

No. 638,000.

Patented Nov. 28, 1899.

B. E. BENHARDUS.
MUSICAL INSTRUMENT.

(Application filed Feb. 14, 1898.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

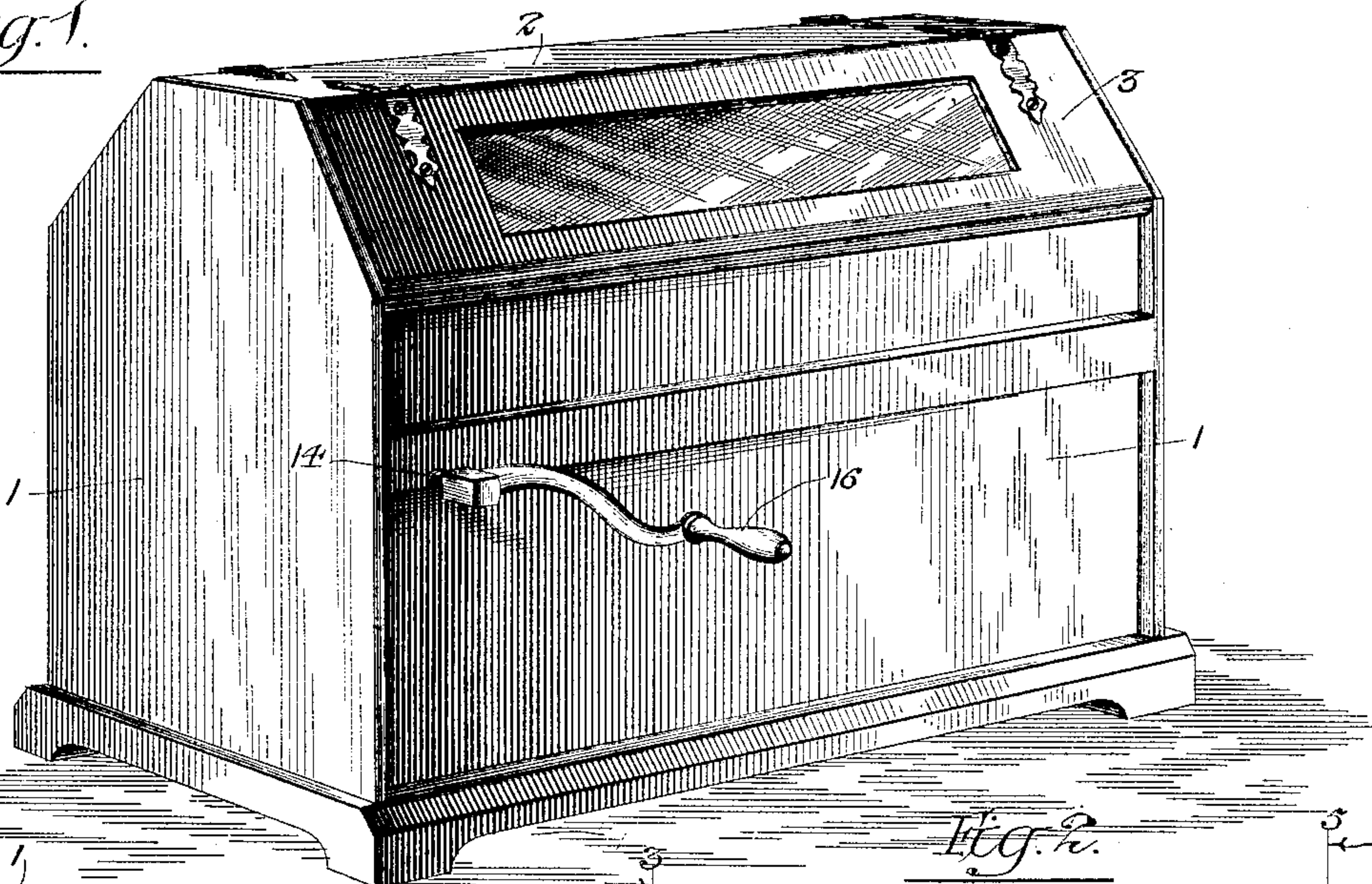
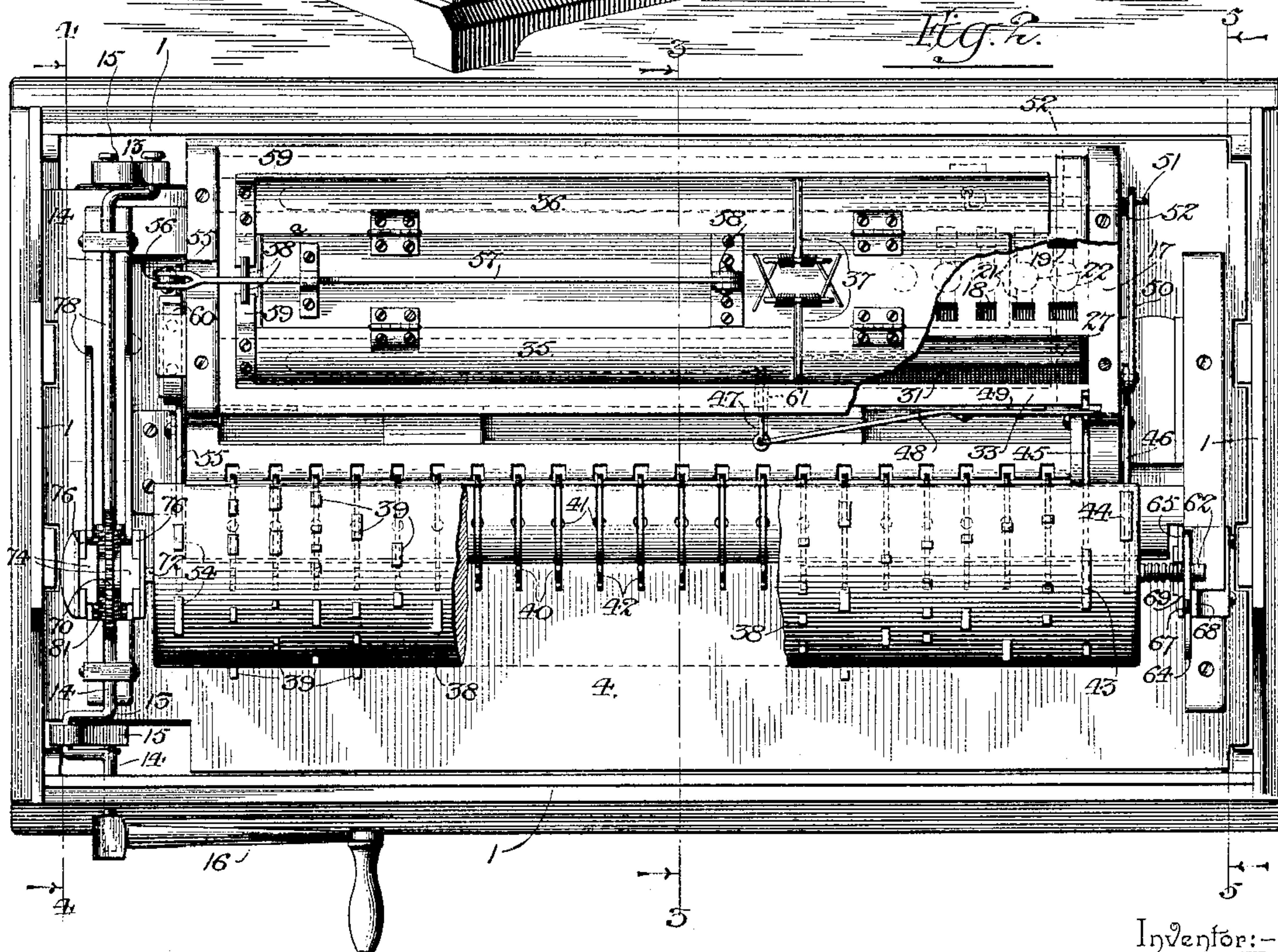


Fig. 2.



