forming-rolls.

In carrying out the invention, I employ, preferably, ten shafts, journaled transversely in any suitable frame and arranged in two horizontal lines of five each, the upper shaft *a* being located in vertical alignment with the lower shaft *b*. The shafts are made in two lengths, five being about twenty inches long and the remainder twenty-two inches in length, and in the arrangement of the several shafts they are made to alternate with the shorter ones in each row. Upon one end of each long shaft a double cog-wheel A is keyed or otherwise secured, comprising an outer spur-wheel and a pinion integral with the inner face thereof, and in the construction of the double cogs the outer face of the spur-wheel and the inner face of the pinion are preferably dished, as best shown in Figs. 3 and 4. The pinion of each double cog-wheel meshes with a pinion B, attached to one extremity of a short shaft *b*. The general arrangement of the gearing is clearly shown in Fig. 1, in which it will be observed that the first shaft *b* carries a double cog-wheel 2, the pinion of which meshes with a pinion (marked 1) upon the upper short shaft *a*. In the next set of vertically-aligning shafts the longer shaft is at the top, and the spur-wheel of the double cog-wheel 3 thereon meshes with the spur-wheel upon the lower shaft *b* of the first set, and the pinion of the said cog-wheel 3 meshes with the pinion B immediately below it. This arrangement is carried out to the rear or delivery end of the machine, the double cog-wheels 2, 3, 6, 7, and 10 being alternately arranged upon the upper and lower shafts *a* and *b*, the spur-gears thereon meshing, and the pinions 1, 4, 5, 8, and 9 are also alternately arranged, gearing only with the pinions immediately above or below them, according to their respective location.

Each shaft *a* and *b* is provided with a box-seat 27 near each end, whereby it is journaled in the frame, the seat of the upper shaft being in vertical alignment with the seat of the lower shaft; and each shaft is further provided near the end opposite to that carrying the cog-wheel or pinion with an annular rib or shoulder 22, and a wrist 26, adjoining the outer face of the shoulder, and the outer end of said wrist, which constitutes one extremity of the shaft, is threaded, the upper shaft being provided with a right-hand thread 24 and the lower shaft with a left-hand thread 25, as best shown in Fig. 3. Upon the threaded end of each shaft a forming or shaping roll is secured, the forming-roll D upon the upper shaft being adapted to operate in connection with the forming-roll D′ upon the shaft below it. The forming-rolls are slipped over the threaded ends of the shafts upon the wrist portions 26 thereof to a contact with the shoulders 22, and are held in position by nuts 23, screwed upon the threaded extremities 24 and 25 to a firm bearing against the

outer face of the forming-rolls, as is best illustrated in Fig. 4.

All the spur-wheels are of the same diameter, likewise the pinions, and the said spur-wheels are constructed of such size that those upon the upper shaft will alternately mesh with those upon the lower shaft from right to left and from left to right. The pinions, both single and attached to the spur-wheels, are designed only to transmit power from one shaft to the other one in vertical alignment.

The object of providing the right and left hand threads upon the shafts *a* and *b* is to force the forming-rolls, when contacting with the blank to be shaped, to continuously tighten themselves upon the shafts, whereby in the process of manufacturing, a roll cannot under any possibility become loosened.

As there are ten shafts, or five vertically-aligning sets employed, preferably, in the construction of the machine, five sets of forming-rolls are also employed.

The first set of forming-rolls is illustrated in detail in Fig. 5, and the rolls are numbered, respectively, 12 and 13. The second set of forming-rolls is illustrated in Fig. 6, said rolls being numbered, respectively, 14 and 15. The third set of forming-rolls is shown in Fig. 7, and the rolls are numbered, respectively, 16 and 17, the last two sets being shown in detail in Figs. 8 and 9, and the rolls being numbered 18 and 19 and 20 and 21.

Each forming-roll of the first set is preferably constructed of two disks, numbered, respectively, 30 and 31 and 32 and 33, the said disks being provided with a central bore, whereby they are mounted upon the shafts, and the disks of the upper forming-roll have their peripheral surface inclined downwardly and inwardly in direction of each other, whereby when the two disks 30 and 31 are brought together and secured upon the shaft, the forming-roll will be provided with a peripheral essentially V-shaped groove. The disk-sections 32 and 33 of the lower forming-roll have their peripheral surfaces beveled from their inner faces downward to their outer faces, whereby when the two disks are brought together upon their shaft the completed forming-roll will be provided with an angular or inverted-V-shaped peripheral surface capable of entering the grooved surface of the roller above. When the metal has passed between the two forming or shaping rolls 12 and 13, it is given the contour illustrated at *c* in Fig. 5. The angle of the inclined surfaces of the two forming-rolls 12 and 13 is preferably that of thirty degrees.

The forming-rolls 14 and 15, (illustrated in Fig. 6,) which are located immediately to the rear of the rolls shown in Fig. 5, are constructed in similar manner to the first set of rolls 12 and 13; but the angle of the grooved surface of the upper roll 14 and the peripheral surface of the lower roll 15 is increased to sixty-five degrees, whereby the blank shaped, as at *c* in Fig. 5, after being passed through this second set of rolls, will be formed as illustrated at *d* in Fig. 6.

