

No. 617,656.

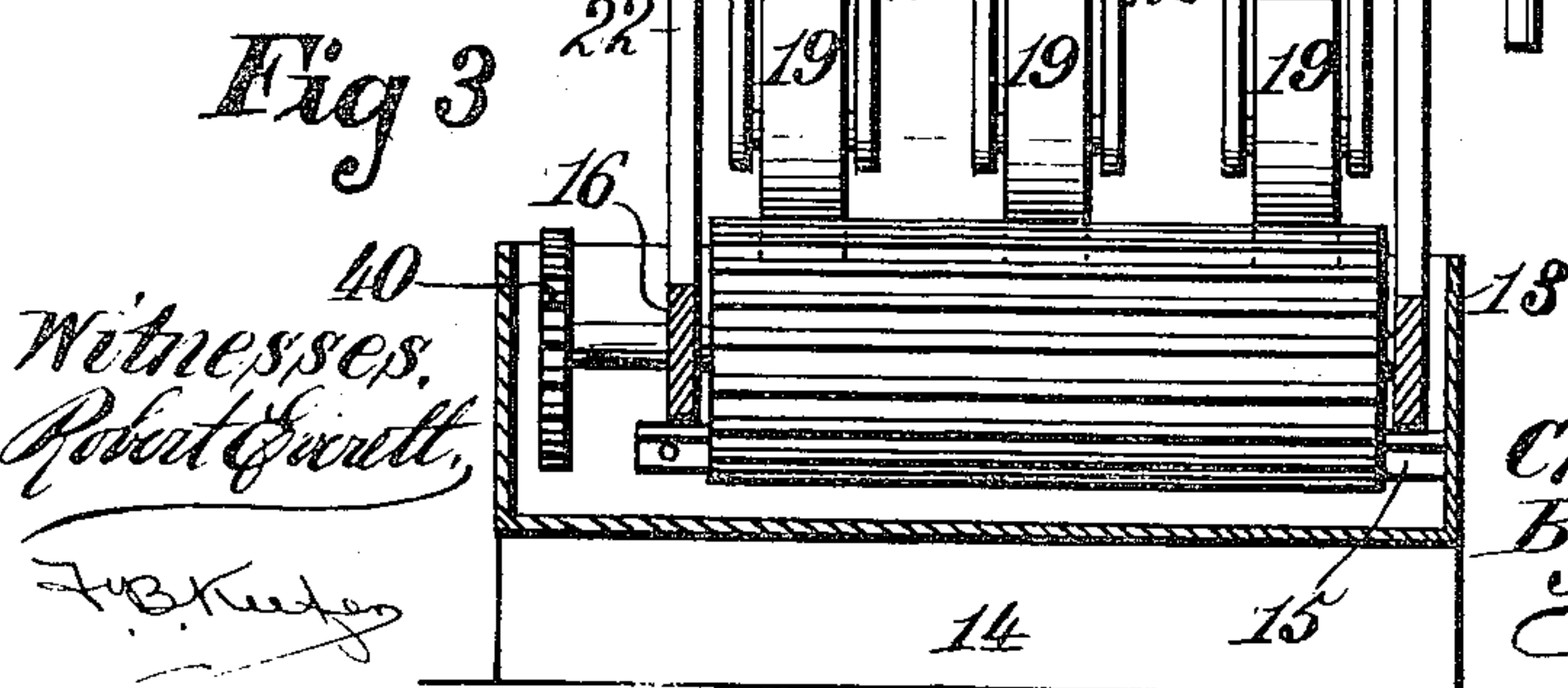
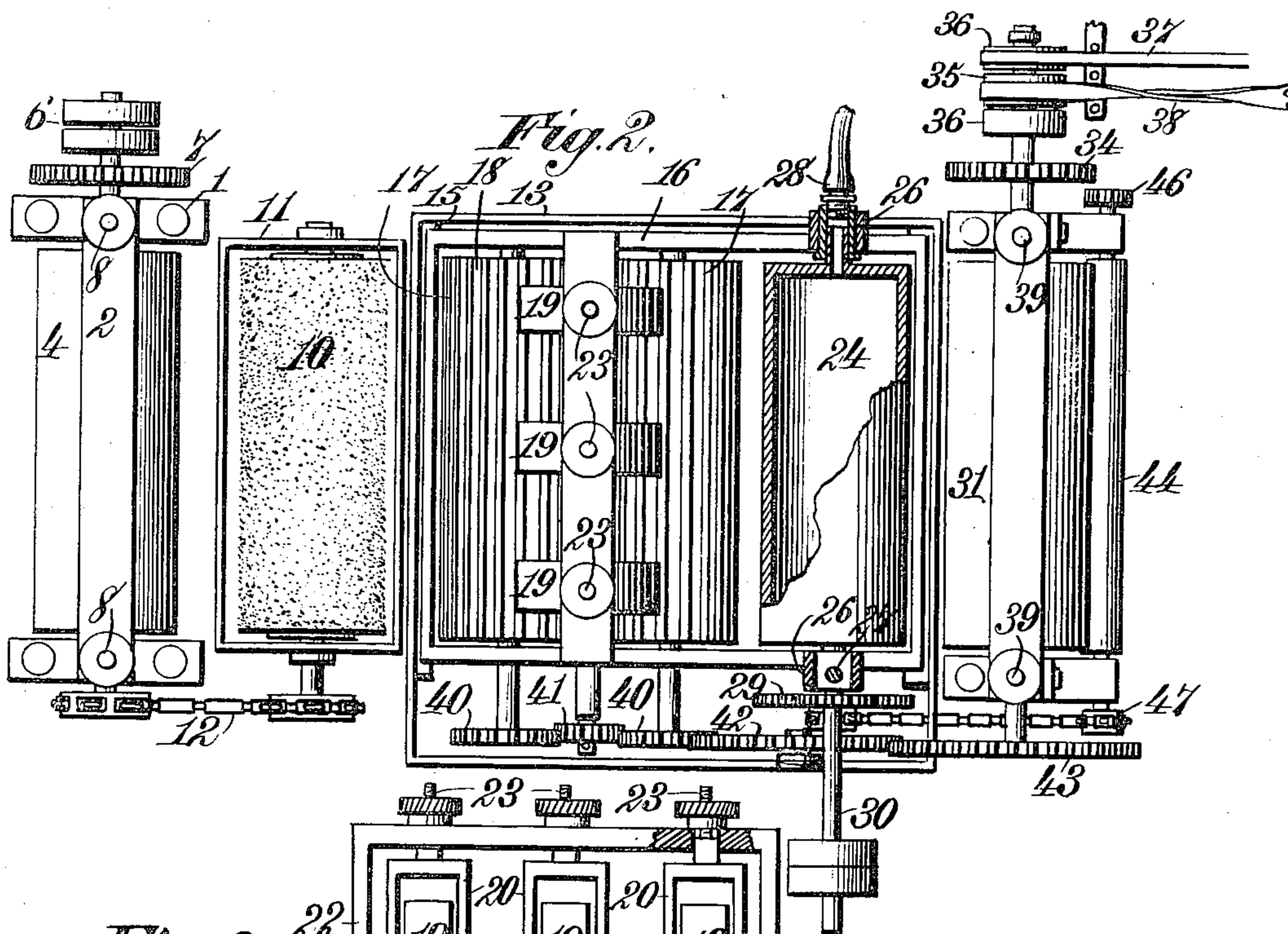
