

No. 705,518.

Patented July 22, 1902.

E. EINFELDT.

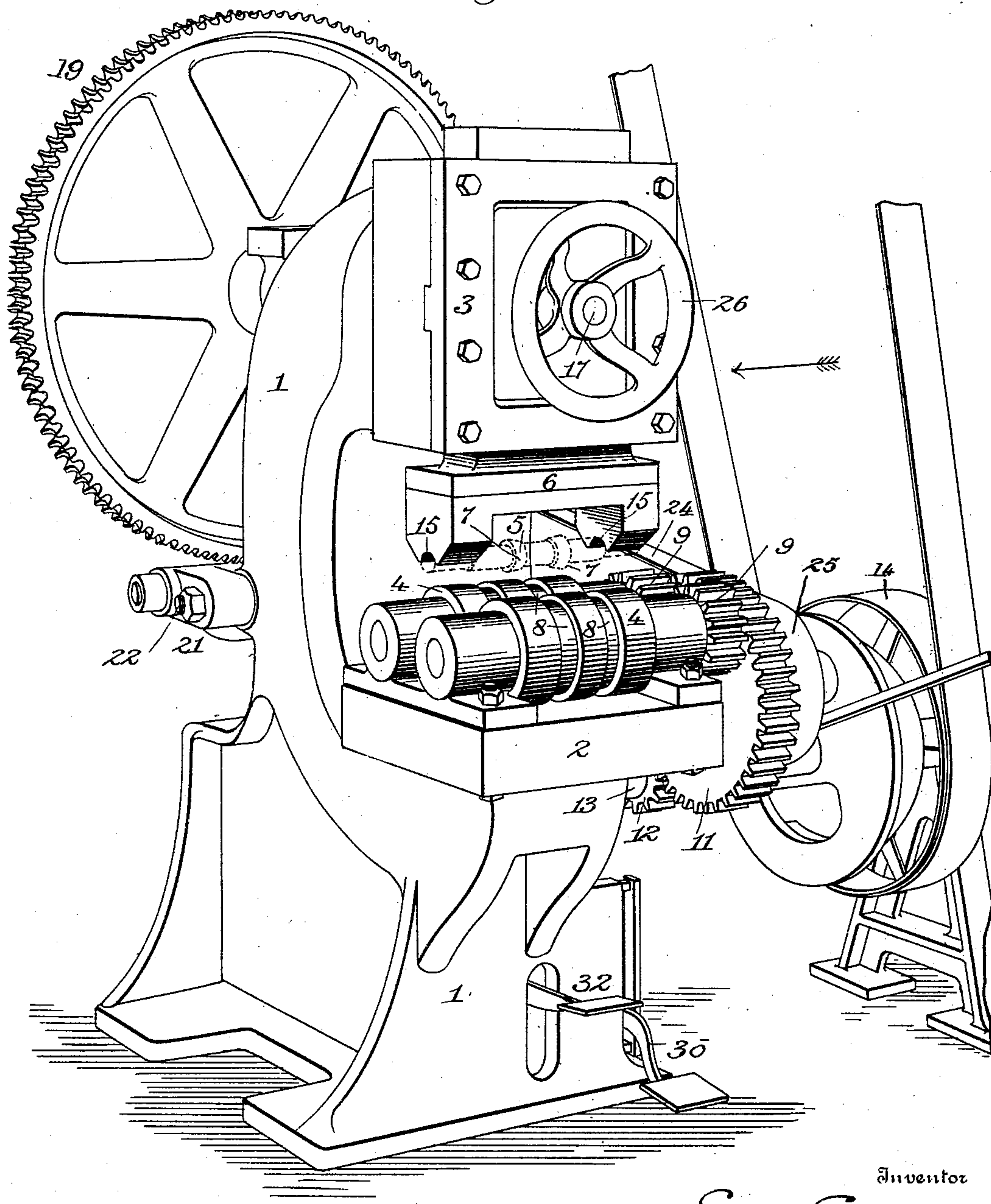
MACHINE FOR FORMING WHEEL HUBS FROM TUBULAR BLANKS.

