No. 886,572. PATENTED MAY 5, 1908.

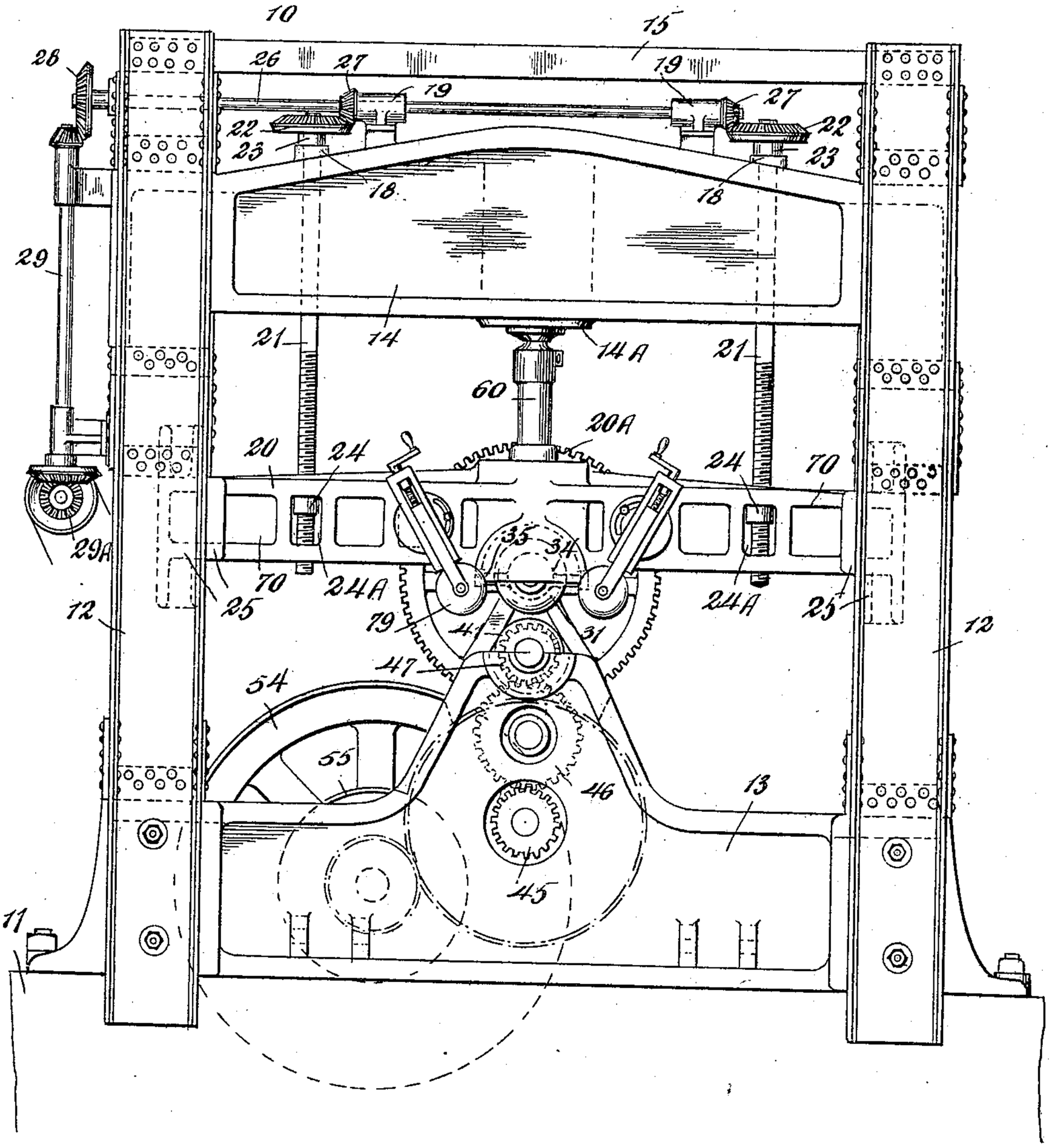
S. ZIETARSKI.

METAL WORKING MACHINE.

APPLICATION FILED MAR. 21, 1906.

