No. 683,050. Patented Sept. 24, 1901.

O. KLATTE.

MECHANISM FOR THE PRODUCTION OF BOILER PIPES, TUBING, &c.

(Application filed Aug. 9, 1899.)

(No Model.) 4 Sheets—Sheet 1.

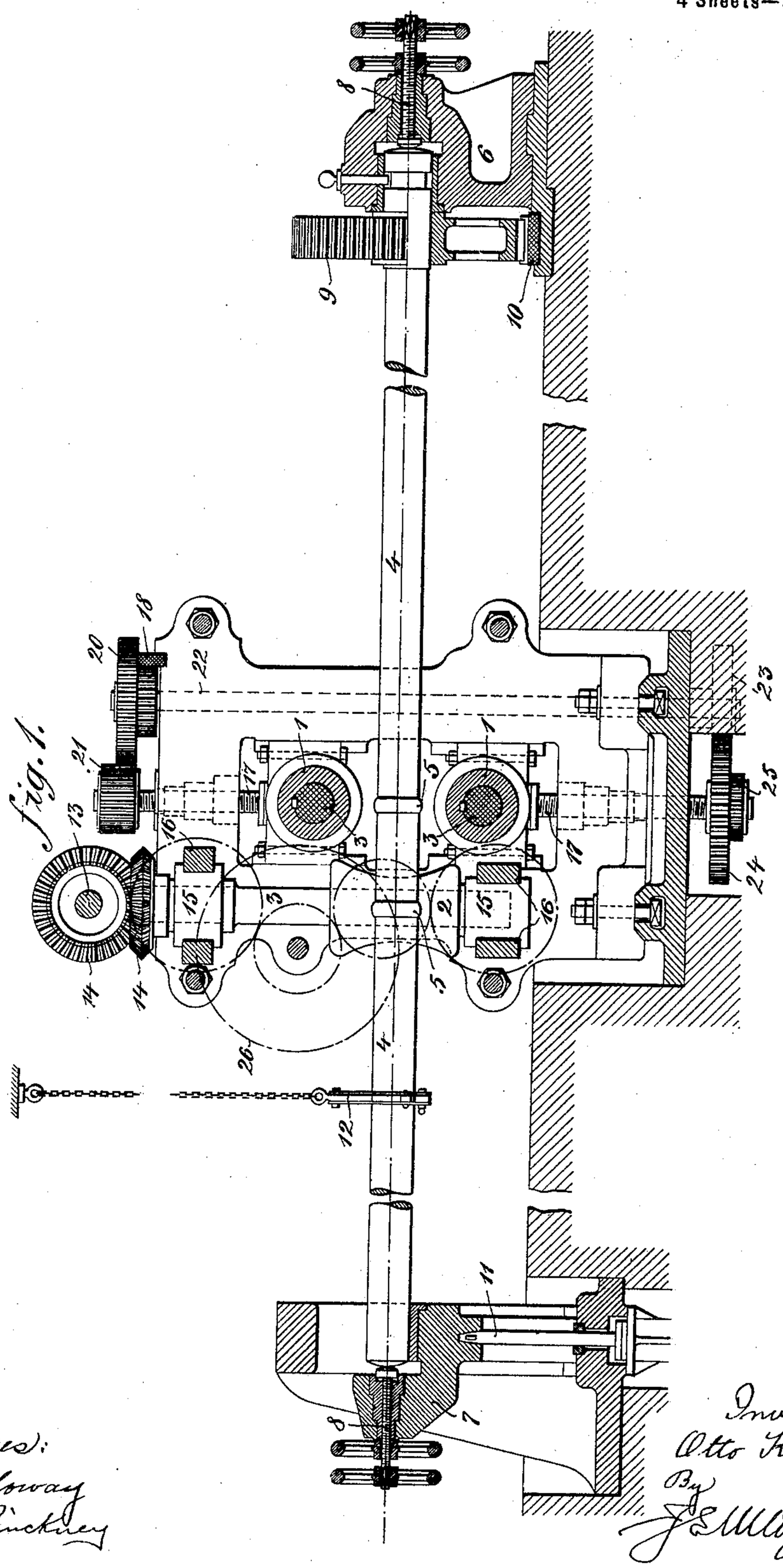

Fig. 1.