The forming-rolls 16 and 17, comprising the third set, are each constructed of three disk members, the members of the upper roll being numbered 38, 39, and 40, and those of the lower roll 41, 42, and 43. The two outer members 38 and 39 of the upper roll and 41 and 42 of the lower roll are constructed in like manner to the disk-sections of the rolls heretofore described; but the angle of the inclination of their beveled peripheral surfaces is increased to seventy-five degrees. The disk 40, which is the intermediate member of the upper roll, is of less diameter than the outer disks, whereby when the three disks are brought together a central essentially rectangular channel will be formed in the base-wall of the V-shaped peripheral groove of the upper roll, as illustrated in Fig. 7, and the intermediate member 43 of the lower roll 17 is of greater diameter than the outer members 41 and 42, so that in the complete formation of the roller 17 a central peripheral rib is formed capable of entering the central channel in the upper roller. When the blank shown at *d* in Fig. 6 has been passed through this third set of rolls, it is shaped as illustrated at *e* in Fig. 7, in which it will be observed that the upper portion of the blank is essentially rectangular in cross-section, and provided with side members extending downward at an angle of about seventy-five degrees.

The fourth set of rolls (illustrated in Fig. 8) is constructed in similar manner to those illustrated in Fig. 7 and just described, with the exception that the beveled surfaces of the disk members are lessened to an angle of about forty degrees, whereby the blank formed, as in Fig. 7, and passed between the fourth set of rolls, is shaped as at *f* in Fig. 8. The disk-sections of the upper roll of the fourth set are numbered 44, 45, and 46 and the disk-sections of the lower roll of this set are numbered 47, 48, and 49.

The operation of forming the blank into the complete felly is accomplished by passing the said blank between the fifth set of rolls, each of which rolls is constructed in three disk-sections, the sections of the upper roll being numbered 50, 51, and 52 and the sections of the lower roll 53, 54, and 55.

The only difference between the construction of the set of rolls illustrated in Fig. 9 and those illustrated in Fig. 7 and in Fig. 8 consists in the fact that the peripheral surfaces of none of the disk-sections are beveled or inclined, being parallel and straight. When the blank has been passed between this last set of forming-rolls, it is shaped, as shown at *g* in said Fig. 9—that is, with a central essentially-rectangular or U shaped member, the side members extending outward in opposite directions at an angle of ninety degrees to the central or body member.

It is evident that as each set of rolls illus-

trated in Figs. 5 and 6 are constructed of two disk-sections they may be rendered adjustable to any sized blank that the operator may desire to pass between them by introducing between the members one or more spacing-disks of proper thickness. More than one spacing-disk should never be used at the same time between the two members of the lower forming-roll, and any spacing-disk employed in connection with this lower roll should be of greater diameter than the outer disk members in order to maintain the proper bevel or inclination of the peripheral surface of the roll.

The blank is entered the machine at *x*, Figs. 1 and 2, and finds an exit at *y*, and as delivered the felly may be made to pass into and through a bending device of any approved construction, whereby the required circular form may be imparted thereto, and the said shaping device is preferably placed so close to the machine that the completed product of the machine need not be handled as fed to the shaping device. The train of gearing may be set in motion in any suitable or approved manner, preferably, however, by connecting a drive-shaft through the medium of the gear 11—for instance, with the lower central double cog-wheel 6—whereby through the medium of one power-shaft the entire train of gearing is made to rotate in the direction indicated by the arrows in Fig. 1, and by reason of the peculiar gearing the forming-rolls are made to turn in the direction indicated by the arrows in Fig. 2.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a series of shafts arranged in two horizontal lines, one above the other, and male and female forming-rolls secured to each vertical set of shafts, of a double cog-wheel fastened to each alternate shaft comprising a spur-gear and a pinion, and pinions also secured to alternate shafts, the several spur-wheels being arranged to mesh and the alternately-arranged pinions to gear each with a pinion of the said double cog-wheels, substantially as shown and described.

2. The combination, with a series of shafts constructed in two different lengths arranged in two horizontal lines, one above the other, the shorter and longer shafts being alternately placed, and male and female forming-rolls detachably secured to each vertical set of shafts, of a double cog-wheel secured to one end of each of the longer shafts comprising a spur-gear and a pinion, the several spur-gears being of sufficient diameter to mesh one with the other, and a pinion secured to the end of each of the shorter shafts adapted to mesh with the pinion of the cog-wheel immediately above or below it, substantially as shown and described.

3. The combination, with a series of shafts constructed in two lengths arranged in two horizontal lines, one above the other, the longer and shorter shafts being alternately placed, the upper shafts having a right-hand thread formed thereon and the lower shafts a left-hand thread, of male and female forming-rolls detachably secured to the threaded end of each vertically-aligning set of shafts, and double cog-wheels attached to the opposite end of the longer shafts meshing with each other and with pinions secured to the shorter shafts, substantially as shown and described

4. The combination, with a series of shafts constructed in two lengths arranged in two horizontal lines, one above the other, the longer and shorter shafts being alternately placed, the upper shafts having a right-hand thread formed thereon and the lower shafts a left-hand thread, each shaft being provided with a shoulder near its threaded end, of male and female forming-rolls mounted upon the ends of each vertically-aligning set of shafts in contact with the shoulders thereof, each set of forming-rolls having a different peripheral contour, lock-nuts screwed upon the threaded extremities of the shafts against the forming-rolls, double cog-wheels secured to the opposite extremities of the longer shafts, the said cog-wheels being adapted to mesh with one another and with pinions attached to the unthreaded ends of the shorter shafts, all combined for operation substantially as shown and described.

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