3 SHEETS—SHEET 1.

Fig. 1



WITNESSES:

Ella Lund

Joseph E. Cavanaugh

INVENTOR

Stanislas Zietarski

BY

E. W. Marshall

ATTORNEY

No. 886,572. PATENTED MAY 5, 1908.

S. ZIETARSKI.

METAL WORKING MACHINE.

APPLICATION FILED MAR. 21, 1906.

3 SHEETS—SHEET 2.

Fig. 3,

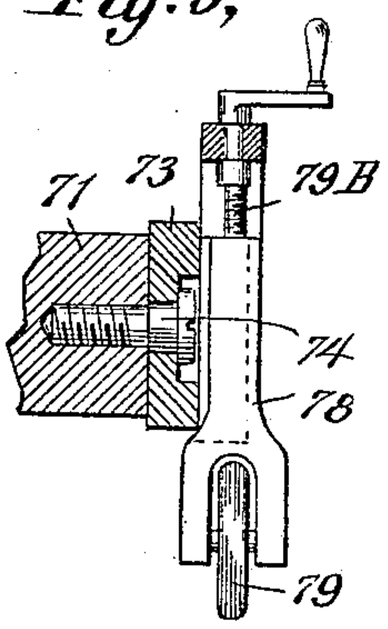


Fig. 4,