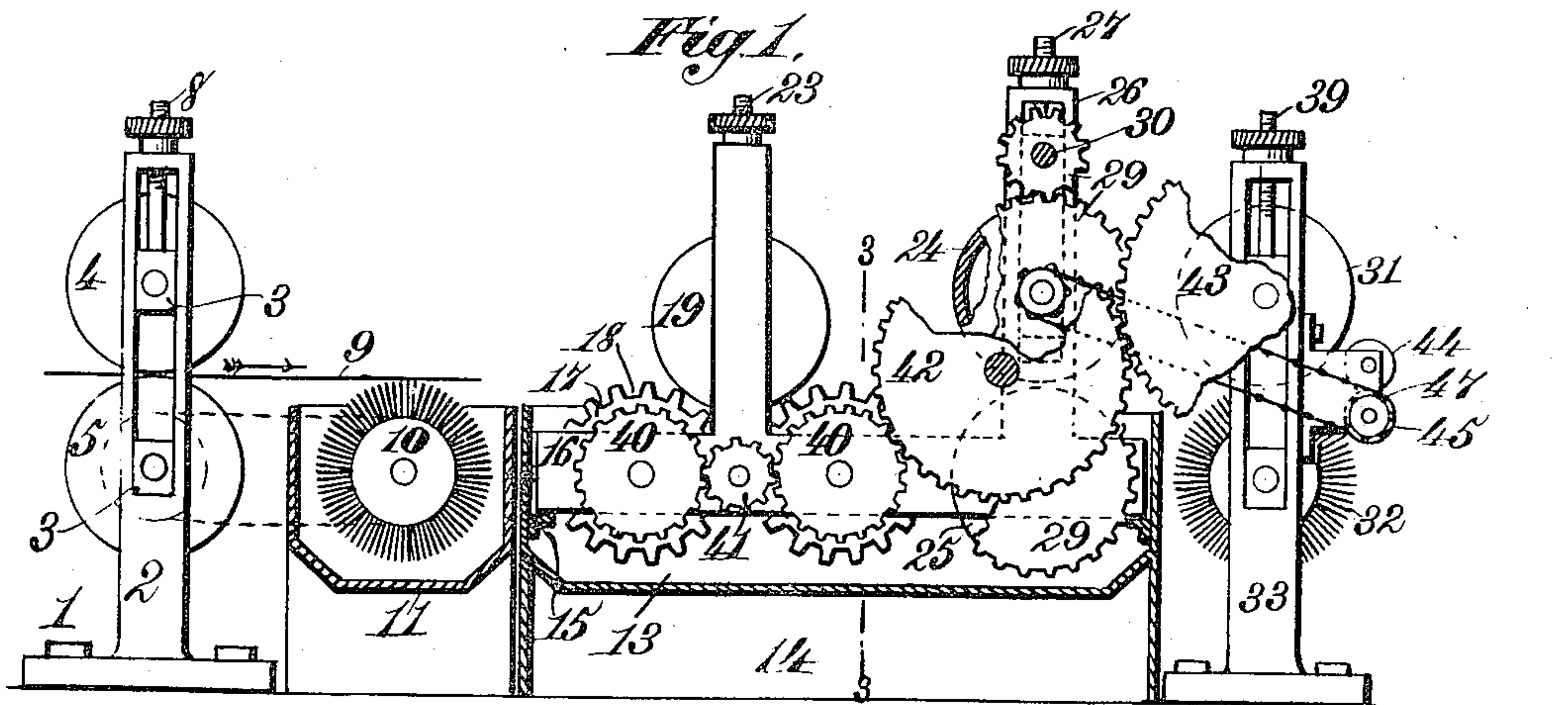
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APPARATUS FOR CLEANING AND COATING SHEET METAL PLATES.