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Fig. 3.

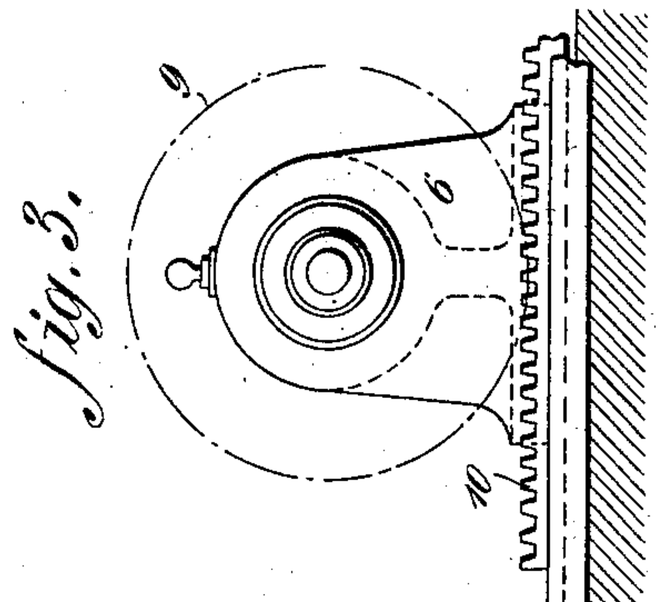

Fig. 2.