(Application filed Oct. 18, 1901.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1



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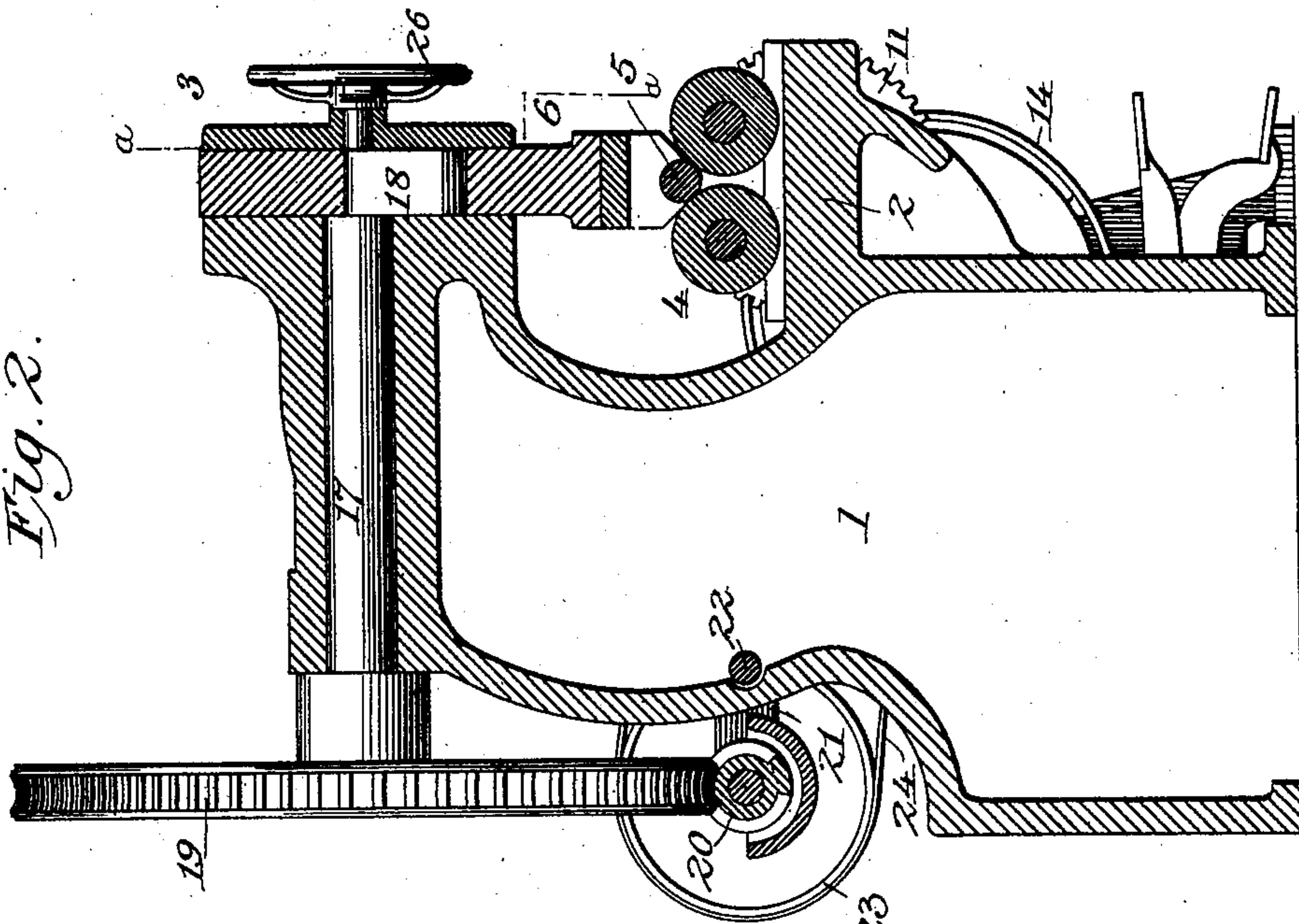
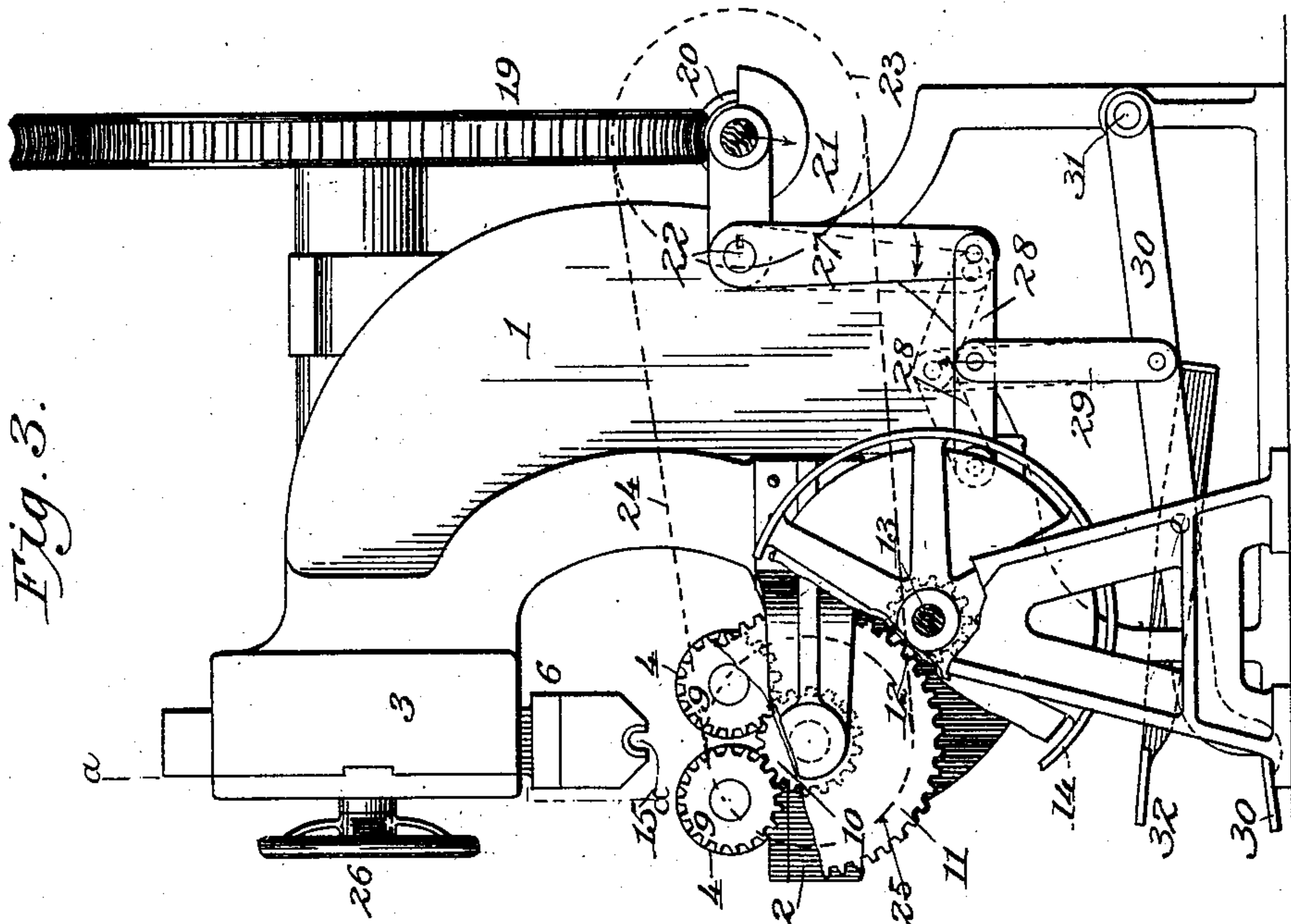
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3 Sheets—Sheet 2.



