No. 862,341. PATENTED AUG. 6, 1907.

J. E. LEWIS.

SHEET METAL GRINDING AND POLISHING MACHINE.

APPLICATION FILED MAR. 8, 1905.

5 SHEETS—SHEET 1.

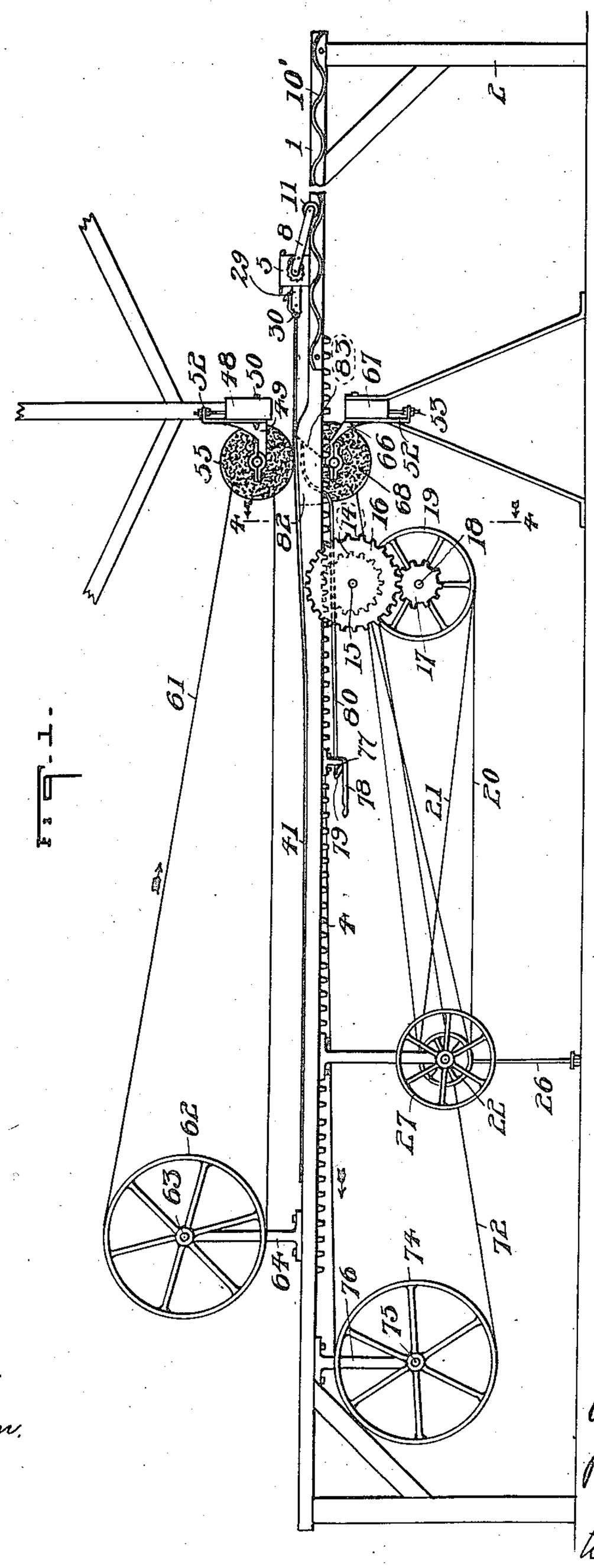

Fig. 1.

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M. A. Buchman.

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His ATTORNEYS

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5 SHEETS—SHEET 2.

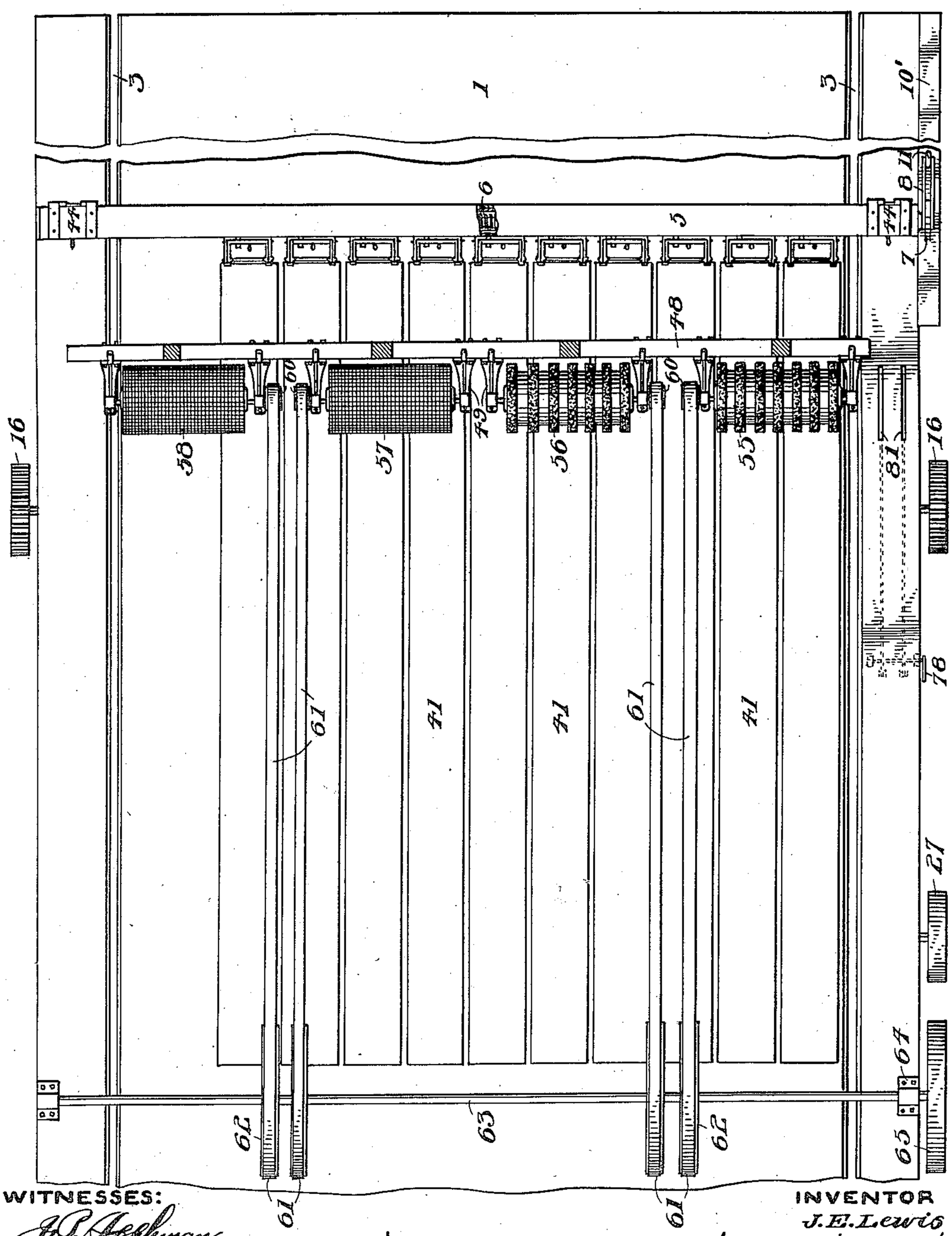

Fig. 2.