(Application filed June 20, 1898.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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APPARATUS FOR CLEANING AND COATING SHEET-METAL PLATES.

SPECIFICATION forming part of Letters Patent No. 617,656, dated January 10, 1899.

Application filed June 20, 1898. Serial No. 683,971. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES C. ROBERTS, a citizen of the United States, residing at Ansonia, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Apparatus for Cleaning and Coating Sheet-Metal Plates, of which the following is a specification.

This invention relates to apparatus for cleaning and coating sheet-metal plates, and has for its object the provision of simple and improved means for the feeding forward of sheet-metal plates, applying acid or a suitable liquid flux to the under sides of said plates, then tinning or coating the same with molten metal, subsequently squeezing off any surplus coating, and finally wiping or burnishing the coated surfaces and feeding out the coated plates.

My invention consists in features of construction and novel combinations of parts in an apparatus for cleaning and coating sheet metal, as hereinafter described and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a sectional side elevation of my improved metal-coating apparatus. Fig. 2 is a part sectional plan of the same. Fig. 3 is a transverse section on the line 3 3 of Fig. 1.

The machine-frame 1 may be constructed in any suitable or convenient manner, and preferably comprises standards 2 at one end, in which are mounted the boxes or bearings 3 for the feeding-in rolls 4 and 5, that are arranged one above the other. The shaft of the upper feeding-in roll 4 may be provided with tight and loose pulleys 6, and the two feeding-in rolls are preferably connected by spur-gearing 7, or any other suitable means may be provided for operating these rolls. It is preferable to provide the boxes of the upper roll-journals with adjusting-screws 8 for causing the said roll to bear on the sheet or plate of metal with any required degree of pressure.

By the action of the feeding-in rolls 4 and 5 the sheet or plate of metal 9 is carried onto and over the top of an acid roll or brush 10, that is mounted to rotate in an acid-bath or liquid flux contained in a tank 11, that is suitably supported in the frame of the machine. Obviously either a rotary brush or a roll may be employed in the acid-bath 11 or any rotary

device covered with cloth or other suitable material for swabbing with acid the under surface of the metal sheet or plate to which the coating of tin or other molten metal is to be applied. The acid roll or brush 10 may be driven by sprocket-gearing 12 from the lower feeding-in roll 5 or otherwise.

The molten tin or tin alloy, leaded tin, or other molten metal to be used in coating metal sheets or plates is contained in a pot 13, set in a furnace 14 of suitable construction. In the pot 13 there are supports 15 for a frame 16, in which are suitable bearings for the journals of the rolls 17 for applying molten metal to the under side of a metal sheet or plate that has just come from the acid roll or brush. The previous application of acid to the metal sheet will remove any oxid or scale and enable the tinning to take better. If the metal sheet is very thin, the tinning can be done with one roll; but it is generally better to provide at least two tinning-rolls in one pot, so that there will be no liability of skipping any part of the sheet, as some sheets of metal are wrinkled or somewhat bent in parts that might thus escape contact with a single tinning-roll.

Each tinning-roll 17 is provided with a roughened surface, so that as the roll is revolved rapidly the molten metal in which the roll is nearly immersed will be thrown upward into contact with the under side of the metal plate or sheet. For this purpose the rolls 17 may be longitudinally fluted or constructed with corrugations or grooves 18 of any suitable character that will serve to throw the molten coating metal upward as the roll is revolved rapidly therein. The grooves 18 may be of any desired length, depth, and width, or the rolls 17 may be corrugated or otherwise roughened in any manner and to any degree that will cause an upward throw of the molten metal under rapid rotation of the roll.

While a metal sheet or plate is being coated it is held down onto the tinning-rolls 17 by means of a number of short pressure-rolls 19, journaled in yokes 20, depending from a cross-beam 21, supported by standards 22 on the frame 16, in which the tinning-rolls are mounted. Each of the yokes 20 is provided with an adjusting-screw 23, and the rolls 19



are spaced apart at suitable intervals, so as to relieve the pressure on the metal sheet or plate sufficiently to prevent spattering of the molten metal over the sheet or plate edges onto the top of the sheet or plate. To keep these top rolls 19 free from tin, it is preferable to mount them above the space between the tinning-rolls. These short top rolls 19 are all mounted in the same line transversely of the machine and are separately adjustable by means of the yokes 20 and screws 23, so as to better press out any irregularities in the metal sheet. From the tinning roll or rolls 17 the coated metal sheet passes next to a pair of smooth-faced squeezing-rolls 24 and 25, that are adapted to remove any surplus coating metal from the metal plate or sheet. The lower squeezing-roll 25 is mounted in the frame 16 and the upper squeezing-roll 24 is mounted in standards 26, supported on said frame. Adjusting-screws 27 are provided for regulating the pressure of the rolls 24 and 25 upon the metal sheet or plate. The upper roll 24 is preferably hollow, so that it can be heated by introducing steam therein through a suitable stuffing-box and pipe connection 28 at one end of the roll. By having the last pair of rolls 24 and 25 smooth-surfaced and by adjusting down the screws 27 the surplus molten metal will be squeezed off from the plate or sheet 9, so that it will require less subsequent wiping. The heating of the roll 24 serves to prevent the sticking of any molten metal that may have spattered over the edges of the metal sheet or plate and onto its upper face.