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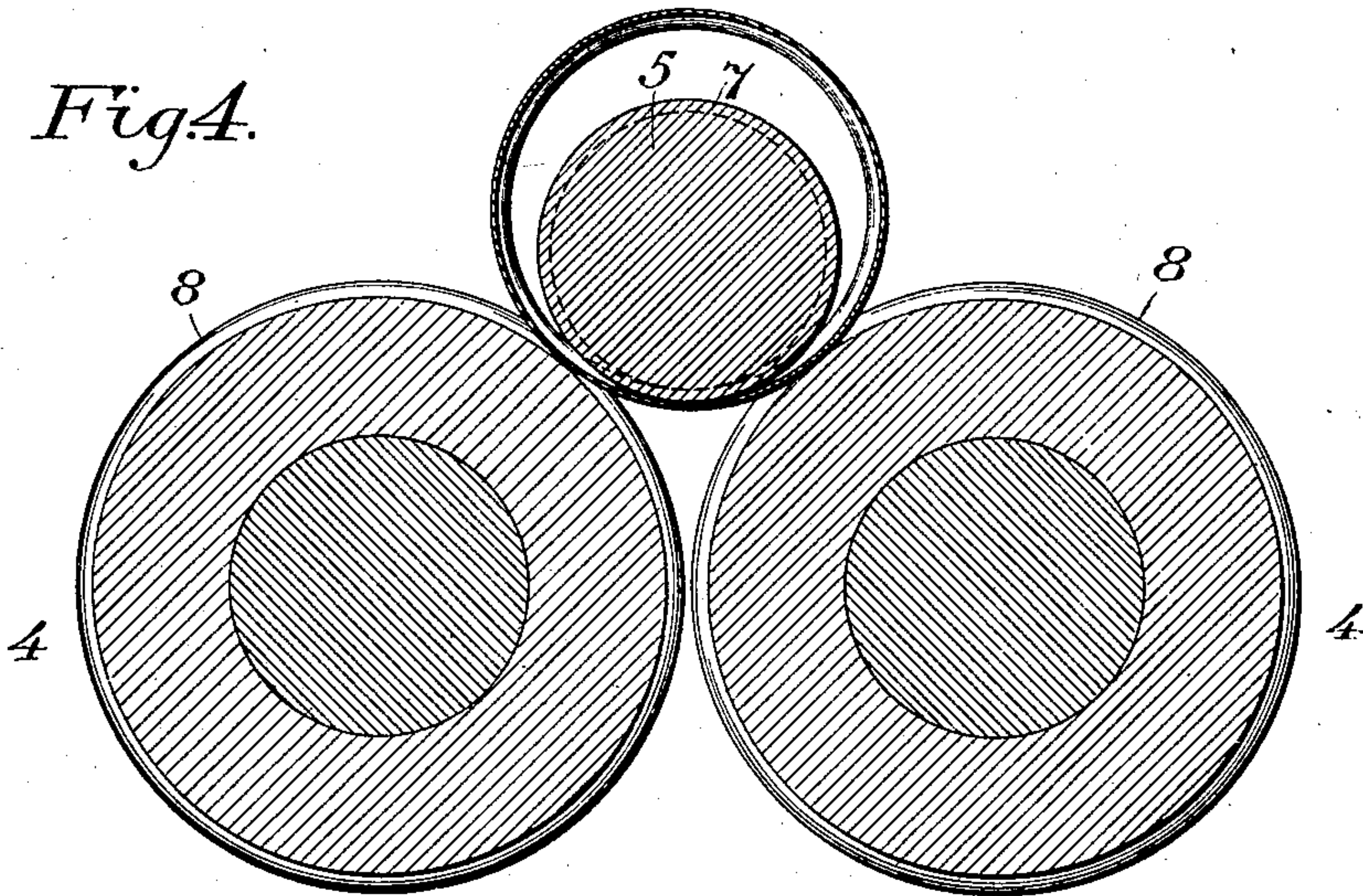
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