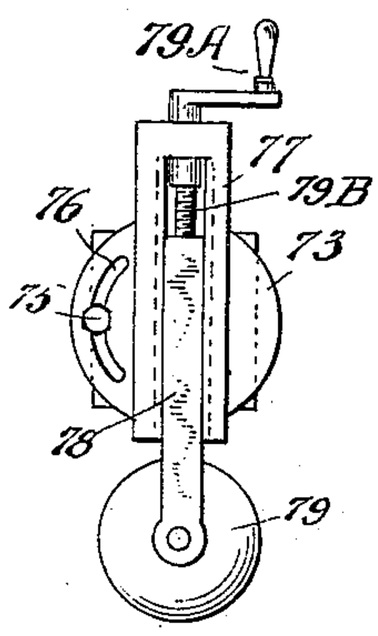
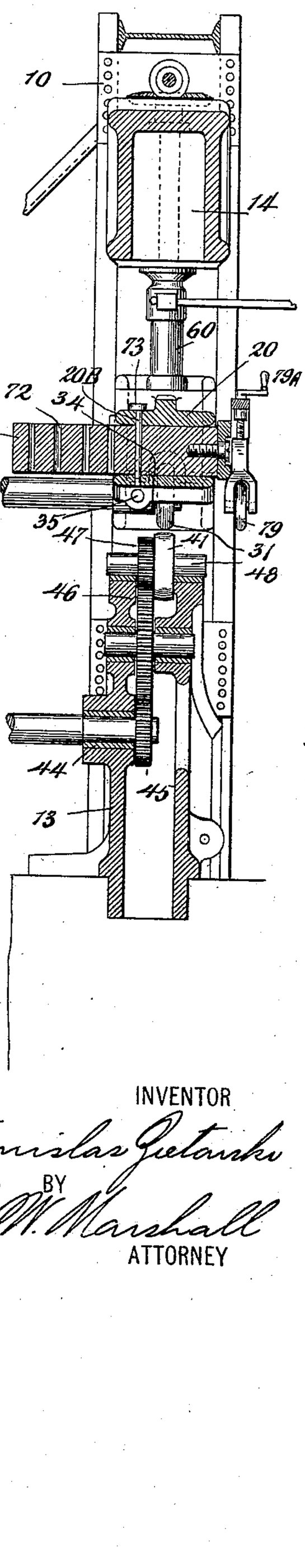
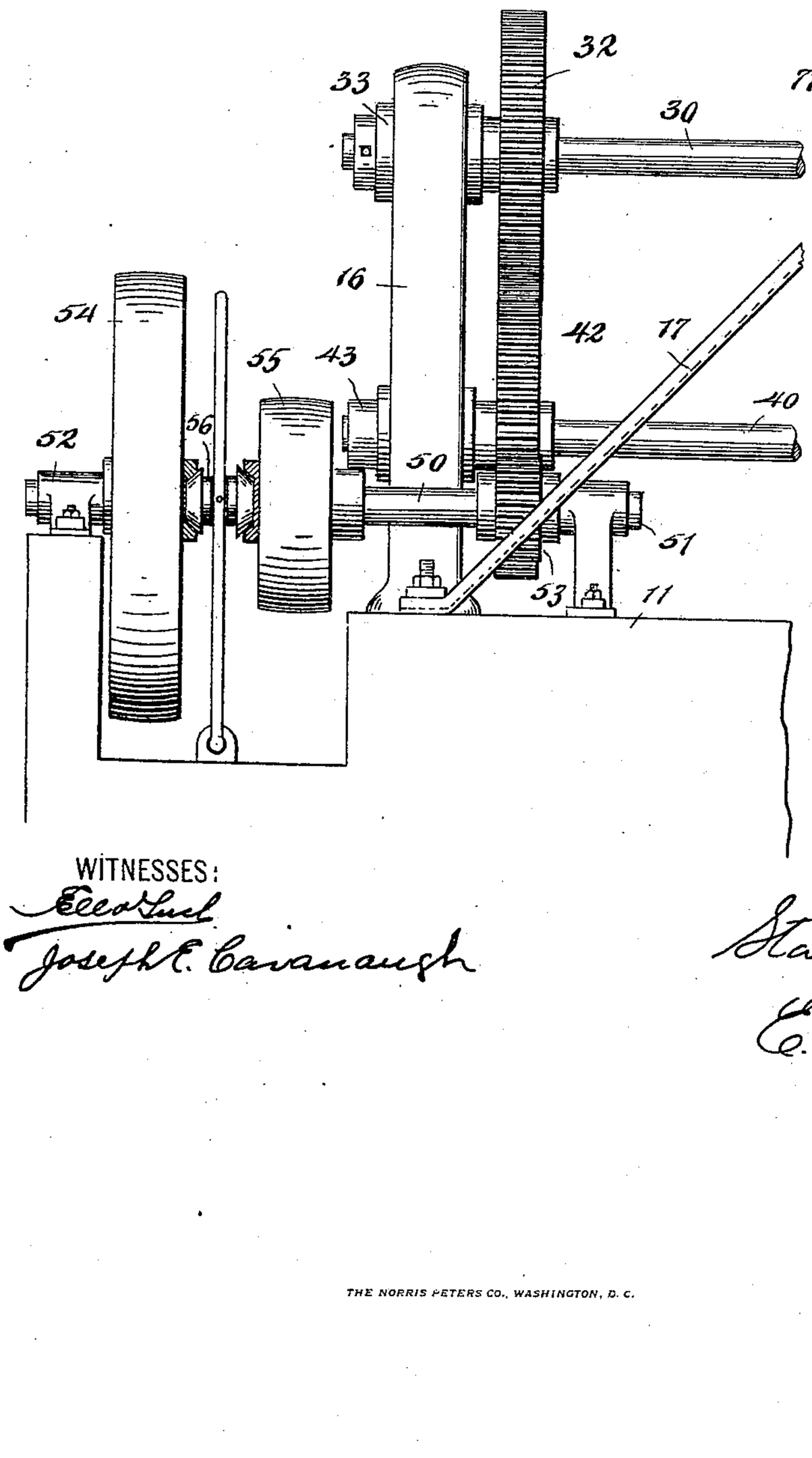


Fig. 2





WITNESSES:

Ellen Lund

Joseph E. Cavanaugh

INVENTOR

Stanislas Zietarski

BY

E. W. Marshall

ATTORNEY

No. 886,572. PATENTED MAY 5, 1908.

S. ZIETARSKI.

METAL WORKING MACHINE.

APPLICATION FILED MAR. 21, 1906.