WITNESSES:
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5 SHEETS—SHEET 3.

FIG. 3.

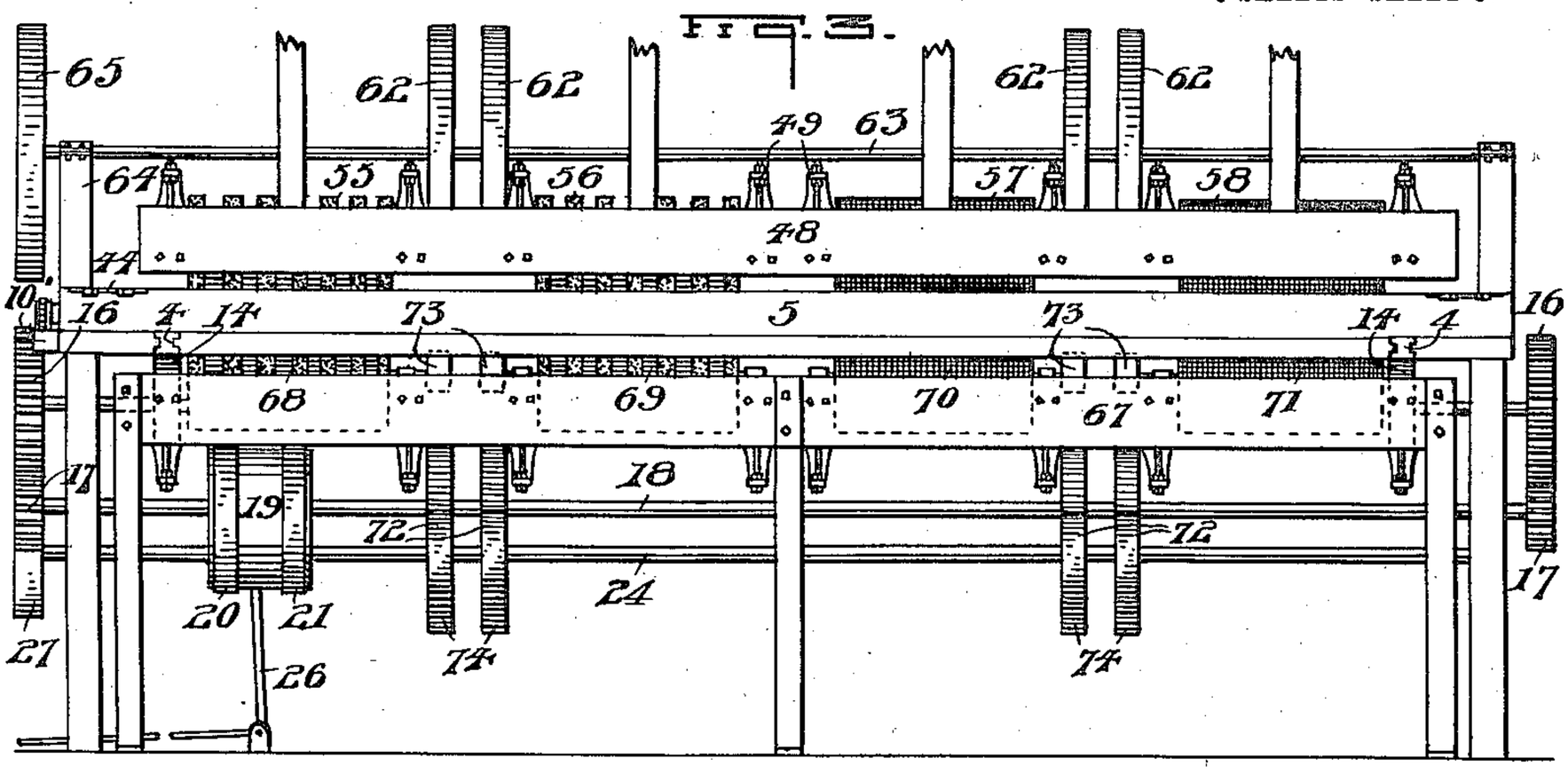


FIG. 4.

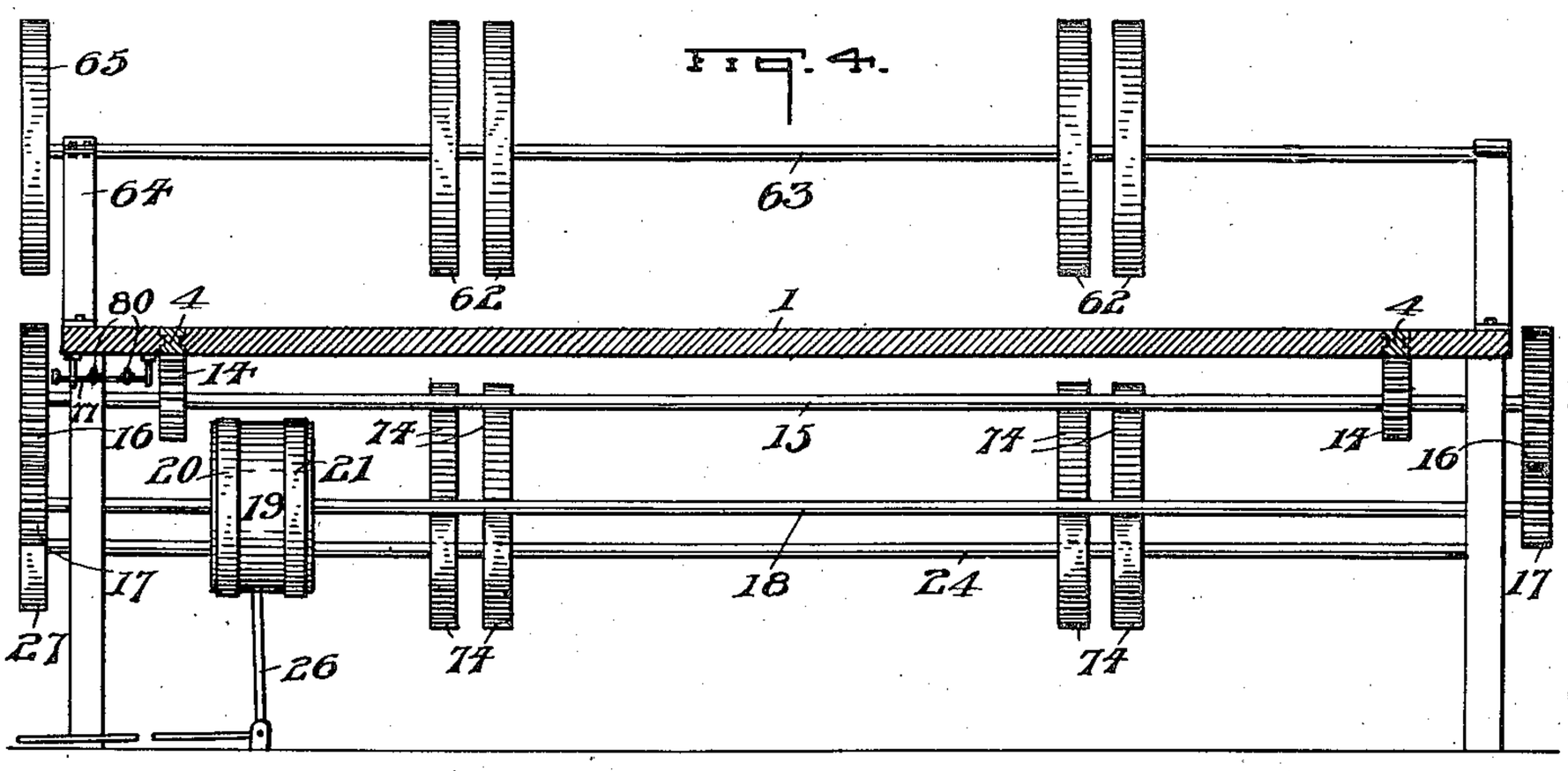


FIG. 5.