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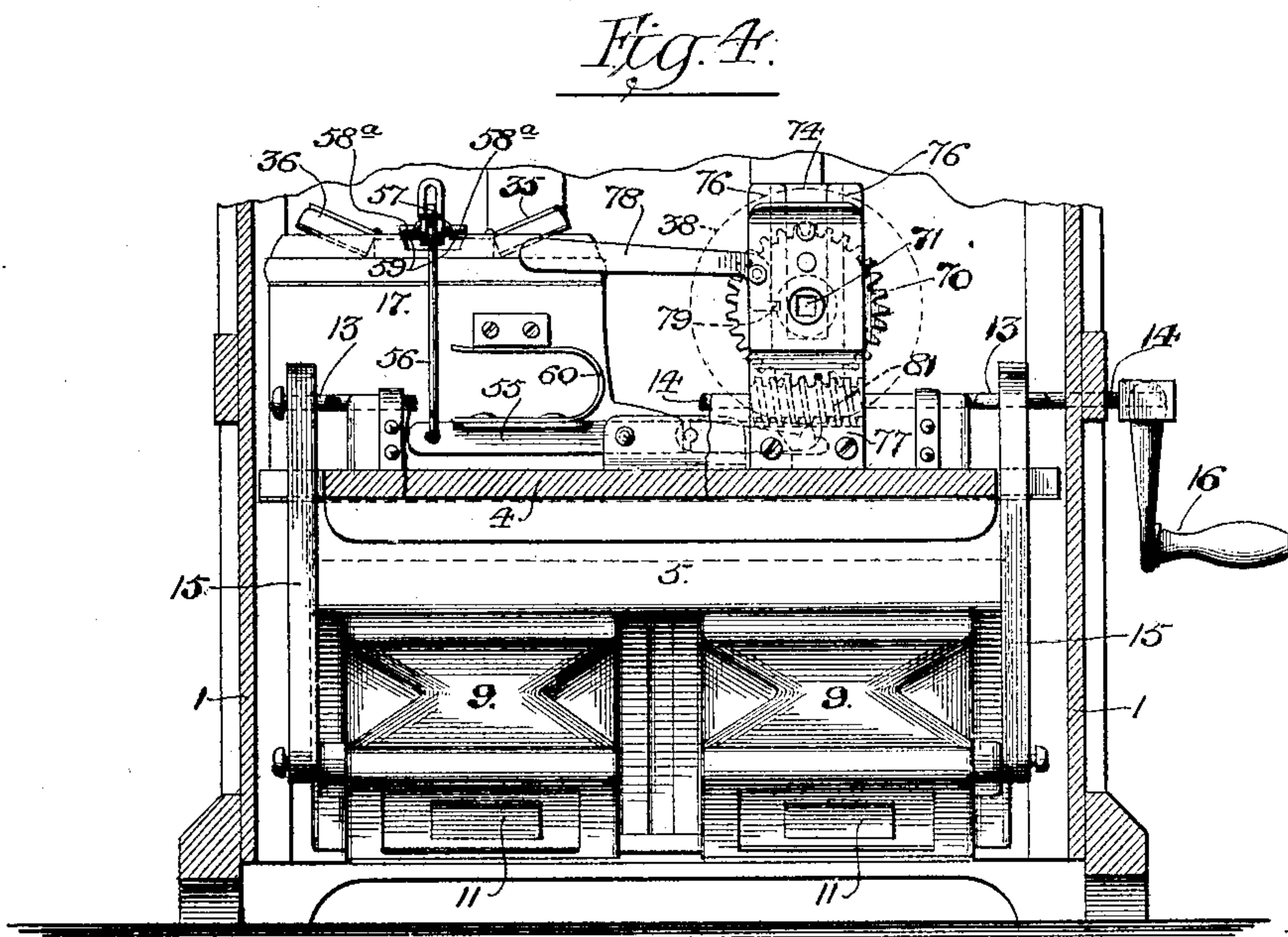