3 SHEETS—SHEET 3.

Fig. 5,

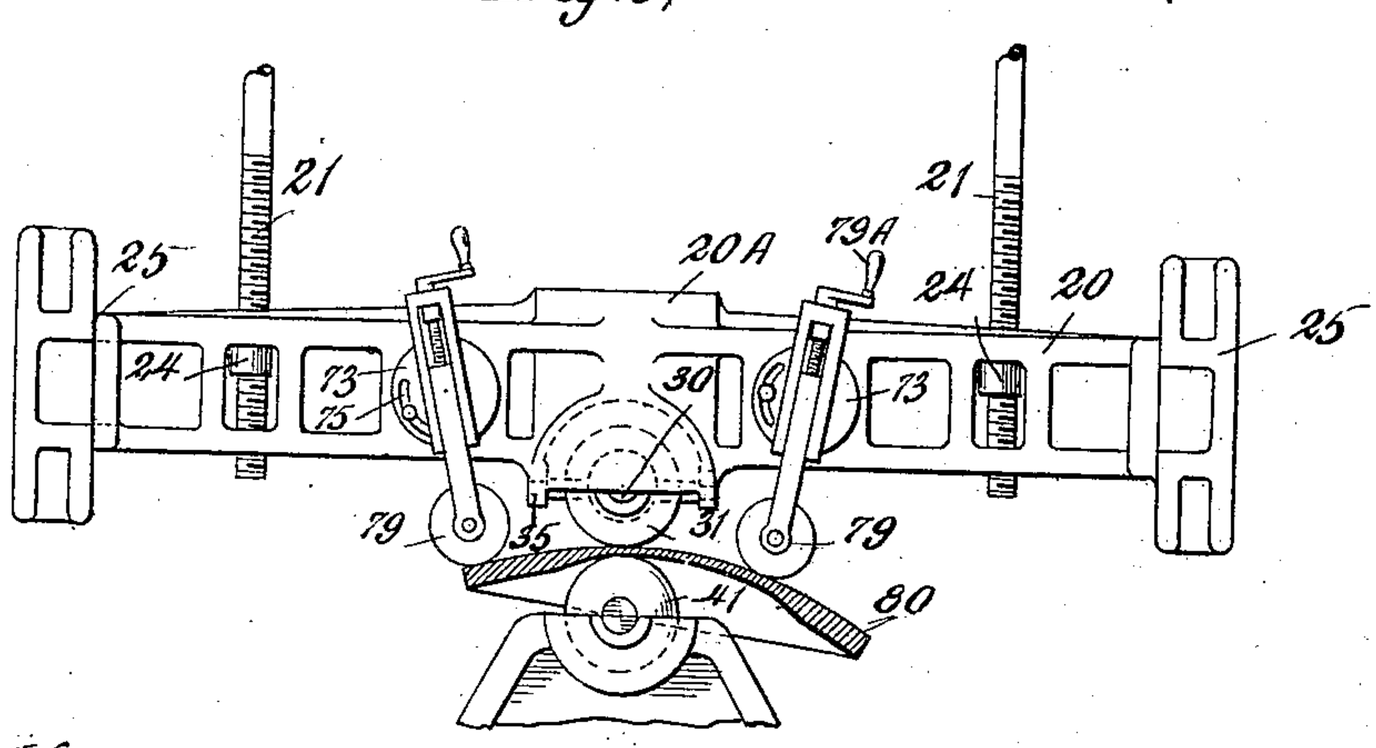


Fig. 6,

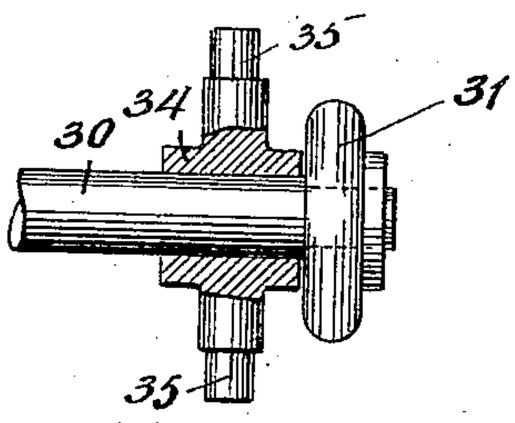
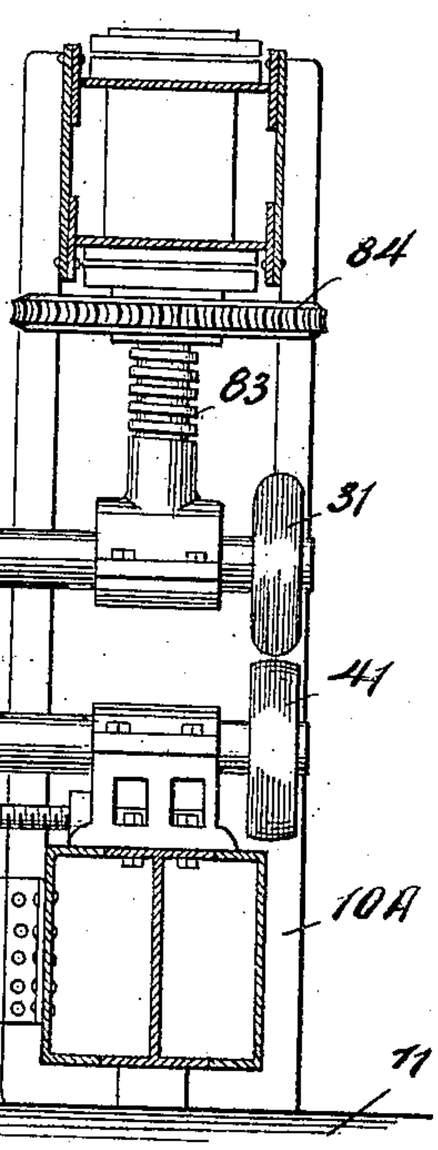