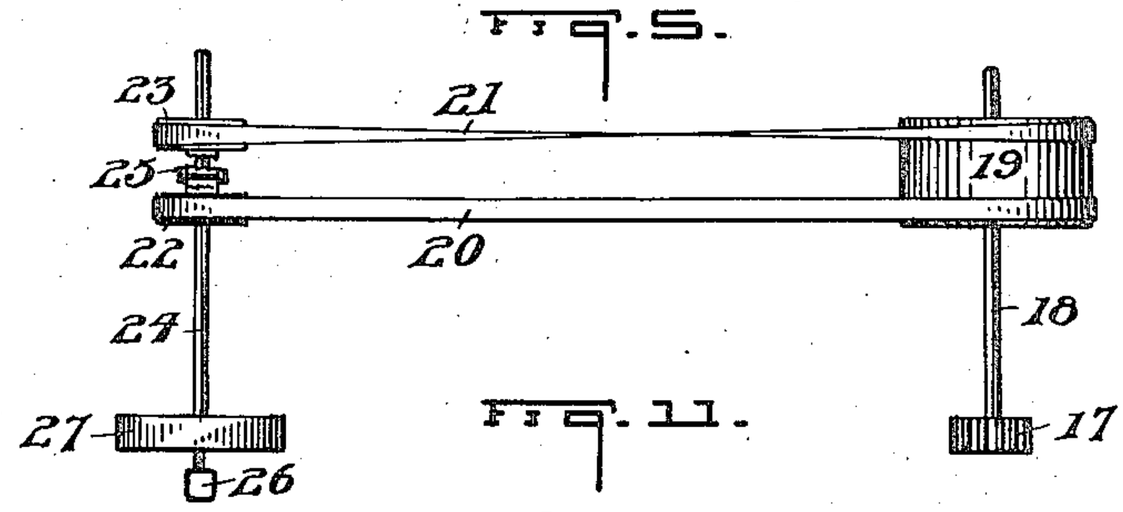
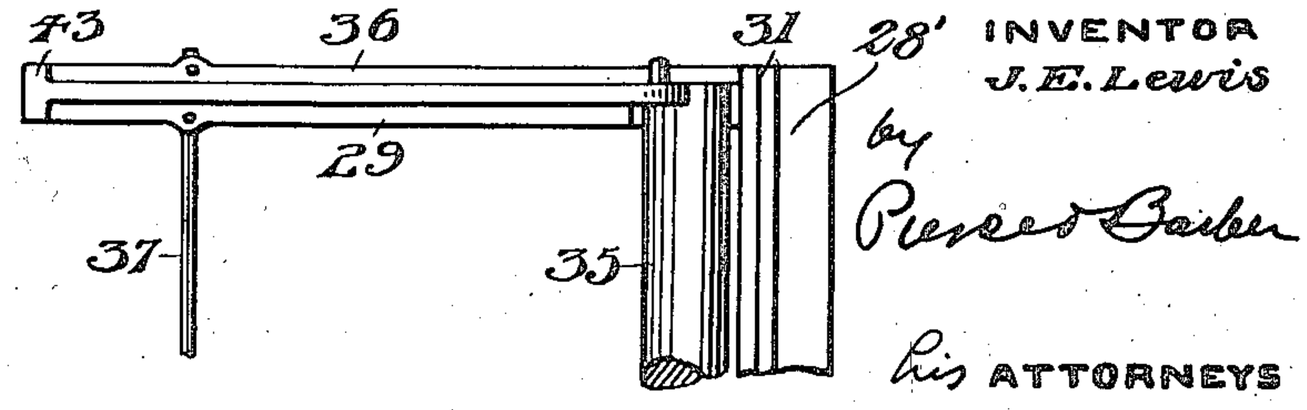


FIG. 11.



WITNESSES:
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5 SHEETS—SHEET 4.

FIG. 6.

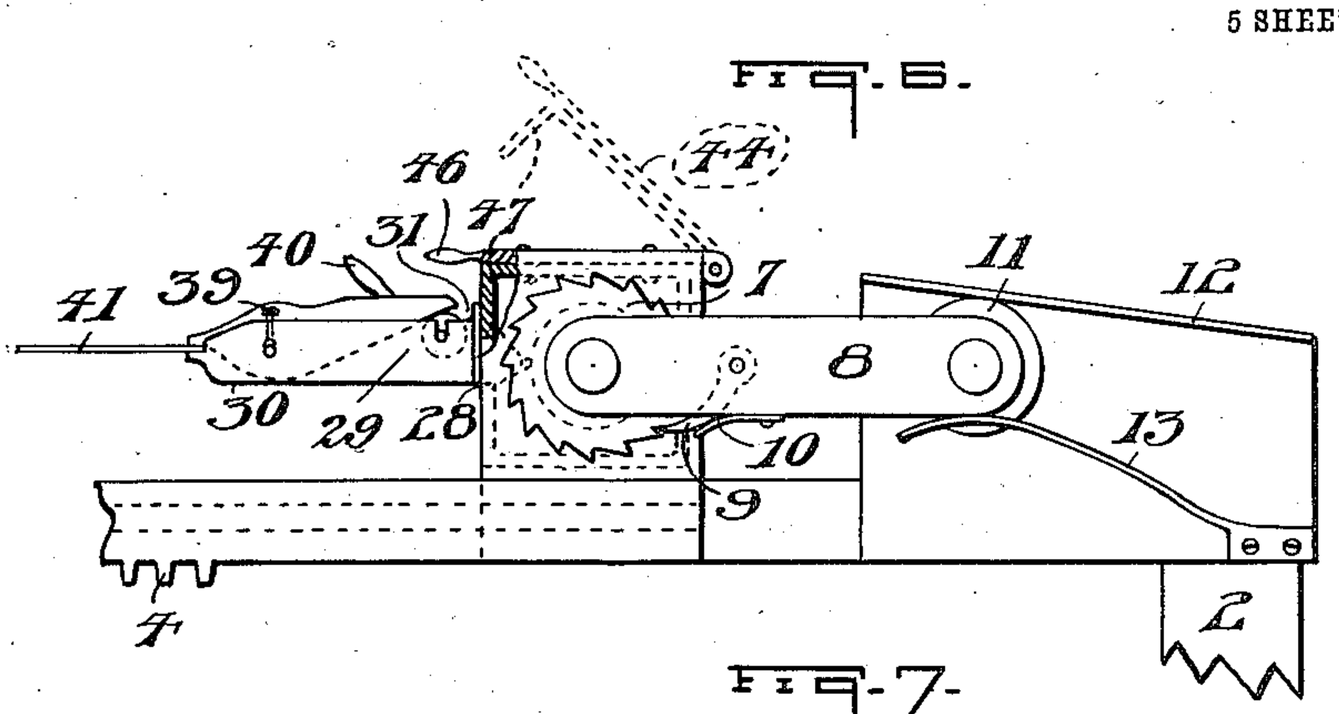


FIG. 7.