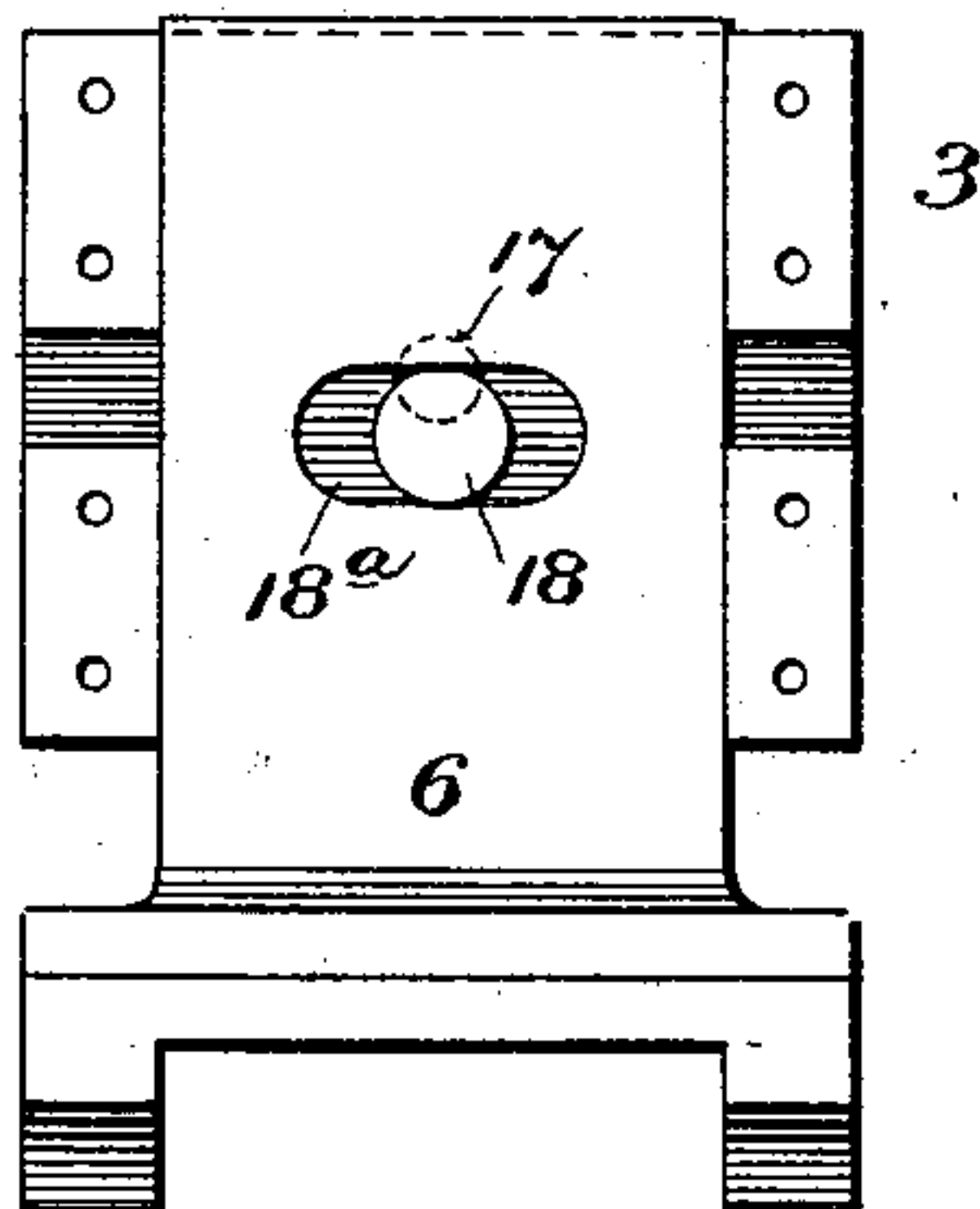
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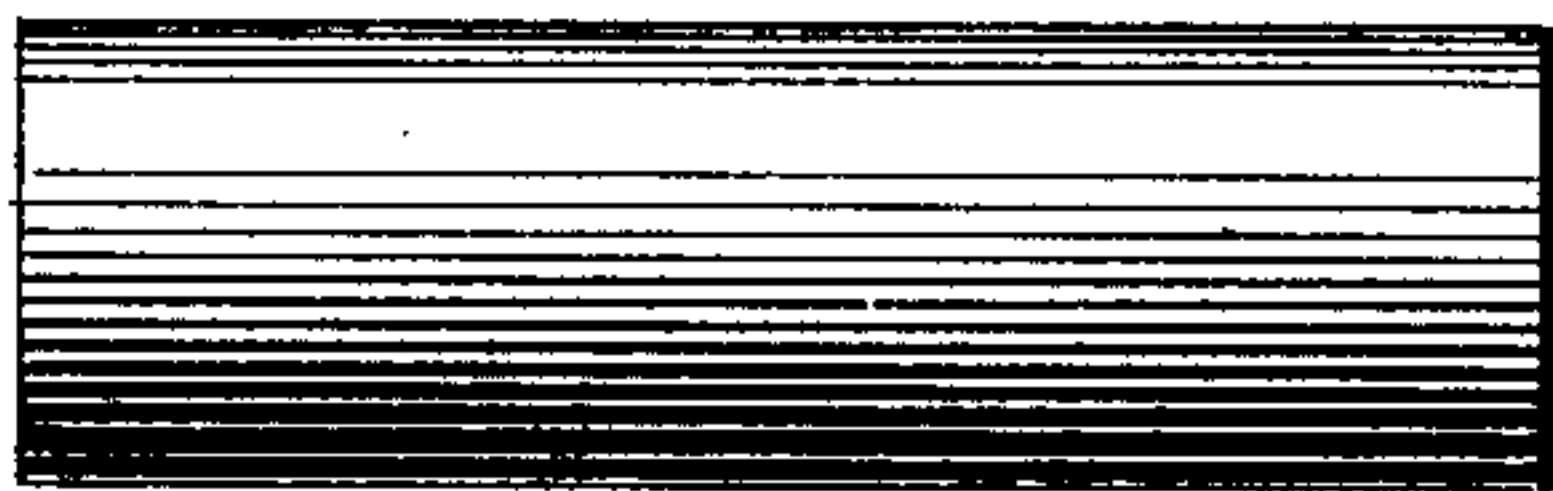
*Fig. 4.*