Fig. 7,



WITNESSES:

Joseph E. Cavanaugh

INVENTOR

Stanislas Zietarski

BY

E. W. Marshall

ATTORNEY

UNITED STATES PATENT OFFICE.

STANISLAS ZIETARSKI, OF NEWARK, NEW JERSEY.

METAL-WORKING MACHINE.

No. 886,572. Specification of Letters Patent. Patented May 5, 1908.

Application filed March 21, 1906. Serial No. 307,208.

To all whom it may concern:

Be it known that I, STANISLAS ZIETARSKI, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, United States of America, have invented certain new and useful Improvements in Metal-Working Machines, of which the following is a specification.

My invention relates to a new and useful improvement in metal working machines, and its object is to provide an efficient apparatus whereby copper or other metals may be rolled into various articles of manufacture

I will describe my invention in the following specification and point out its novel features in claims.

Referring to the drawings, Figure 1 is a front elevation of my improved machine; Fig. 2 is a side elevation, partially in section, with its center portion broken away. Fig. 3 is a side elevation, partially in section, of a detail of my machine, and Fig. 4 is a front elevation of the parts shown in Fig. 3. Fig. 5 is a front elevation of certain parts of my apparatus showing the method of using it. Fig. 6 shows a detail of my machine, and Fig. 7 is a side elevation of a modification of my invention.

Like characters of reference designate corresponding parts in all of the figures.

10 designates the frame of my machine. This frame is mounted upon a suitable foundation 11. The front part of the frame comprises two upright posts 12, 12 which may be built up of angle-irons as shown, or constructed in any suitable manner. Between these posts and connected to them and resting upon the foundation 11 is a base 13 which is arranged to support various parts of the machine, as will be fully described later. Near the upper part of the uprights 12, 12 a heavy, stationary, transverse beam 14 is placed. This is securely attached to the uprights and is arranged to support various parts of the apparatus. The uprights may be further connected together, if desired, by a cross-bar 15.

Near the rear end of the machine and resting upon the foundation 11 is an upright pedestal 16 which is arranged to support certain bearings. This pedestal 16 is connected to the front portion of the frame by bars 17.

20 designates a movable transverse beam which is suspended from the stationary transverse beam 14 by means of screws 21, 21. The upper ends of these screws are provided with bevel-gears 22, 22 which are securely attached to the screws 21, 21, and which have collars 23, 23 which rest upon bosses 18, 18 upon the stationary transverse beam 14. The screws 21, 21 extend down and through the movable transverse beam 20 and through nuts 24, 24. These nuts 24, 24 are arranged to be held in recesses 24^A, 24^A in the transverse beam 20, said nuts being prevented from rotation but free to move up and down in said recesses. The uprights 12, 12 are so designed that they form slides or guideways for the movable transverse beam 20, and the latter is provided at its ends with enlarged portions 25, 25 which act as guide-shoes and which are arranged to slide up and down over the uprights 12, 12. It may be seen, then, that the transverse movable beam 20 is suspended from the stationary transverse beam 14 by the screws 21, 21 and that they are firmly supported by the uprights 12, 12.