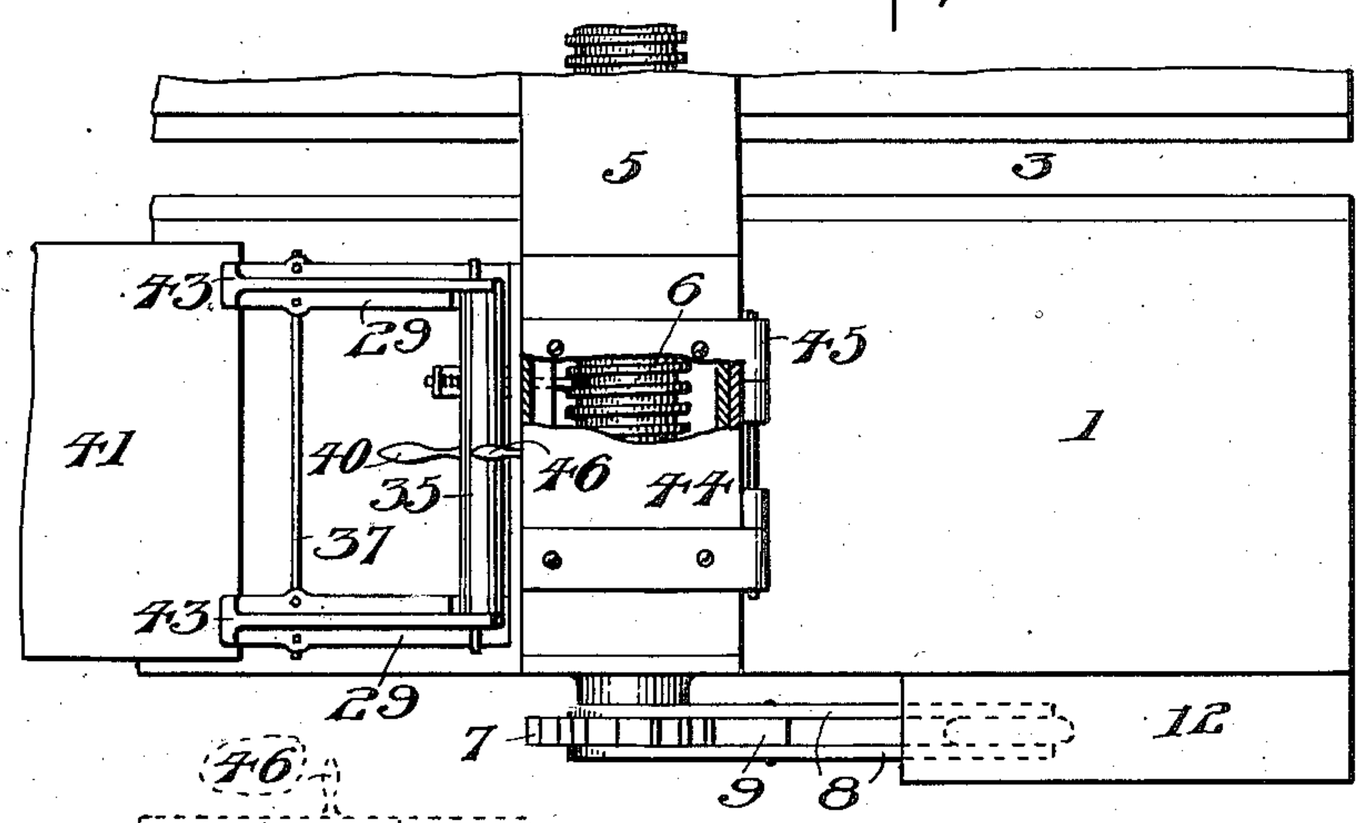


FIG. 8.

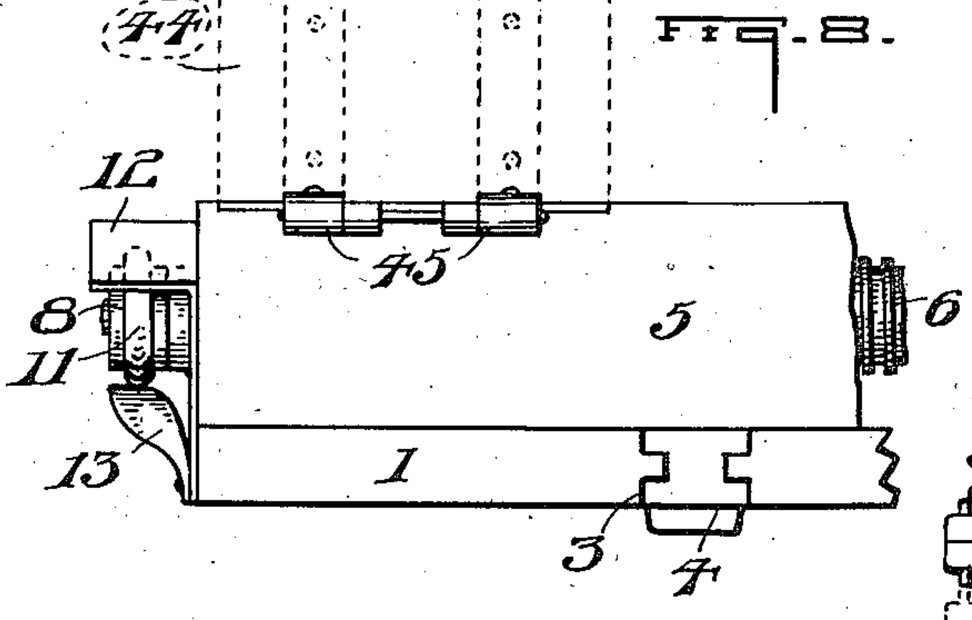


FIG. 9.