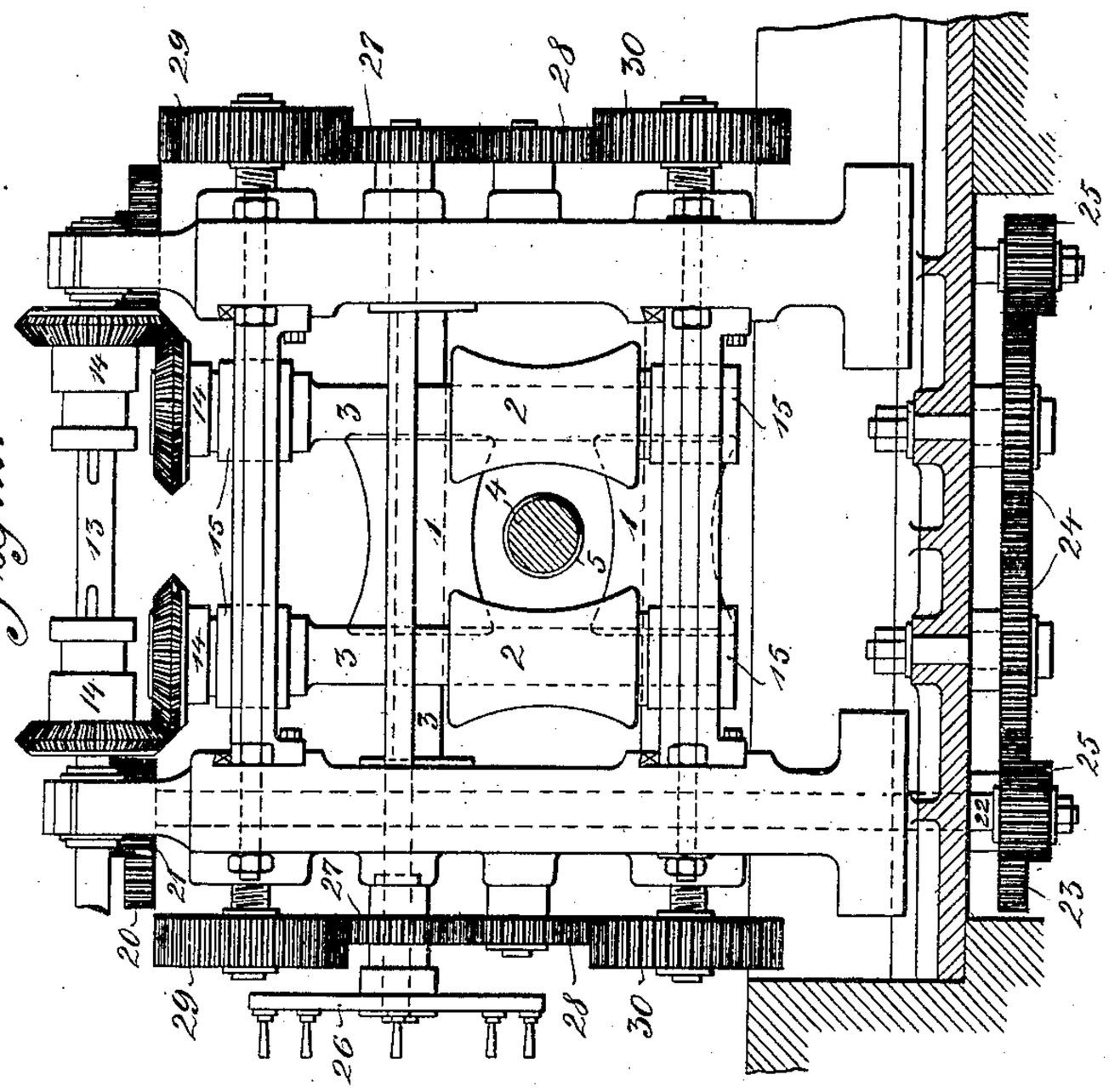

Fig. 4.