Supported on the top of transverse beam 14, by journal-bearings 19, 19, is a shaft which carries upon it bevel-pinions 27, 27 which mesh with the bevel-gears 22, 22. One end of the shaft 26 is provided with a bevel-gear 28 which may be driven by any suitable power, as, for example, by a shaft 29 which may be driven by a pulley 29^A connected to a suitable source of power and connected to the bevel-gear 28 through suitable gearing. It may be seen that whenever the pulley 29^A is driven in one direction or the other the screws 21, 21 will be similarly driven in one direction or the other, and that the movable transverse beam 20 will be raised or lowered thereby. The nuts 24, 24 are arranged to have considerable play or lost motion in the recesses 24^A, 24^A, so that while the position of the nuts 24, 24 determines the position of the transverse beam 20, the latter beam may be moved up by these nuts by other means, as, for example, the thickness of material placed between the rolls 31 and 41 which will be described later.

30 designates a shaft which extends from the front to the rear of the machine and which carries near its forward end a roll 31 and near its rear end a gear 32. The rear end of this shaft 30 is supported by a suitable bearing 33 in the pedestal 16, and its forward end is supported by a bearing 34 which I prefer to make in the manner shown in Fig. 6. This bearing 34 is arranged to be supported by the movable transverse beam 20.

The position of the beam 20 varies, and the movement of the beam will thus have a tendency to put the bearing 34 out of alinement. For this reason I prefer to arrange the bearing 34 with trunnions 35, 35 which are supported by the beam 20 and which allows the bearing 34 to always remain in alinement with the shaft 30. The parts of bearing 33 are somewhat loosely fitted together to give this bearing a slight flexibility to allow for the limited movement of the shaft 30.

40 designates another shaft which runs from the rear to the front part of the machine, and this shaft is supported by a bearing 43 in the pedestal 16 and by a bearing 44 in the base 13 of the front portion of the machine. Attached to this shaft 40, near its rear end, is a gear 42 which is arranged to mesh with the gear 32, and at its forward end is a gear 45 which is arranged to transmit the movement of the shaft 40 to a gear 47 through an intermediate gear 46, all of which gears are supported by the base 13. The gear 47 is rigidly attached to a shaft 48 to which is also attached a roll 41. It may be seen, therefore, that the movement of the shaft is transmitted through the arrangement of gears just pointed out to the roll 41.

50 designates a countershaft which is supported by two bearings 51 and 52 mounted upon the foundation 11. Mounted upon and rigidly attached to this countershaft is a gear 53 which is in mesh with the gear 42 upon the shaft 40.

54 and 55 are pulleys which are arranged to be connected to a suitable source of power and to be driven at different rates of speed. These pulleys are loosely mounted upon the countershaft 50. A clutch 56 is provided, however, on this countershaft 50 and arranged to connect the pulley 54 or the pulley 55 to the countershaft 50 and to thereby drive the countershaft at either the speed of the pulley 54 or that of the pulley 55.

It may be readily seen from the preceding description that whenever the clutch is moved to connect the countershaft 50 to the source of power that the shafts 30 and 40 and their connected rolls 31 and 41 are driven thereby through the gearing.

The rolls 31 and 41 are made with short lateral dimensions; that is, their thickness is short compared with their diameter. Their rolling surfaces may be of various shapes but are preferably convex. The result is that when the rollers are brought together they will touch at a point.

The front portion of the machine which I have described is arranged to be entirely open around the portions of the rolling surfaces of the rolls which are adjacent to each other. The rolls, thus, are of such form that there is a free space in all directions about their rolling surfaces. The portion of the base 13 which supports the roll 41 is also cut away so as to leave a free space below the adjacent surfaces of the rolls. The whole apparatus is therefore designed to have a clear free space in all directions about the adjacent portions of the rolls 31 and 41. I mean by this and wish to be understood, when I use the expression "a free space in all directions about portions of the rolling surfaces which are adjacent to each other", that there is a free space of considerable dimension for insertion and manipulation of the material which is placed between the rollers so that the latter may be moved forward or backward or to either side and may be moved up or down at will, and I do not, of course, mean that there is an unlimited free space in all directions, or that there is a free space toward the rolling surfaces themselves.