If desired, the upper rolls may be made from or covered with asbestos or some material to which the molten metal will not stick.

The smooth-faced squeezing-rolls 24 and 25 are connected and driven by spur-gearing 29 from a pulley-shaft 30 and are always driven in the same direction as the travel of the sheet to assist in moving it forward.

From the squeezing-rolls 24 and 25 the sheet or plate of metal is carried to a pair of rotary wipers 31 and 32, that are arranged one above the other. These wipers may both be rotary brushes, for while only the lower one is immediately concerned in the operation of coating the under side of a metal sheet an upper brush will serve to wipe off any beads of molten metal that might have got over the edges of the sheet, especially if the edges should be broken or irregular, as is frequently the case. In place of a brush, however, the upper wiper 31 may be simply a roll to hold the plates or sheet of metal down onto the lower wiper 32, which is preferably a rotary brush that may be constructed from any suitable brushing or wiping material. The shafts of these rotary wipers are mounted in standards 33 and are connected by spur-gears 34, through which one wiper receives its motion from the other. On the shaft of one of the rotary wipers there are a fast pulley 35 and

loose pulleys 36, so that by means of a straight belt 37 and crossed belt 38, with a suitable belt-shipper, the rotary wipers can be driven in either direction and may be reversed at will in order that the brushing or wiping of the metal sheet may be toward either end. It is preferable to provide the upper rotary wiper 31 with adjusting-screws 39 to regulate the pressure on the metal sheet or plate.

The tinning-rolls 17 should be run faster than the sheet or plate of metal is fed over them. On the shaft of each tinning-roll there is a spur-gear 40, connecting by an intermediate 41 with the gear of the other tinning-roll. Through a larger intermediate 42 the gears of the tinning-rolls are driven from a spur-gear 43 on the shaft of the upper rotary brush or wiper.

The coated metal sheet is carried out of the machine by feeding-out rolls 44 and 45, that are preferably smooth-faced. The shafts of these rolls are connected by spur-gears 46, and they may be driven by chain-gearing 47 from the shaft of one of the squeezing-rolls.

It will be seen that the metal sheet or plate to be coated is fed into the machine between the feeding-in rolls 4 5, whence it passes over the acid-applying roll or brush 10, thence to the tinning-rolls 17 between the same and the pressure-rolls 19, thence between the squeezing-rolls 24 and 25 to the rotary wipers 31 32, and is then delivered by the feeding-out rolls 44 45 in a finished condition. The feeding-in rolls 4 5, acid-brush 10, squeezing-rolls 24 25, and feeding-out rolls 44 45 always revolve in the direction of the feed. The tinning-rolls 17 are normally revolved in the direction that the metal sheet or plate is carried. By revolving the tinning-rolls in the same direction that the metal sheet or plate is moving these rolls are less apt to throw any molten metal over the first end of the sheet onto its upper face. When the forward end of a sheet of metal enters between the feeding-out rolls 44 and 45, the rotation of the tinning-rolls 17 and wipers 31 and 32 is reversed by means of a belt-shipper, so that as the feeding-out rolls 44 45 carry the plate or sheet of metal from the machine it will be finished off equally well at both ends. Also, by thus reversing the rotation of the tinning-rolls and wipers they are prevented from throwing any coating metal over the last end of the sheet, as might otherwise occur if they were not reversed.

The apparatus is applicable to the cleaning and coating of sheet brass, copper, zinc, and other metal plates or sheets, and in passing the same through the machine they are straightened, relieved of dents or wrinkles, and fully coated on the side exposed to the application of molten metal. Obviously sheets that have been coated on one side may be reversed and coated on the other side also, if desired.