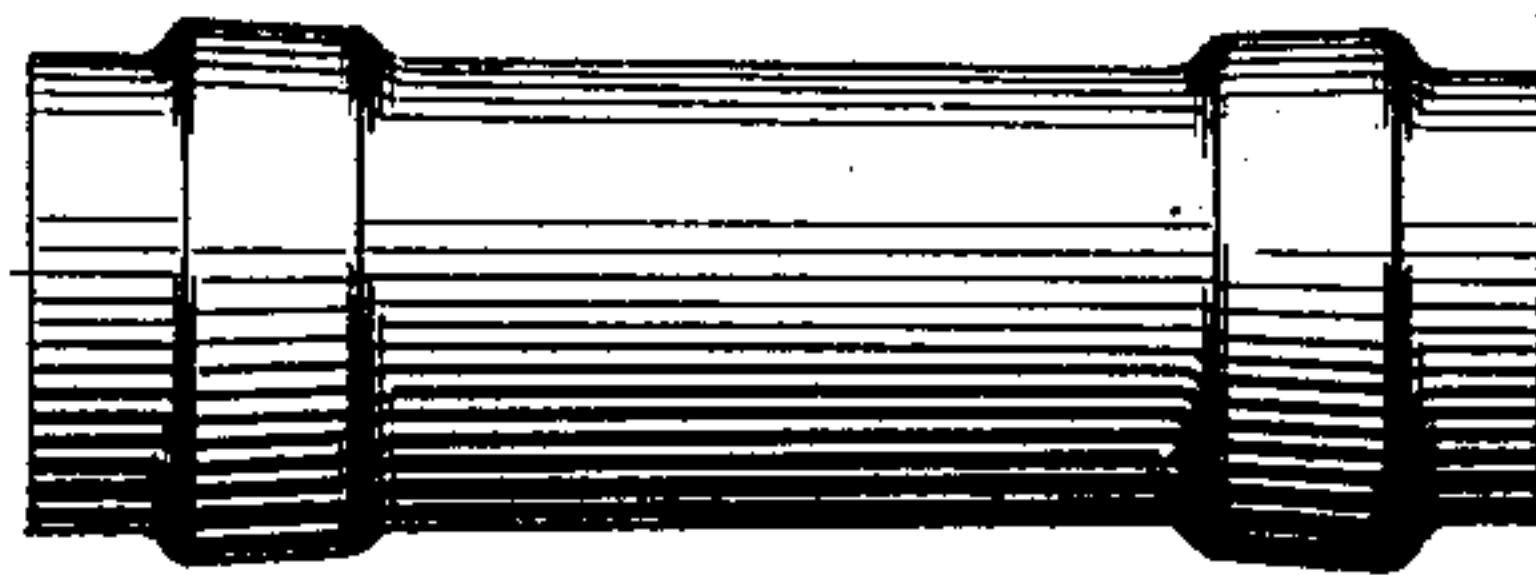
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