The relative position of the two rolls may be regulated by changing the position of the movable transverse beam 20 in a manner which has been already described. The rolls may be brought together until the distance apart of their rolling surfaces corresponds to the desired thickness of the finished article of manufacture. When material is placed between the rolls the movable transverse beam 20 is free to be pushed up thereby. In order to prevent this and to provide means for pressing the upper roll 31 downward an additional element is provided, preferably in the form of a hydraulic jack 60, which is arranged to be interposed between the stationary transverse beam 14 and the movable transverse beam 20, and these beams are provided with flat surfaces 20^A and 14^A, respectively, for the purpose of supporting this hydraulic jack. Of course, a screw-jack of ordinary construction may be used for this purpose if desired.

This machine is designed and arranged to roll copper or other metals into articles of manufacture in a novel manner. The metal is first made into the form of a circular disk or into any other desired form having considerable thickness and of about the weight of the finished article of manufacture. The disk is then placed between the rolls 31 and 41 so that these rolls bear upon the central portion of the disk. The rolls are then set in motion and are brought together under pressure, and the disk is guided so that its central portion will be rolled down to the desired thickness. The disk will, of course, be driven by the rolls and may then be guided in such a manner that the movement of the disk will be rotating and that the path of the rolls which the rolls make upon the disk will be spiral. The rolls will, therefore, flatten out the central portion of the disk at first and the area of the flattened portion will continually increase as the operation continues. The disk may be guided by hand or by any other suitable means, and as it is flattened out, may be moved up or down

into the desired form of the finished article of manufacture.

This machine is particularly adaptable for rolling copper kettles, but it is not limited, of course, to such use. I have described it in connection with rolling copper, but it may be used with many other metals and alloys, and it has been found, in fact, that material which is not capable of being formed or hammered by other processes may be successfully rolled by its use.

The movable transverse beam 20 is provided with a series of recesses or openings 70, 70. These are arranged for the purpose of receiving and supporting bars, like 71, which are used to support guiding means for the material as it is rolled. I will now describe these guiding means.

The bar, like 71, is provided with openings 72, and the transverse beam 20 is provided with similar openings 20^B. A pin 73 is arranged to be placed through the openings 20^B in the tranvserse beam 20 and one of the openings 72 in the bar 71 and to thereby hold the bar 71 in a given position within the recess 70. A plate 73 is pivoted to the end of the bar 71 by a screw 74 which is screwed into the center of the end of the bar 71. The plate 73 is so arranged that it may be rotated about the screw 74. A bolt 75, which extends through a slot 76 in the plate 73 and screws into the bar 71, is provided for the purpose of locking the plate 73 in a desired position. The plate 73 is provided with a straight portion 77 which acts as a guide for a bracket 78 which carries at its lower end an antifriction roller 79. This bracket with its roller may be moved up and down by hand by means of a crank 79^A and screw 79^B. These parts are shown clearly in Figs. 3 and 4. In Figs. 1 and 5 two of these guiding rollers are shown. Fig. 5 shows the manner in which these guiding rollers may be used, for in this case a disk 80 of metal is shown in the process of being rolled and at the same time being guided by the rollers 79, 79. By the use of these guiding means articles of large dimensions may be successfully formed or manufactured by this machine. The guiding rollers 79 may be of any desired shape, and they may sometimes be made with concave surfaces rather than with convex surfaces as shown. Means may also be arranged to guide the material back and forth, if desired, in the direction of the axis of the shaft 30.

In the modification shown in Fig. 7 the frame 10^A is constructed somewhat differently, and the rolls 33 and 41 are both attached, respectively, to their shafts 30 and 40. In this case power is transmitted to the rollers through a worm 81 and gear 82, and the position of the roll 31 is regulated by a screw 83 which may be raised or lowered by means of a worm which is arranged to mesh with a gear 84. The gage-carriage 85, which carries a gage-wheel 86 and the position of which may be adjusted by means of a screw 87, may be provided in this case to guide the material when it is placed between the rolls. The screw 87 may be turned by hand or by other suitable means, as, for example, by a friction wheel 88 which may be brought into contact with the shaft 40. The operation of this form of my invention is similar to that already described and needs no further description here.