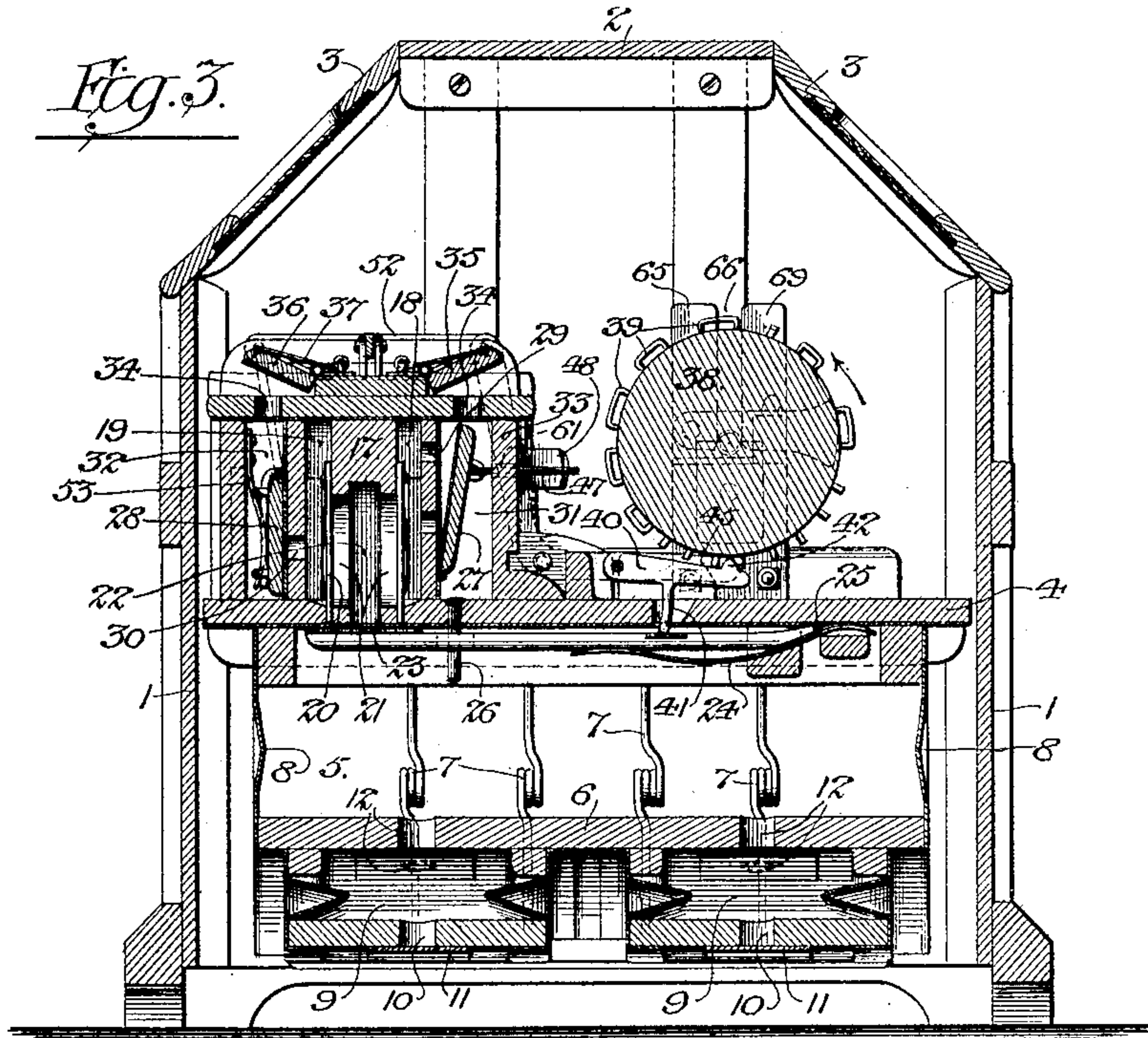
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3 Sheets—Sheet 2.