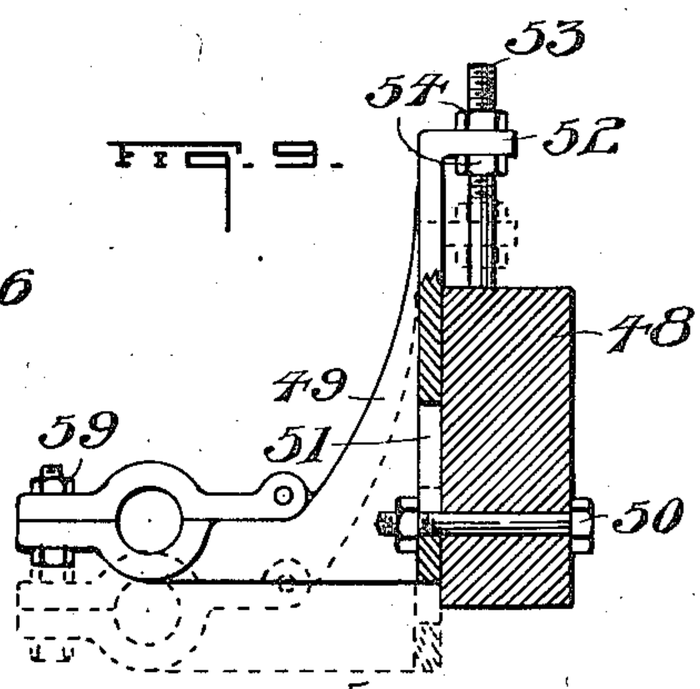
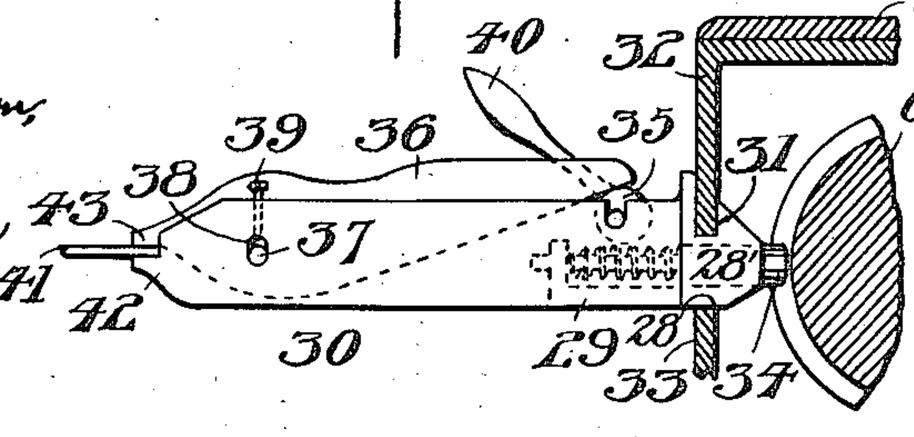


FIG. 10.



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SHEET METAL GRINDING AND POLISHING MACHINE.

APPLICATION FILED MAR. 8, 1906.

5 SHEETS—SHEET 5.

Fig. 12.

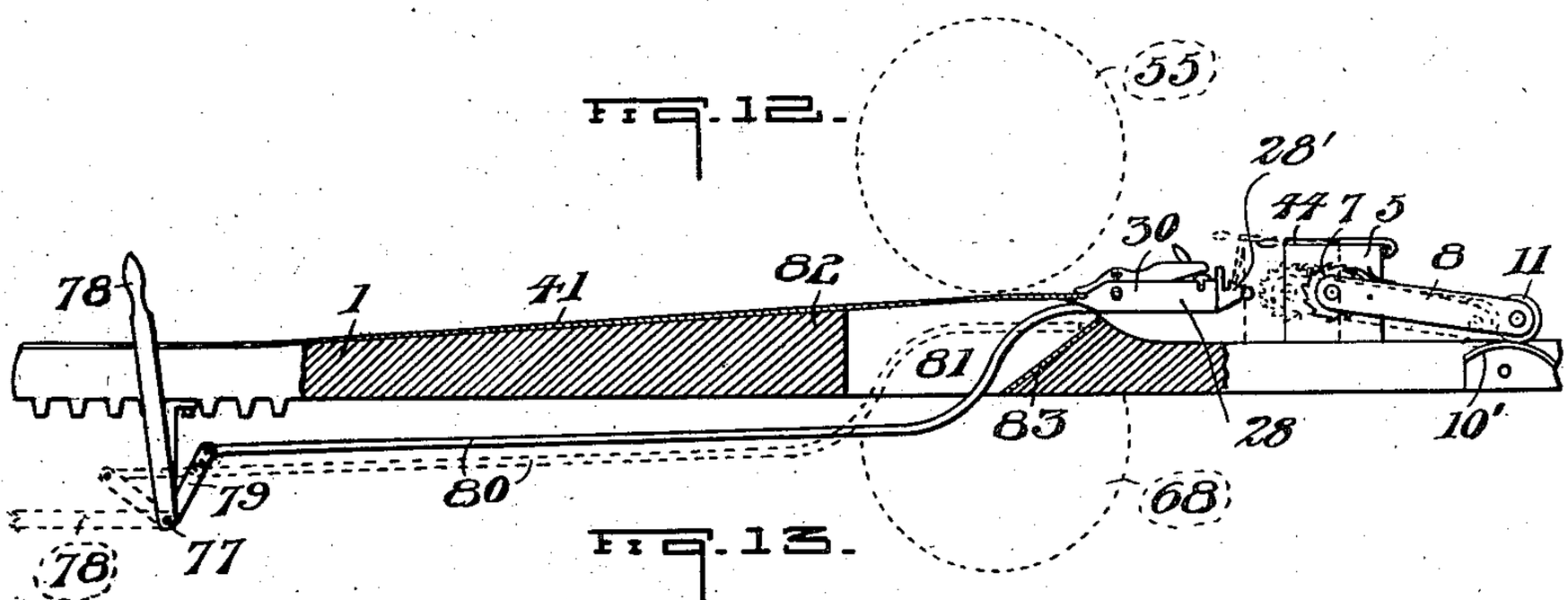


Fig. 13.

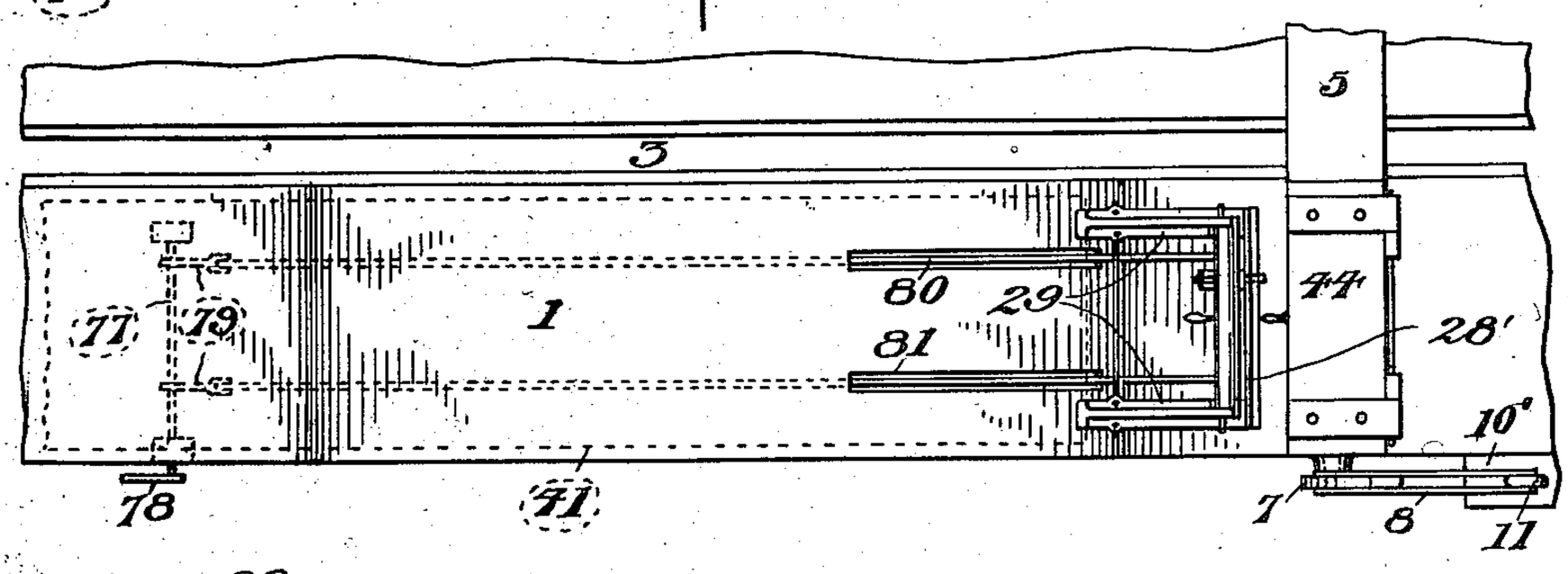


Fig. 14.