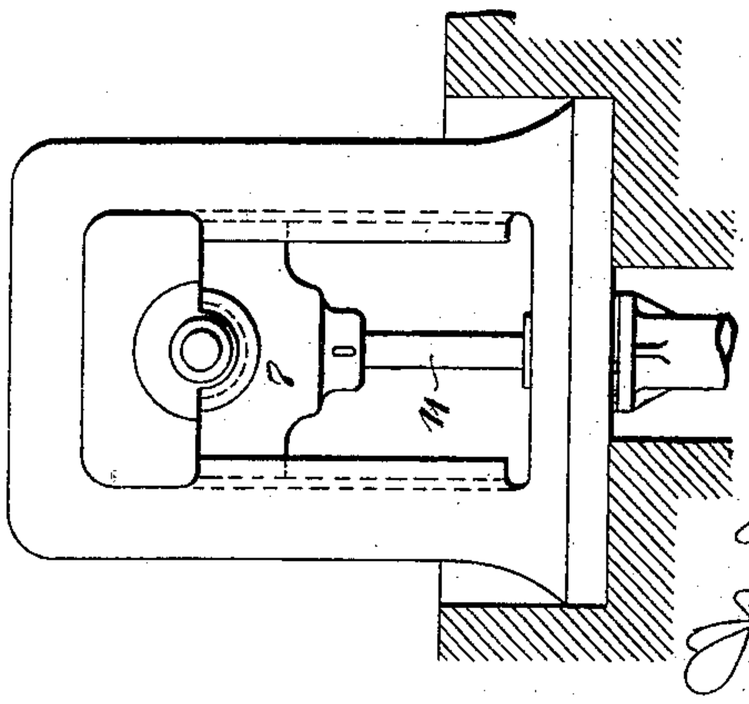

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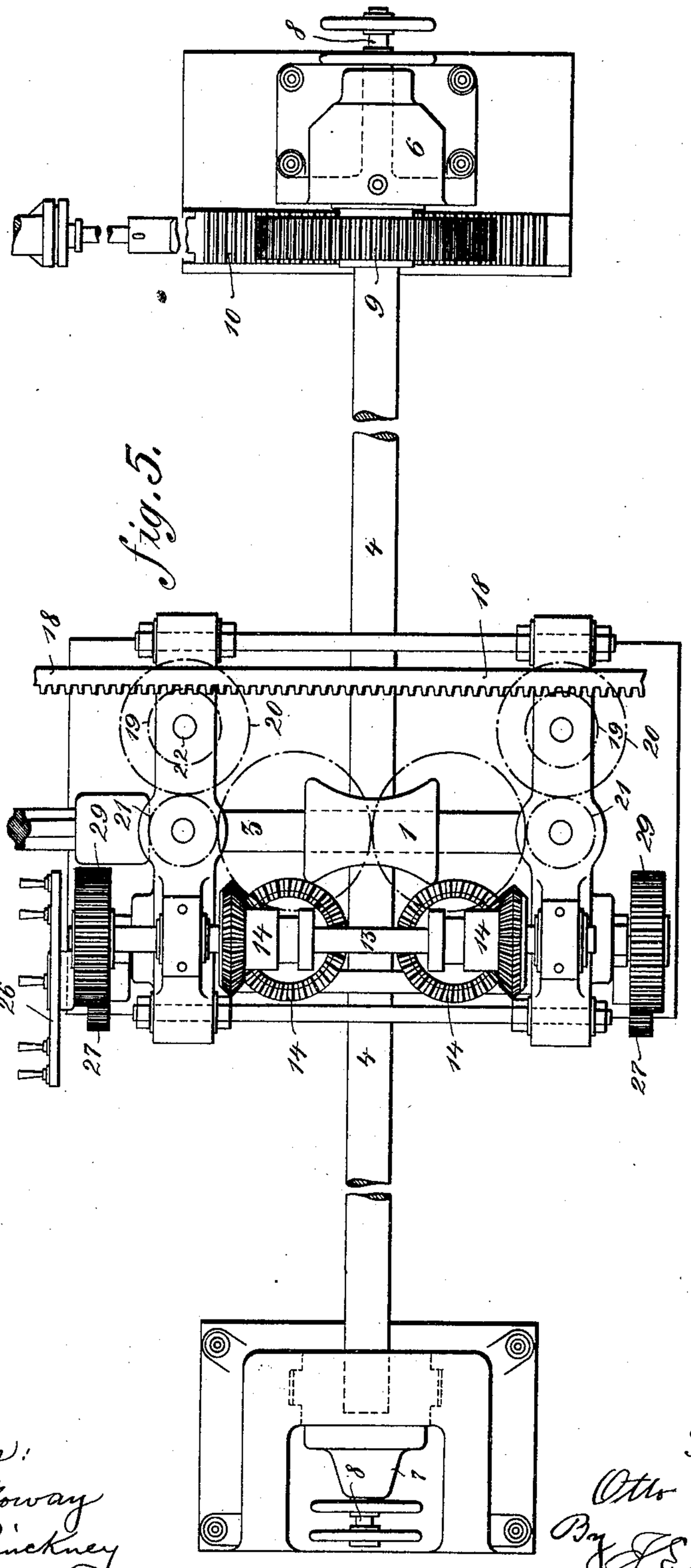
Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