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# UNITED STATES PATENT OFFICE.

EMIL EINFELDT, OF DAVENPORT, IOWA, ASSIGNOR TO BETTENDORF METAL WHEEL COMPANY, A CORPORATION OF ILLINOIS.

MACHINE FOR FORMING WHEEL-HUBS FROM TUBULAR BLANKS.

SPECIFICATION forming part of Letters Patent No. 705,518, dated July 22, 1902.

Application filed October 18, 1901. Serial No. 79,131. (No model.)

*To all whom it may concern:*

Be it known that I, EMIL EINFELDT, of Davenport, county of Scott, and State of Iowa, have invented a new and useful Improvement in Machines for Forming Wheel-Hubs, &c., from Tubular Blanks, of which the following is a specification.

This invention relates to a machine for forming wheel-hubs or other hollow articles; and it consists of mechanism of improved form and construction designed particularly to act on the inside of a tubular blank and form therein one or more annular grooves to receive the spoke-heads.

The invention consists also in the details of construction and combination of parts hereinafter described and claimed.

Referring to the drawings, Figure 1 is a perspective view of my improved machine. Fig. 2 is a vertical sectional elevation of the same from front to rear. Fig. 3 is a side elevation as viewed in the direction of the arrow in Fig. 1. Fig. 4 is a transverse section through the supporting-rolls and expanding-mandrel, showing the same acting on a tubular blank. Fig. 5 is a vertical transverse sectional elevation on the line *a a* of Figs. 2 and 3, showing the crank-stud for operating the pressure-head. Fig. 6 is a view of the tubular blank before being acted upon by the machine. Fig. 7 is a view of the same after being acted upon by the machine.

In the accompanying drawings, referring to Figs. 1, 2, 3, and 4, 1 represents a frame of a suitable form and material adapted to give support to operative parts of the machine now to be described. This frame is provided with a horizontal bed-plate 2 and an overhanging portion 3. 4 represents two rotary supporting-rolls mounted in suitable bearings, side by side, on the bed-plate and adapted to give support to the tubular blank which is to form the hub. 5 represents an expanding roll or mandrel adapted to extend within the tubular blank and acted on by a vertically-movable pressure-head 6, which operates to urge the mandrel in forcible contact with the blank and the latter in forcible contact with the supporting-rolls. The expanding-mandrel is formed with two peripheral ribs or shoulders 7, which when the mandrel forces

the blank against the supporting-roll will be opposite corresponding grooves 8 in the supporting-rolls, so that these shoulders and grooves, when the supporting-rolls are rotated, will coöperate on the blank to bend the material of the same radially outward in two lines, forming in the blank internal grooves and corresponding external swells, as shown in Fig. 8. It is evident, however, that the number of the shoulders and grooves may be increased or diminished and their form varied according to the form which it is desired to give to the finished hub. The supporting-rolls are positively rotated in the same direction by means of pinions 9 thereon, driven by a spur-gear 10, fixed to the hub of a large pinion 11, which in turn is driven by a smaller pinion 12 on a driving-shaft 13, clutched to a continuously-rotating driving-pulley 14. The rotation of these rolls imparts to the tubular blank when the latter is pressed against them by the mandrel a corresponding rotation, which by a frictional contact with the mandrel causes the same to act with a rolling effect on the interior of the blank, bending the same outward at the points where the ribs on the mandrel and the grooves in the supporting-rolls meet. The ends of the mandrel are in the form of journals which rotate in open bearings or slots 15 in the under side of a vertically-movable head 16, mounted in the overhanging portion of the frame, the arrangement being such that the head may exert a downward pressure on the mandrel, and the latter may be removed bodily therefrom to admit of the blank being set in place or removed. The mandrel is thus rotatable freely with respect to the supporting-rolls, its motion being due to its frictional contact with the blank. This feature of construction I deem of peculiar advantage and importance in that the mandrel may conform to the varying speeds of the blank as the grooves in process of formation enlarge or deepen. The vertical movement of the pressure-head is effected by a horizontal fore-and-aft shaft 17, Figs. 2 and 3, which is mounted in the overhanging portion of the frame and has fixed to its forward end an eccentric stud 18, engaging in a transverse slot 18<sup>a</sup> in the head, the construction being such that when