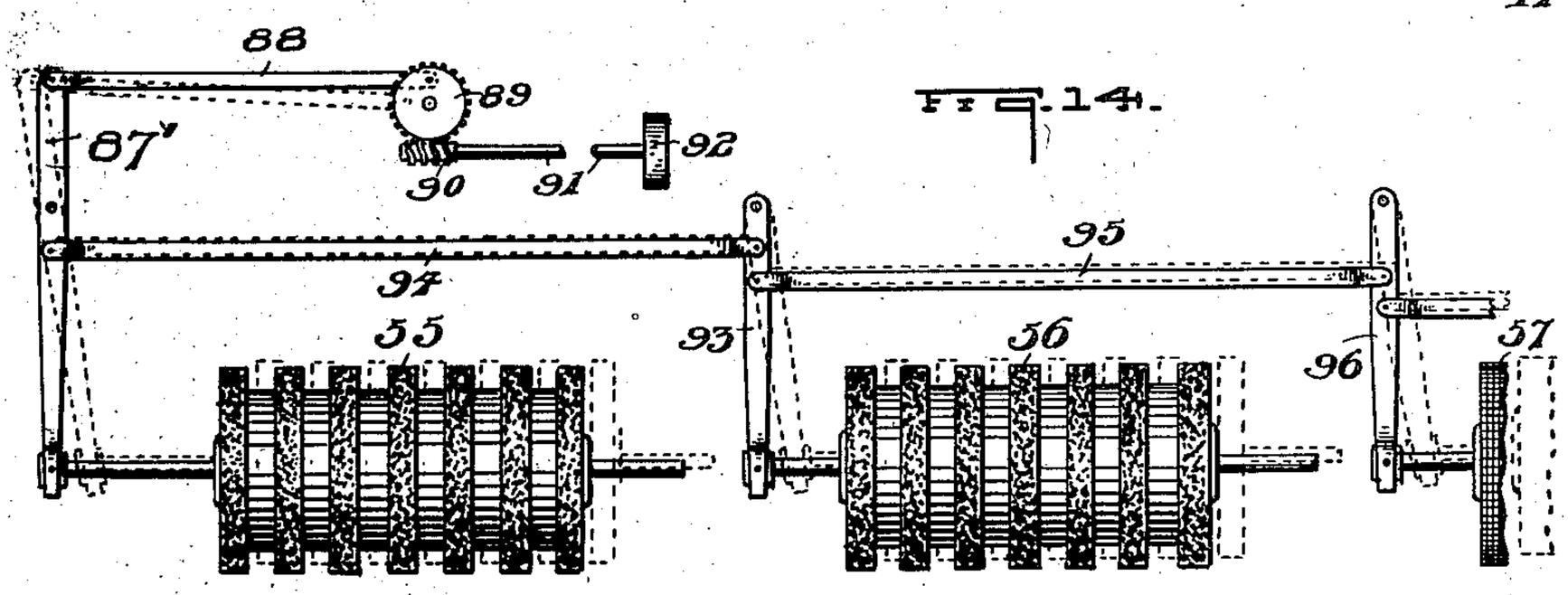
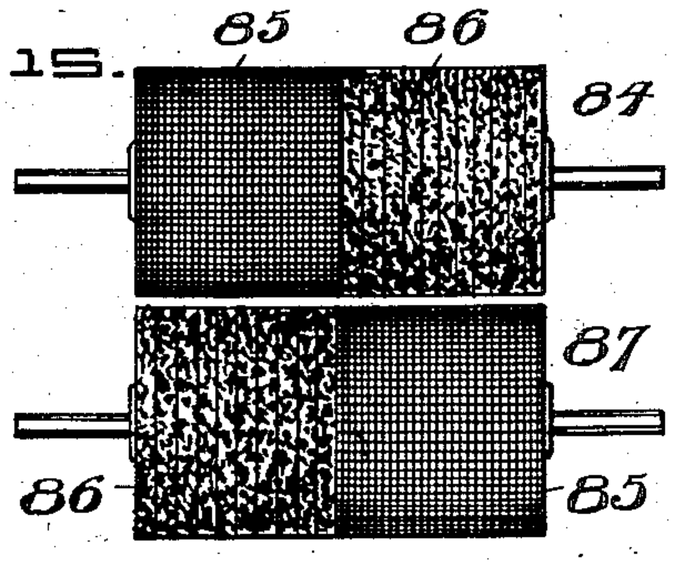


Fig. 15.



WITNESSES:
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UNITED STATES PATENT OFFICE.

JOHN E. LEWIS, OF BRACKENRIDGE, PENNSYLVANIA, ASSIGNOR TO HARRY E. SHELDON, OF PITTSBURG, PENNSYLVANIA.

SHEET-METAL GRINDING AND POLISHING MACHINE.

No. 862,341. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed March 8, 1905. Serial No. 249,048.

To all whom it may concern:

Be it known that I, JOHN E. LEWIS, a citizen of the United States, residing at Brackenridge, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Metal Sheet or Plate Grinding and Polishing Machines, of which the following is a specification.

My invention relates to machines for grinding and polishing sheets or plates of metal and in its most complex form, comprises mechanism for continuously treating a series of sheets or plates, so that while one sheet or plate is being discharged at one side of the mechanism another is being entered at the other and a number of intermediate sheets or plates are undergoing treatment commencing with coarse grinding and ending with delicate buffing.

I have found that if one of each pair of rolls be of a yielding nature, it will yield sufficiently to permit the dented, thickened or roughened portions to be depressed so as not to injure the sheets. I prefer to pass each sheet a number of times between each pair of rolls, and to move it sidewise while passing through the rolls. The sheet moves progressively from one pair of rolls to others of gradually finer material until it receives the desired surface finish.

The design of my machine is to prepare sheet metal plates for subsequent treatment by which they are given a rich glossy finish, though it may be used with other purposes in view.

My invention will be readily understood by referring to the accompanying sheets of drawing, in which

Figure 1 is a side elevation thereof, a portion being broken away; Fig. 2, a plan thereof; Fig. 3, an end elevation thereof; Fig. 4, a cross-section on the line 4—4 of Fig. 1; Fig. 5, a plan of the reversing mechanism for the feed table; Fig. 6, a fragmentary view showing a portion of the feeding table with a sheet clamp thereon; Fig. 7, a plan of Fig. 6; Fig. 8, an end view thereof; Fig. 9, the means for adjusting the rolls; Fig. 10, a sectional detail of a sheet clamp with a portion of the feeding screw therefor in cross-section; Fig. 11, an enlarged plan of one end of the clamp; Fig. 12, a longitudinal section of one end of the table having the method of assembling a sheet clamp and the carrier therefor; Fig. 13, a plan of the same portion of the table; Fig. 14, an elevation showing means for reciprocating the rolls; and Fig. 15, an elevation of a pair of compound rolls for grinding or polishing both sides of the sheets or plates.