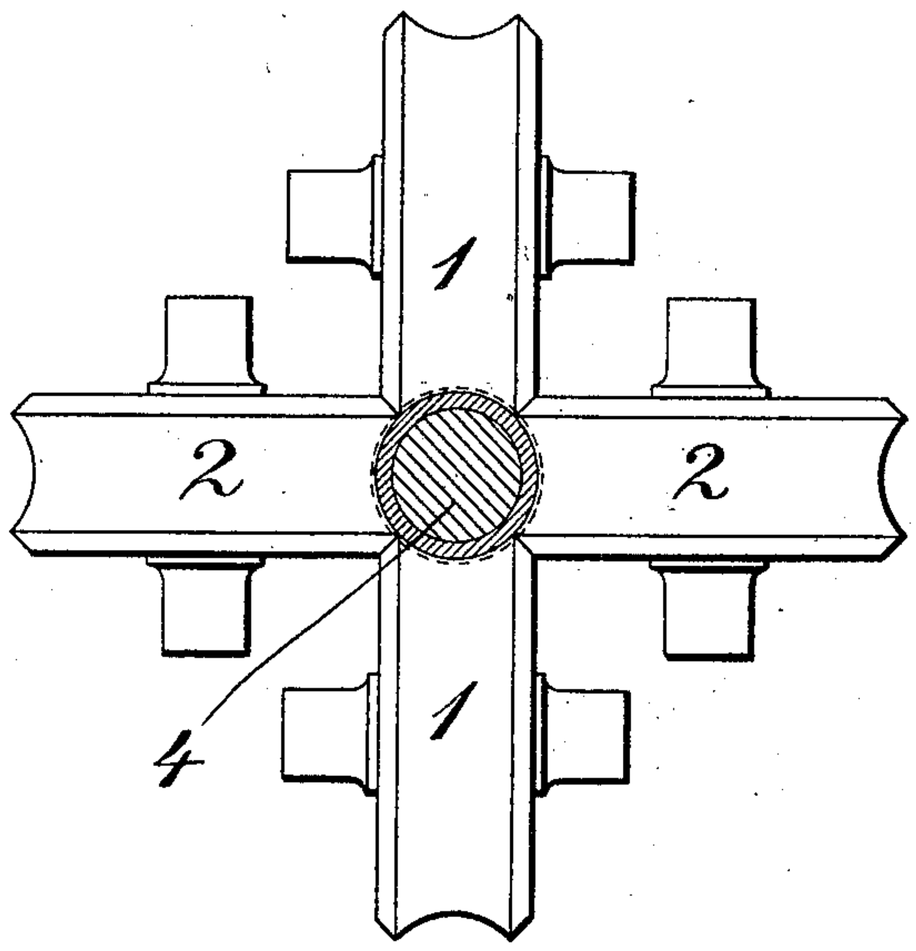

fig 6.

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UNITED STATES PATENT OFFICE.

OTTO KLATTE, OF DUSSELDORF, GERMANY.

MECHANISM FOR THE PRODUCTION OF BOILER-PIPES, TUBING, &c.

SPECIFICATION forming part of Letters Patent No. 683,050, dated September 24, 1901.

Application filed August 9, 1899. Serial No. 726,670. (No model.)

To all whom it may concern:

Be it known that I, OTTO KLATTE, a subject of the King of Prussia, German Emperor, residing at Dusseldorf, Prussia, German Empire, have invented certain new and useful Mechanism for the Production of Boiler-Pipes, Tubing, and the Like, of which the following is a specification.

This invention relates to a mechanism for the production of boiler-pipes, tubings, fighting-masts for war-ships, flame-tubes, and the like in one piece without seam.

By the new mechanism the work is drawn out and simultaneously more or less widened when mounted on a mandrel centrally passing through the caliber of a so-called "universal" rolling-mill, and then the work may be finished as desired.

The invention is illustrated by the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section through the center of a so-called "universal" rolling-mill used for effecting the lengthening. Fig. 2 is an end elevation of the universal rolling-mill, the pedestals for the mandrel being removed and the mandrel itself shown in section. Figs. 3 and 4 show end elevations of the two pedestals referred to. Fig. 5 is a plan view of the so-called "universal" rolling-mill. Fig. 6 shows a detail mentioned in the following description.