the shaft is rotated in one direction the head will be lowered rapidly at first, and then more slowly as it approaches the supporting-rolls and forces the mandrel into active relation 5 to the same and to the blank. When rotated in the opposite direction, the pressure-head is raised and releases the mandrel, permitting the finished hub to be removed and a new blank inserted in its place. The relation of the 10 crank-stud to the slot in the pressure-head is such that when the stud is at the lowest point in its movement the pressure-head will also be at its lowest point, with the mandrel in active relation to the blank and rolls, as 15 clearly shown in Fig. 5. This will cause the mandrel to be carried rapidly to and from the supporting-rolls, so that the greatest pressure will be slowly and gradually exerted when the mandrel forces the blank against the rolls 20 to produce the grooves in the blank. The shaft is operated by means of a worm-wheel 19 on its rear end, adapted to be engaged by a horizontal worm 20, extending at the back of the frame and mounted in the rear end of 25 a supporting-frame 21, pivoted, as at 22, to the main frame in such manner that by the rocking of this supporting-frame the worm may be raised or lowered to engage or disengage the worm-wheel. The worm has fixed 30 to one end a pulley 23, connected by belt 24 with a pulley 25 on a hub of the large pinion 11, before alluded to. On its forward end the fore-and-aft shaft has fixed to it a hand-wheel 26 at the outside of the frame, by means 35 of which the shaft may be rotated independently of the action of the worm when the latter is disengaged from the worm-wheel. The purpose of this hand-wheel is to manually raise or lower the head quickly to release the 40 mandrel when the hub is finished or to bring the mandrel in contact with the blank before the worm-wheel is operated.

The operation of the rocking frame to engage or disengage the worm is effected by the 45 foot-lever mechanism represented particularly in Fig. 3, where it is seen that the rocking frame 21 has rigidly fixed to it at one end a depending arm 27, connected at its lower end by means of horizontal toggle-links 28 50 with the main frame. These links at their point of union are connected by a vertical link 29 with a horizontal foot-lever 30, pivoted at its rear end, as at 31, to the main frame, so that when the forward end of the 55 lever is depressed the link 29 will be drawn downward and straightening out the toggle-links will move the arm 27 rearward, which action will rock the supporting-frame and raise the worm into engagement with the 60 worm-wheel. The parts are restored to their former positions with the worm disengaged by means of a second foot-lever 32, pivoted between its ends to the frame of the machine and having its rear end arranged to engage 65 beneath the other foot-lever, the arrangement being such that the depression of lever 32 will raise lever 30 from its lowered position

and through the toggle-links will pull arm 27 forward again, and thereby rock the supporting-frame and lower the worm out of engagement with the worm-wheel. 70

In the operation of the mechanism described the mandrel is inserted in a section of tubing to form a hub, which tubing is preferably heated, and it is set in place on the 75 supporting-rolls, the pressure-head having previously been raised, the worm lowered out of engagement with the worm-wheel, and the driving-shaft disconnected by the clutch. The hand-wheel is now turned to bring the 80 pressure-head down quickly, so that the open bearings in its ends will straddle the projecting ends of the mandrel, after which the clutch is operated to cause the rotation of the supporting-rolls and worm, and foot-lever 30 85 depressed to engage the worm with the worm-wheel. This will cause the pressure-head to urge the mandrel slowly downward in forcible engagement with the hub, thereby pressing the same against the supporting-rolls and 90 causing the mandrel and rolls to cooperate to form in the hub tubular internal grooves and corresponding external swells. When the operation is completed and the grooves formed to the proper depth, foot-lever 32 is operated 95 to disengage the worm, and the clutch is operated to disengage the shaft and arrest the rotation of the rolls. The hand-wheel is now turned to quickly raise the pressure-head, after which the grooved finished hub may be 100 removed and a new blank seated in place and the foregoing operation repeated.