I have shown more than one form of my invention to show that it is capable of being made in various ways. It is particularly adaptable for use in the manufacture of kettles, but I do not wish to limit myself in any way to this specific use as my invention may be used with other kinds of metals and for forming other kinds of articles of manufacture. It is particularly adaptable for forming circular kettles, but it may also be used for manufacturing articles of other forms, as, for example, elliptical dishes or vessels.

The rolls 31 and 41 are usually made with convex rolling surfaces as shown in the drawings. This is not necessary, however, and various forms of rolling surfaces may be used in carrying out my invention. I sometimes use one form of rolls for forming one part of the article of manufacture and then remove these rolls and put others in their place for forming other parts of the finished article. I therefore do not wish to limit myself to any specific form of rolls, except that they should be rolls with a comparatively short lateral dimension rather than cylindrical rolls.

What I claim is:

1. A pair of rolls with coöperating rolling surfaces, a frame having a main member and a movable member, means constructed and arranged to move the movable member in relation to the main member, said rolls being mounted upon the members, means for driving at least one of the rolls, the main member having a projection thereon extending toward the other member, the said projection serving as a support for the roll which is mounted upon the main member.

2. A pair of rolls with coöperating rolling surfaces, a shaft for each of said rolls, a frame having a main member and a movable member, means constructed and arranged to move the movable member in relation to the main member, said rolls being mounted upon the members, means for driving the shafts, said main member having a projection thereon extending toward the movable member, the said projection serving as a support for the roll which is mounted on the main member, and gears connecting the roll which is supported by the projection on the main member to its shaft.

3. A pair of rolls with coöperating rolling surfaces, each of said rolls having a short lateral dimension, a driving shaft for each of

said rolls, a frame constructed to have an open portion, said frame having a fixed main member and a movable member, means constructed and arranged to move the movable member in relation to the fixed main member, said rolls being mounted upon the members near the open portion of the frame, means for driving the shafts, the main member having a projection thereon extending toward the movable member, the said projection serving as a support for the roll which is mounted on the main member, gears connecting the roll which is supported by the projection on the main member to its shaft, and means for forcing the rolls toward each other under pressure.

4. A pair of rolls with coöperating rolling surfaces, a frame having a main member and a movable member, means constructed and arranged to move the movable member in relation to the main member, said rolls being mounted upon the members, means for driving at least one of the rolls, the main member having a projection thereon extending toward the other member, said projection serving for a support on the roll which is mounted upon the main member, and means for guiding material between the rolls.

5. A pair of rolls with coöperating rolling surfaces, a stationary frame having a main member and a movable member, a screw in the stationary part of the frame coöperating with the movable member for adjusting the relative position of the rolls, said rolls being mounted upon the members, means for driving at least one of the rolls, the main member having a projection thereon extending toward the movable member, the said projection serving as a support for the roll which is mounted upon the main member, and means associated with the stationary portion of the frame and with the movable member by forcing the rolls toward each other under pressure.

6. A pair of rolls with coöperating rolling surfaces, a shaft for each of said rolls, a stationary frame having a main member and a movable member, means constructed and arranged to move the movable member in relation to the main member, said main member having a projection thereon extending toward the movable member, a fixed bearing upon said projection for one of the shafts, a slidable pivoted bearing upon the movable member for the other of said shafts, intermeshing gearing attached to the shafts, means for driving the gearing, means associated with the stationary portion of the frame and with the movable member for forcing the rolls toward each other under pressure, and adjustable brackets arranged to guide material between the rolls.

7. A pair of rolls with coöperating rolling surfaces, each of said rolls having its lateral dimension short in relation to its diameter, shafts for each of said rolls, means for driving at least one of the shafts, a stationary frame constructed to have an open portion, a fixed bearing for one of the shafts on said frame near its open portion, a movable member slidably mounted upon the frame, a movable bearing for the other shaft on the movable member, said movable bearing being near the open portion of the frame, a screw for adjusting the relative position of the bearings, a lost motion connection between said screw and the movable member, said rolls, frame and bearings being arranged to leave a free space of considerable dimension in all directions about the portion of the rolling surfaces which are adjacent to each other, and additional means for forcing the movable member and the roll which it supports toward the roll which is supported in the stationary frame.

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

STANISLAS ZIETARSKI.

Witnesses:

JOSEPH E. CAVANAUGH,

ELLA LEECH.