The universal rolling-mill (shown in Figs. 1 to 5) consists of horizontal rolls 1 1 and vertical rolls 2 2. If required, a train of such rolls may be employed. The rolls consist of shafts 3 3 3 3, on which are keyed the removable chilled rings 1 1 and 2 2. These rings are more or less hollow—that is, concave on the outer surface—the degree depending upon the size of the work. Thus the passage or caliber formed by the four rolls is more or less angular. (See Fig. 2.) For rolling objects of large diameter—such as large boiler-shell plates, tubings, &c.—it is best, as already mentioned, to have a still more angular caliber, while for work of smaller diameter—such as tubes, fighting-masts, flues, &c.—the caliber should be as nearly circular as possible. In the latter case finishing can be done with four rolls lying in the same plane. (See Fig. 6.) Through the center of the caliber formed by the four rolls a spindle or mandrel 4 is passed. It consists of three parts, the length of the central part being approximately equal to the distance between the vertical planes of the axes of the horizontal and vertical rolls. Between the central part and each end part is a removable ring 5, of suitable material, which by adjusting the spindle or mandrel 4 longitudinally may be brought exactly into the vertical planes of the axes of the vertical and horizontal rollers. The different parts of the spindle are secured together by pins passing into suitable borings. They are firmly drawn together after insertion of the rings 5 5 by wedges driven through slots in the boring and pin. The outer ends of the spindle 4 are carried in pedestals 6 7. Screw-spindles 8 8 are also provided for the purpose of enabling the spindle 4 to be adjusted longitudinally, so as to bring the rings 5 into their correct position, as above explained. The pedestal 6 is stationary, and the spindle end is held in place by means of a pin passing into an annular groove in the said spindle. Keyed to the spindle at the same end is a toothed wheel 9, which can be turned by a rack 10, so that the spindle 4 may be rotated at will. The other pedestal 7 is supported by the rod 11 of a hydraulic or steam piston, and the spindle 4 is supported only below, the upper half being free. Thus if the lower bearing is sunk the work can be inserted over the end of the spindle, which is held in position during this interval by the ring 12. The latter consists of two parts jointed together, which when laid around the spindle may be secured together by a pin or the like.

The vertical rolls 2 2 are driven in the ordinary manner by means of a shaft 13 and bevel-wheels 14. The bearings 15 of this shaft slide to and fro on cross-beam 16. The bearings for the horizontal rolls 1 1 are vertically adjustable, being arranged in guides in the standards. Screws 17 are provided for adjusting the horizontal rolls and are turned hydraulically by means of a toothed rack 18 engaging with toothed wheels 19, whereby other toothed wheels 20 and 21 are rotated and turn the upper screws 17. The lower screws 17 are turned by means of one of the wheels 19 rotating the shaft 22 and driving the toothed wheels 23, 24, and 25. The vertical

rolls can likewise be adjusted by means of the rack 18 or from the cog-wheels through suitable toothed gearing. On the drawings, however, a hand-wheel 26 is shown for the purpose, by means of the shaft of which and toothed wheels 27, 28, 29, and 30 motion is transmitted to the adjustment-screws. The two pairs of rolls may thus be adjusted independently of each other.

The drawing out may also be done in a two-high mill with either two horizontal or two vertical rolls and a spindle capable of exact fixing and adjustment instead of in a universal mill with an adjustable spindle which is stationary. The rolls are then concaved to suit only work of one diameter, or they are formed with several diminishing halves or quarters, one beside the other. In the first case the spindle remains stationary in its bearings. In the second case either the spindle with its bearings is laterally adjustable—*i. e.*, may be moved in the direction longitudinally of the rolls—and so may be suited to the diameter of the work, or the spindle may be stationary in its bearings and the rolls may be adjustable in the longitudinal direction and also to the spindle. In any case wherever there is a displacement to be effected the rolls must first be separated and then after the adjustment again brought together. The adjustment of either rolls or spindle may be done during the rolling process while the work is on the spindle before the rolls. In each of the diminishing halves or quarters of the rolls a suitable spindle may be arranged, as described. In such case the work must each time be set upon the spindle and again drawn off it. The purpose of this system of rolling is to produce tubes of different sizes and smaller cross-section and to admit of finishing to exact dimensions being done on a second rolling-mill.

The cast, pressed, bored, or forged corrugated or smooth work must have an internal diameter admitting of ready introduction of the spindle 4. The latter can be of any suitable diameter. The rings, however, must be appropriate for the size of the caliber between rolls, which again naturally depends upon the work in hand.