What I claim as my invention is—

1. In apparatus for coating metal sheets or



plates the combination of a pot for molten metal, a tinning-roll mounted to rotate in said pot and having a roughened surface to throw molten metal upward against the under side of a sheet or plate of metal carried over said roll, means for applying pressure to the upper side of said metal sheet or plate, rotary wipers between which the coated sheet is passed to wipe molten metal from said sheet, a pair of smooth-faced squeezing-rolls located between the tinning-roll and the wipers and one of which squeezing-rolls is hollow to contain a heating medium, and means for reversing the tinning-rolls and wipers, substantially as described.

2. In apparatus for coating metal sheets or plates, the combination of a pot for molten metal, a tinning-roll mounted in said pot and having a roughened surface to throw molten metal upward against the under side of a sheet or plate of metal carried over said roll, means for applying pressure to the upper side of said metal sheet or plate, a pair of smooth-faced squeezing-rolls to remove surplus coating metal from the coated plate or sheet, the upper one of said rolls being hollow, means for introducing steam into said hollow roll, rotary wipers geared with the tinning-roll, and means for reversing the rotation of said wipers and tinning-roll, substantially as described.

3. In apparatus for coating metal sheets or plates, the combination of an acid-tank having a rotary brush or swab mounted therein, a pot for molten metal, a tinning roll or rolls mounted to rotate in said pot and throw molten metal upward against the under side of the plate or sheet of metal to be coated, means for applying pressure to upper side of said plate or sheet, rotary wipers geared with the tinning roll or rolls, and means for reversing the rotation of the wipers and said tinning roll or rolls, substantially as described.

4. In apparatus for coating metal sheets or plates the combination of a pot for molten metal, tinning-rolls mounted to rotate in said pot for the purpose of applying molten metal to the under side of a sheet or plate of metal carried over said rolls, a number of spaced-apart and separately-adjustable pressure-rolls mounted across the machine above the space between the tinning-rolls, wipers for wiping and finishing the coated metal sheet or plate, a pair of smooth-faced squeezing-rolls located between the tinning-rolls and the

wipers, and means for reversing the rotation of the tinning-rolls and wipers, substantially as described.

5. In apparatus for coating metal sheets or plates, the combination of a pot for molten metal, a frame supported in said pot and having standards projecting above the same, tinning-rolls mounted in said frame, pressure-rolls mounted in standards above the tinning-rolls to bear upon a sheet or plate of metal carried between the tinning-rolls and pressure-rolls, squeezing-rolls mounted in said frame and standards, means for adjusting the pressure on said metal sheet or plate, rotary wipers geared with the tinning-rolls, means for reversing the direction of rotation of said wipers and tinning-rolls, and mechanism for feeding the metal sheet or plate, substantially as described.

6. In apparatus for coating metal sheets or plates the combination of an acid-tank having a rotary brush or swab mounted therein, a pot for molten metal, tinning-rolls mounted to rotate in said pot for the purpose of applying molten metal to the under side of a metal sheet or plate carried over said rolls, pressure-rolls mounted over the tinning-rolls, rotary wipers between which the coated metal sheet or plate is passed, a pair of smooth-faced squeezing-rolls located between the tinning-rolls and wipers, and means for reversing the rotation of the tinning-rolls and wipers, substantially as described.

7. In apparatus for coating metal sheets or plates, the combination of feeding-in rolls, an acid-tank having mounted therein a rotary brush or swab driven from one of the feeding-in rolls, a pot for molten metal, tinning-rolls mounted in said pot, means for driving said rolls faster than the feed of the metal sheet or plate, pressure-rolls mounted above said tinning-rolls, squeezing-rolls, rotary wipers to receive the coated metal sheet or plate from the squeezing-rolls, means for reversing the rotation of said tinning-rolls and wipers, and feeding-out rolls driven from one of the squeezing-rolls, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CHARLES C. ROBERTS.

Witnesses:

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