Referring to the drawings, 1 represents a stationary frame or table supported on the legs 2 or otherwise. Slidable in the slots 3 in the table are the rack-bars 4, whose rear ends are secured to the cross-piece or carrier 5 reaching from one side of the table to the other. The edges of the slots 3 are shown provided with tongues which fit in grooves in the sides of the rack bars, whereby the bars are supported and guided in their movements.

The cross-piece 5 is hollow and contains the screw 6, having at one end the ratchet wheel 7, situated between a pair of arms or plates 8 which are journaled on the screw shaft. A pawl 9 is pivoted between the plates and is pressed against the ratchet wheel 7 by the spring 10. I have shown the wheel and pawl constructed to drive the former from left to right, but the arrangement might be reversed. The free ends of the plates or arms 8 have pivoted between them the roller 11, which rides on the wavy track 10′ secured to one edge of the table. As the carrier moves along the table, the arms 8 will vibrate up and down and on each upward movement the screw will be rotated and the clamps and sheets fed laterally along the table simultaneously with their reciprocation with the carrier.

In Figs. 3, 6, 7, and 8, I show the roller 11 arranged to ride down beneath the inclined track or guide 12 at the front of the table, when the carrier 5 is almost at the limit of its return movement, which is toward the right on Figs. 1 and 2. The spring or lower guide 13 raises the plates 8 to their normal position as the cross-piece begins a forward movement, as shown on Fig. 6.

The cross-piece or carrier 5 is moved backward and forward on the table 1 by the rack-bars 4, which mesh with the pinions 14 on the shaft 15 below the table. The shaft 15 has secured thereto the spur-gears 16 meshing with the pinions 17 on the shaft 18, which also carries the drum or pulleys 19. The latter are driven by the straight belt 20 and the crossed belt 21 running on the pulleys 22 and 23, loose on the shaft 24. Between the two pulleys is the slidable clutch member 25 slidable on and rotatable with the shaft 24. The member 25 can by means of the shifter 26 be made to engage and drive either pulley in a manner well known. The shaft 24, which is beneath the table, is driven always in one direction by the wheel 27; but by shifting the clutch member 25 by means of a shifter, such as 26, the rack-bars 4 and the cross-piece 5 may be made to travel in the desired direction.

The cross-piece 5 has a slot 28 running along the front, in which slot travel the two arms or ends 29 of the clamp 30. The cross-bar 28′ has an upwardly opening slot or notch 31 in which the upper wall 32 of the slot 28 fits to retain the clamp in the cross-piece and guide it thereon. The cross-bar 28′ rests on the lower wall 33 of the slot. The rear side of the clamp carries a spring actuated pin 34 which normally projects beyond the frame of the clamp into the spiral groove or thread of the screw 6.

Journaled in the ends 29 of the clamp is the eccentric shaft 35 which lies beneath the rear arms of the clamping levers 36 working on the fulcrum rod 37. The rod 37 is adjustable by reason of the slotted bearings 38 and the setscrews 39 which pass through the ends 29 into engagement with the rod. The eccentric 35 is operated by the handle 40. The metal sheets 41 to be treated in my machine are clamped between the fixed jaws 42 on the ends 29 and the movable jaws 43 which are the forward arms of the levers 36. Each end of the hollow cross-piece or housing 5 is provided with a door 44, which may be raised on its hinge 45 by the handle 46. The doors have downwardly extending flanges 47 which, when the doors are closed, lie in line with the wall 32 and in the slots 31 of the clamps 30.

Extending transversely above the table 1 is a beam or support 48, to which the rearwardly projecting brackets 49 are secured by the bolts 50 which pass through the beam and vertical slots 51 in the brackets, whereby the brackets may be vertically adjusted and securely fastened. The upper ends of the brackets have horizontal lugs 52 having holes fitting on the vertical threaded bolts 53 secured in the beam. Each lug 52 is between two nuts 54 on the bolt corresponding to the lug. By adjusting the nuts on the bolts the brackets can be still further held immovable. The dotted lines on Fig. 9, show a bracket adjusted to a lower position than that shown in full lines.

The forward ends of the brackets form journal bearings for the rolls 55, 56, 57, and 58. In order that the rolls may be quickly removed and replaced, I hinge the top of the journal box to the bracket and lock the two parts of the box together by the bolts 59. By simply removing the bolts, the boxes can be opened and the rolls changed without any expensive or annoying delays.

The rolls 55 to 58 are arranged in an end to end transverse line over the table and each roll is driven by a pulley 60 over which runs a belt 61, driven by a pulley 62 on the shaft 63, mounted in the standards 64 on the table 1. The shaft 63 is driven by the pulley 65 secured thereto.

Mounted on brackets 66 on the transverse beam 67 beneath the table 1 are the rolls 68, 69, 70 and 71, which form pairs respectively with the rolls 55, 56, 57, and 58. The brackets 66 are mounted on the beam 67 precisely as the brackets 59 are mounted on the beam 48, except that the brackets 66 extend downwardly so that the lugs 52 and the bolts 53 are below the beam 67 instead of above it as in case of the upper brackets.

The rolls 68 to 71 are driven by separate belts 72 in a manner similar to that by which the rolls 55 to 58 are driven, that is, by pulleys 73 on the rolls shafts and pulleys 74 on the shaft 75 supported in the hangers 76 below the table. The shaft 75, as well as the pulleys 27 and 62, will be driven by suitable motor power geared thereto in a manner readily supplied by any person acquainted with mechanics.

The rolls are preferably constructed as follows:—The rolls 55 and 56 are preferably composd of alternate disks of emery or other abradant and spacers strung and clamped in the roll shaft; the former being preferably of coarser; the rolls may, however, be made of solid emery or other abradant, but I prefer the disk arrangement as they will rack into depressions in the sheet, and grind and polish them, which time cylindrical rolls could not do. For some work the latter rolls might be desirable. The rolls may be made solid and with corrugations, if desired. The roll 57 is made of disks of cloth, belt or other fabric or soft material, strung and clamped on the roll shaft and filled with emery which has been soaked into the same. The roll 58 is similarly constructed but is preferably filled with finer emery than the roll 57 or is not filled with an abradant. The lower rolls are preferably all made of cloth, or other comparatively soft and yielding material into which the upper rolls may press portions thereof which normally lie above the upper surface of the sheets. I preferably construct the lower rolls of muslin strung and clamped on the roll shafts, so that the surface of the roll is very soft and yielding, so much so that when not rotating, it would not support a sheet so as to hold it against its companion roll. When the lower rolls are revolving at a light speed, their centrifugal force will lift the sheets and support them yieldingly against the companion roll. When an uneven, thickened, buckled or elevated portion of the sheets is engaged by the harder rolls, the sheets will yield or bend into one or more of the disks of the muslin or yielding rolls.