Having thus described my invention, what I claim is—

1. In a machine of the type described, the 105 combination with the supporting-rolls, of driving mechanism therefor, a vertically-moving pressure-head, a mandrel adapted to be carried by the head into active relation to the supporting-rolls, mechanism for moving the 110 head vertically, and operative connections between the same and the driving mechanism of the supporting-rolls.

2. In a machine of the type described, the 115 combination with the supporting-rolls, of driving mechanism therefor, a pulley 25 connected with said driving mechanism, a vertically-movable pressure-head, mechanism for operating the same, a worm-wheel connected therewith, a worm engaging the worm-wheel, 120 a pulley on the worm, and a belt connecting said pulley with pulley 25.

3. In combination with the supporting-rolls, a pressure-head movable to and from the same and adapted to afford a bearing for 125 a mandrel, a crank-stud engaging the head, a rotary shaft connected with the stud and means for rotating the shaft, the relation of the crank-stud and head being such that when the head presents the mandrel in active 130 relation to the rolls the crank-stud will be at its lowest point.

4. In combination with the supporting-rolls, a mandrel-carrying head movable to



and from the same, a horizontal slot in the head, a crank-stud mounted in the slot, a shaft connected with the stud, and means for rotating the shaft.

5 5. In combination with the supporting-rolls, a mandrel-carrying pressure-head, operating mechanism therefor, means for connecting and disconnecting the mechanism with the head, and means for manually moving the head when the operating mechanism  
10 is disconnected.

6. In combination with the supporting-rolls, a mandrel-carrying head movable to and from the same, an operating-shaft operatively connected with the head, power-driven  
15 means for rotating the shaft, and a hand-wheel connected with the shaft, and serving as a means for rotating the shaft independently of the power-driven mechanism; whereby  
20 by the power-driven mechanism may be disconnected from the head and the latter operated by hand.

7. In combination with the supporting-rolls, a vertically-movable mandrel-carrying  
25 head, a horizontal shaft, a crank-stud on the shaft engaging the head, a hand-wheel on the stud, a worm-wheel on the shaft, a worm adapted to be engaged or disengaged with the wheel, and means for driving the worm.

30 8. In combination with the supporting-rolls, a vertically-movable mandrel-carrying head, operating mechanism therefor, a worm-wheel connected with said operating mechanism, a rocking frame, a worm mounted in the frame, means for rocking the frame to engage and disengage the worm with the worm-wheel, and means for driving the worm.

9. In a machine of the type described the combination with the vertically-movable  
40 pressure-head and the worm-wheel for operating the same, of a rocking frame, a worm mounted therein, means for driving said worm, an arm depending from the rocking frame, toggle-links connected with the arm  
45 and with the frame of the machine, a foot-lever, and connections between the same and the toggle-links.

10. In a machine of the type described, the combination with the pressure-head and the  
50 worm-wheel operatively connected therewith, of a rocking frame, a worm mounted therein below the worm-wheel and movable to and from the same, a foot-lever operatively connected with the rocking frame and adapted

when depressed to rock the same and lower  
the worm out of engagement with the worm-wheel, and a second lever engaging the first and adapted when depressed to elevate the first lever and engage the worm with the worm-wheel.

11. In a machine of the type described, the combination with the supporting-rolls adapted to support the blank under treatment, of a vertically-movable pressure-head formed with open bearings adapted when the head  
60 is moved toward the supporting-rolls to loosely engage the ends of a portable mandrel.

12. In a machine of the type described, the combination with the supporting-rolls adapted to support the blank under treatment, of  
70 a portable mandrel adapted to be inserted within the blank with its ends projecting beyond the ends of the blank, and a vertically-movable pressure-head adapted to engage the ends of the mandrel and apply pressure thereto and formed to afford a bearing therefor; whereby as pressure is applied to the mandrel by the head the former may be rotated freely.

13. In a machine of the type described, the combination with the supporting-rolls, of a  
80 vertically-moving head provided in its lower end with opposing open bearing-slots, and a portable mandrel having its ends in the form of journals adapted to extend in said slot.

14. In a machine for forming grooved hubs  
85 from tubular blanks, the combination with grooved supporting-rolls, of a ribbed expanding-mandrel adapted to extend within the blank, a vertically-movable pressure-head adapted to be engaged with the mandrel and  
90 to present the same with the blank in active relation to the supporting-rolls, and power-driven mechanism so connected with the pressure-head that the latter will approach the supporting-rolls with a gradually-decreasing  
95 speed; whereby the formation of the grooves is initiated by a comparatively rapid approach of the mandrel, and the speed of the latter decreased as the resistance offered by the deepening of the grooves becomes greater.

100 In testimony whereof I hereunto set my hand, this 2d day of July, 1901, in the presence of two attesting witnesses.

EMIL EINFELDT.

Witnesses:

NATH FRENCH,  
M. LOUISE DODGE.