The manner of operation is as follows: The spindle 4 of the universal rolling-mill, Figs. 1 to 5, is slung in the ring 12, the pedestal 7 sunk, and the well-heated work pushed over the spindle. The ring 12 is now raised to its usual position and the spindle adjusted by means of the screw 8 and pedestal 7. The work is now adjusted in position between the rolls. As soon as the rolls are by means of the arrangements described adjusted so as to exert the desired pressure on the work the latter is twice drawn through the rolls in each position and between the two passes turned through forty-five degrees each time, so that it is rolled by the vertical and horizontal rolls with pressures exerted at right angles to each other. After each pass the reversing-engine is reversed, and after the backward pass the further adjustment of the rolls for the succeeding pass commences. Should the work sit loosely on the spindle 4, it must be turned around through forty-five degrees by tongs. If, on the contrary, it jams on the spindle, the latter must be turned by means of the rack 10 and toothed wheel 9. When the work is sufficiently rolled, it is removed from the spindle in the reverse manner to that in which it was set on it. It can then be cut at the ends or otherwise by roller-shears or, if desired, be slit up. The work is then, either in its present state or after being reheated, further rolled for finishing on the so-called "universal" rolling-mill with caliber and spindle or spindle-rings precisely adjusted to the dimensions for the finished work.

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

1. A mill for rolling metal bodies of cylindrical form, comprising two horizontally-mounted, adjustable rolls and two vertically-mounted, adjustable rolls driven by means of suitable gearing, or a series of such pairs of rolls, arranged together so as to form a passage between them, a horizontal sectional spindle to receive the work to be rolled, passing through said passage, means for adjusting said spindle in the direction of its length and for adjusting it vertically and means for rotating said spindle, all substantially as described.

2. A mill for rolling metal bodies of cylindrical form, comprising two horizontally-mounted adjustable rolls and two vertically-mounted adjustable rolls driven by means of suitable gearing, or a series of such pairs of rolls, arranged together so as to form a passage between them, a horizontal spindle to receive the work to be rolled, passing through said passage, rings secured to the said spindle, means for adjusting said spindle in the direction of its length and for adjusting it vertically and means for rotating said spindle, all substantially as described.

3. A mill for rolling metal bodies of cylindrical form, comprising two horizontal, concaved rolls 1, 1 mounted in vertically-sliding bearings, two vertical, concaved rolls 2, 2 mounted in horizontally-sliding bearings and driven by suitable gearing 14, arranged so as to form a passage between them, a horizontal spindle 4 composed of three parts secured together, passing through said passage, rings 5 encircling the spindle and held in place by the meeting ends of its said parts, a pedestal 6 to support said spindle, provided with a screw-spindle 8 to adjust same in the direction of its length, a pedestal 7 to support the other end of said spindle, open above sliding vertically in a standard under the influence of a piston 11 and provided with a screw-spindle 8 for adjusting the said spindle in the direction of its length, a toothed wheel 9 mounted on said spindle, operated by a rack

10, pairs of screw-spindles 17 passing through the standards of the mill and operating the sliding bearings of the horizontal rolls, toothed wheels mounted on said screw-spindles operated through intermediate gearing by a toothed rack 18 and pairs of screw-spindles passing through the framing and operating the sliding bearings of the vertical rolls, toothed wheels 27 mounted on said screw-spindles operated through intermediate gearing by a hand-wheel 26, all substantially as described.

4. In a mill for rolling metal bodies of cylindrical form, the means shown of supporting one end of the spindle for receiving the work, comprising a pedestal 7 open above sliding vertically in a standard, provided with a screw-spindle 8 for adjusting the said spindle in the direction of its length, said pedestal being attached below to the piston-rod of a cylinder operated by suitable power, substantially as described.

Signed at Dusseldorf, Germany, this 20th day of July, 1899.

OTTO KLATTE.

Witnesses:
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GEO. P. PETTIT.