Supported beneath the table 1 is the rock shaft 77, to which is secured the operating handle 78 and the arms 79. To the latter are pivotally connected the rods 80, which lie beneath the table and have their forward ends bent so as to extend through the slots 81 at or near the outer ends of the rolls 55 and 68. When the handle lies horizontally, as in Fig. 1 or in dotted lines in Fig. 12, the forward ends of the rods 81 lie below the raised portion 82, which begins on the table preferably slightly on front line of the rolls and taper out to the flat table surface at the rear thereof, as shown in Fig. 12. When the handle is thrown into vertical position as shown in full lines on Fig. 12, the forward ends of the rods ride up on the inclines 83 and project in front of the line of the rolls. A clamp and plate being assembled with the clamp slightly in front of the line of the rolls, the rods, when pushed forward, will slide beneath the sheet and beneath the rod 37 and eccentric 35, and support the clamp, the forward ends of the rods 80 abutting the rear side of the forward cross-piece. When the carrier 5 engages the clamp the tapered rear portions thereof will enter the slot between the walls and raise the cover 44, which, when the wall 47 reaches the slot 31, drops into the same, whereby the carrier and clamp are connected automatically. If the pin 34 should engage one of the threads of the screw 6, it would be pushed back thereby until the groove of the thread arrived under the pin, when the latter would automatically seat itself between the screw threads. If the guide 12 be used instead of the track 10; the operation will be the same as that detailed except that the clamped sheets move laterally near the close of their retreating movement, as is clear without further explanation.

The operation is as follows: The pairs of rolls will be adjusted, and the rolls started in the direction indicated by the arrows alongside the belts 61 and 72. The rolls will revolve at high speed, so that their surfaces will move much faster than the sheets which pass between them. The first clamp 30, with a sheet, is

connected to carrier 5 as described above. The crosshead or carrier 5 continues to move forward and backward, and the clamped sheet of course accompanies it and at the same time moves laterally by reason of the revolution of the screw 6, for the distance of about two inches, more or less at each reciprocation. When the sheet has been fed forwardly as far as possible, the feed is reversed and the sheet dragged back through the rolls, and then again moved forward and backward until the sheet has passed through all the rolls and laterally beyond the final set of rolls. The sheet then is removed from the clamp and the clamp removed from the carrier to be attached to another sheet and connected again to the carrier. As soon as the first sheet has moved laterally enough, a second sheet is attached to a clamp and fed through the machine at the side of the first. Successive sheets are likewise passed into and fed through the machine, so that finally a finished sheet and a clamp will be removed from one side of the machine, and a rough sheet and a clamp will be placed therein at the other side, while the whole intermediate space will be occupied by a row of clamps and parallel sheets. At each reciprocation of the carrier all the sheets in the clamps will be likewise reciprocated, some undergoing rough grinding, some finer grinding, some still finer grinding or coarse buffing, and others fine buffing. The process is continuous and the work is progressive from one side of each sheet to the other. The forward ends of the clamping jaws are made thin and tapering so that the sheets may be fed as far as possible through the rolls.

If it be desired to grind and polish both sides of the sheets this may be accomplished by constructing the rolls as shown on Fig. 15, where the roll 84 is shown with the portion 85 thereof composed of yielding material, as described and another portion 86 composed of emery or other abradant constructed of disks or made solid. The roll 87 which coöperates with the roll 84 is composed also of the described portions 85 and 96.

The rolls may be reciprocated endwise during their rotation by the mechanism shown in Fig. 14, wherein 92 represents a pulley connected to the shaft 91 and driven in any suitable manner. The shaft 91 has thereon the worm 90, which drives the worm wheel 89, having connected thereto the pitman 88. The latter is connected to one end of the driving lever 87′, whose other end is connected to the shaft of the roll 55. The lever 87′ is also connected to the lever 93 by the link 94, the lever 93 being connected to the shaft of the roll 56. The lever 93 is connected to the lever 96 by the link 95, the lever 96 being connected to the shaft of the roll 57. Similarly the other rolls to the right may be connected indirectly to the driving lever 87′. When the pulley 92 is rotated all the rolls will be reciprocated longitudinally in an evident manner.

While I have stated the manner in which I prefer to operate my machine or one built on its principles, I do not limit myself to that manner as the sheets may be advanced laterally more or less than two inches after or during each backward and forward movement.

Having described my invention, I claim—

1. In a machine for surfacing metal sheets, a table to support the sheets, a surfacing roll, means for passing the sheets in contact with the roll, and means independent of the roll and the table for causing relative movement of the sheets and the roll transversely of the line of feed during their passage transversely of the rolls.

2. In a machine for surfacing metal sheets, a table to support the sheets a surfacing roll, means for passing the sheets in contact with the roll and transversely thereof, and means independent of the roll and the table for moving the sheets longitudinally of the rolls during their passage transversely of the rolls.

3. In a machine for surfacing metal sheets, a table to support the sheets a pair of coöperating surfacing rolls, means for passing the sheets on the table to and fro between the rolls, and means independent of the table for moving the sheets laterally so that any selected portion of the rolls will at a later to and fro movement of the sheets act on portions of the sheets laterally of those acted on at a previous to and fro movement.

4. In a machine for surfacing metal sheets, a pair of surfacing rolls, a carrier in front of said rolls, means for moving the same toward and from the rolls, a sheet holder, means for securing the holder to the carrier, and means for moving the sheet holder laterally.

5. In a machine for surfacing metal sheets, a pair of surfacing rolls, a carrier in front of and parallel to said rolls, means for moving the carrier toward and from said rolls, a sheet holder insertible in and removable from the carrier, and a screw coöperating with the carrier to move the sheet holders laterally.

6. In a machine for surfacing metal sheets, a series of pairs of surfacing rolls, a carrier parallel with the rolls, means for moving the carrier toward and from the rolls, a series of sheet holders connected to said carrier, and means for simultaneously moving said sheet holders laterally.

7. In a machine for surfacing metal sheets, a table to support the sheets a pair of surfacing rolls, a sheet holder, means for causing relative movement of the rolls and holder whereby the rolls act on the sheet, and means for causing a relative movement of the holder and rolls at an angle to the first movement.

8. In a machine for surfacing metal sheets, a pair of surfacing rolls, a housing in front thereof, having a slot, a sheet holder removably held in said holder and slidable in said slot, and means for moving the housing toward and from said rolls.

9. In a machine for surfacing metal sheets, a pair of surfacing rolls, a housing in front thereof, having a horizontal slot therein, a sheet holder resting on the lower wall of the slot and having an opening in the upper side in which is seated the upper wall of said slot, and means for moving the housing toward and from the rolls.

10. In a machine for surfacing metal sheets, a pair of surfacing rolls, a housing in front thereof, having a horizontal slot therein, a sheet holder resting on the lower wall of the slot and having an opening in the upper side in which is seated the upper wall of said slot, means for moving the holder along the slot, and means for moving the housing toward and from the rolls.

11. In a machine for surfacing metal sheets, a sheet clamp having a pair of jaws, means for closing the jaws on the sheet, means for moving the clamp in two directions one at an angle to the other, and a pair of surfacing rolls between which the sheet passes during said movements of said clamp.

Signed at Pittsburg, this 27th day of February, 1905.

JOHN E. LEWIS.

Witnesses:
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F. N. BARBER.