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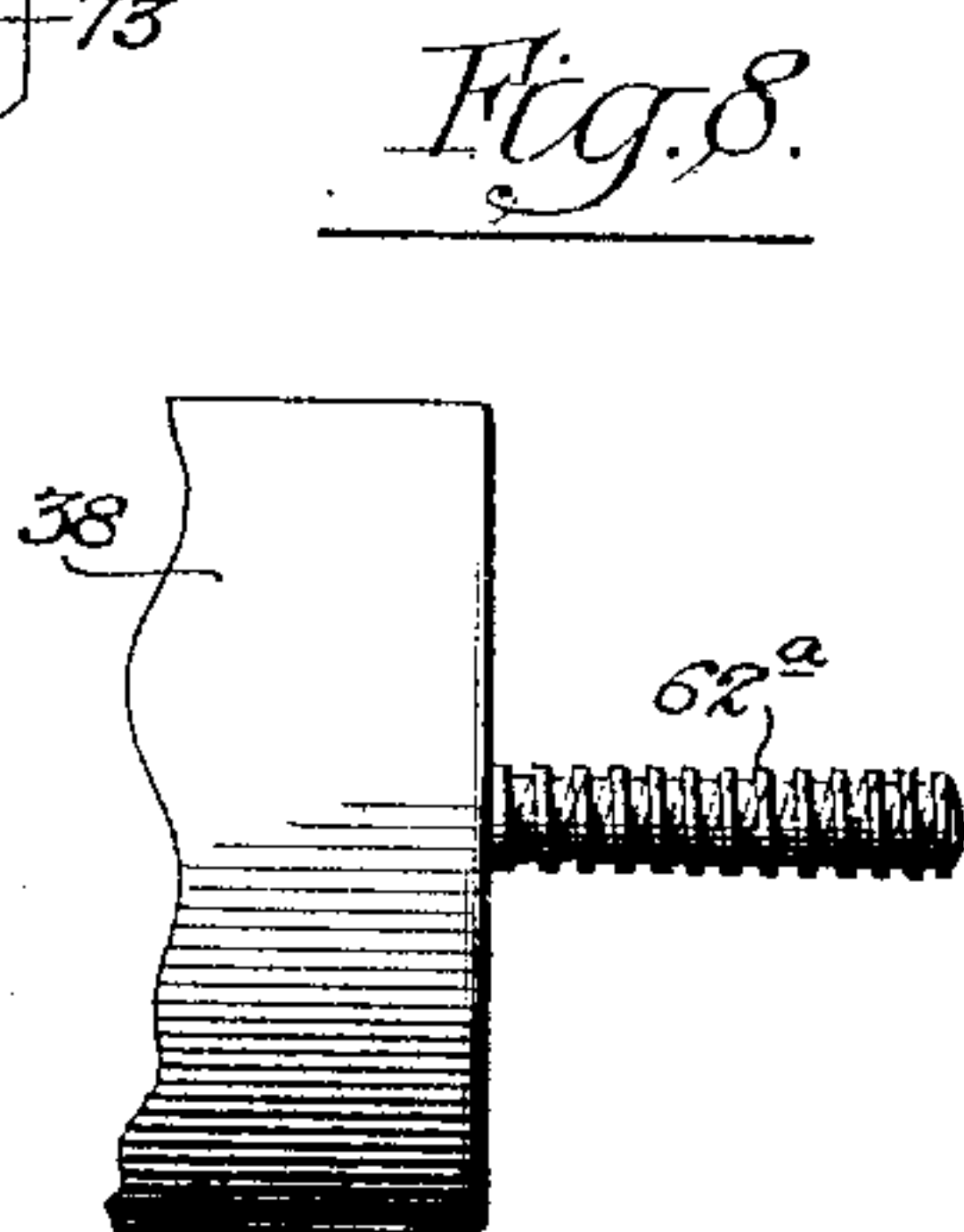
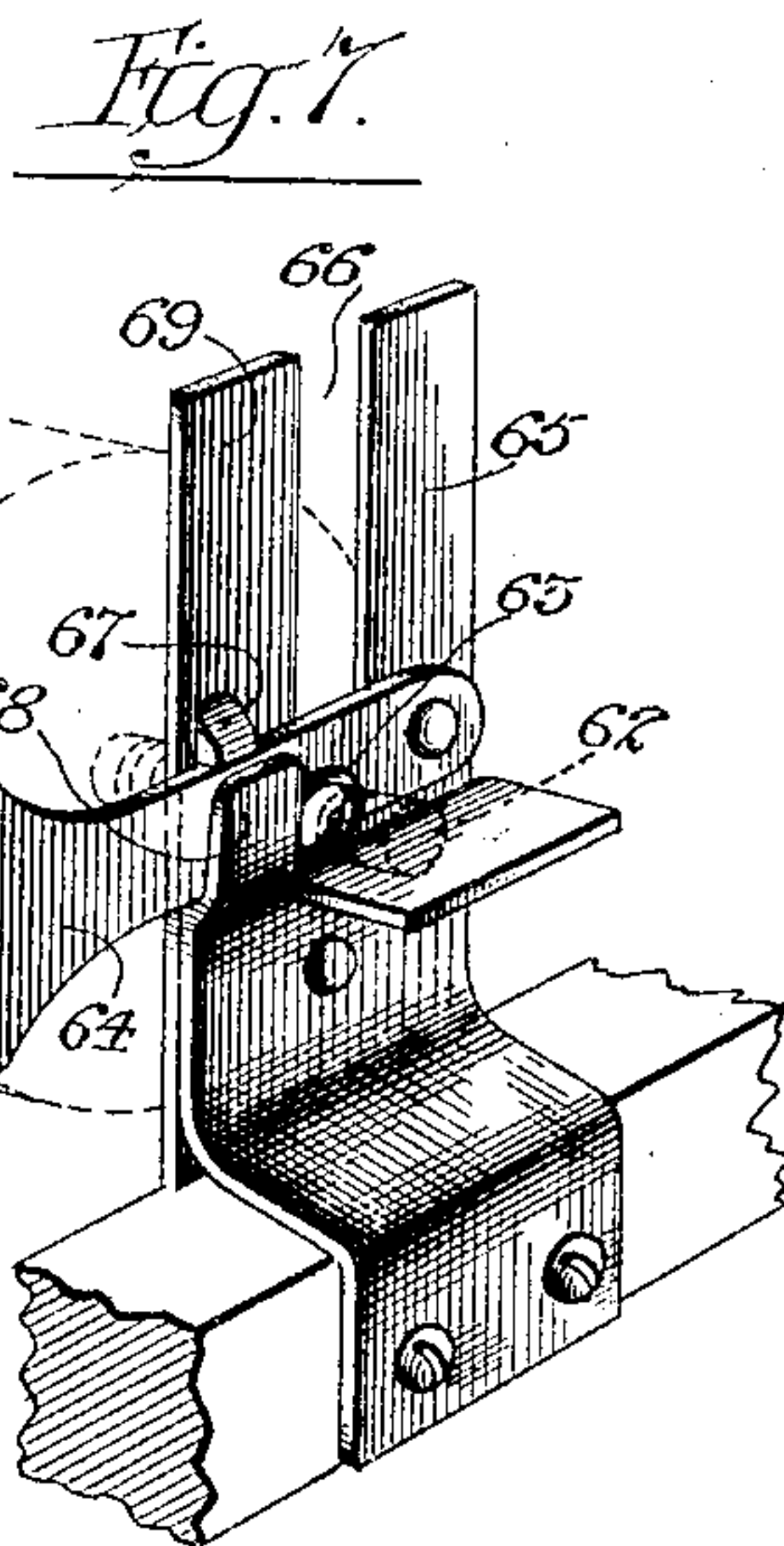
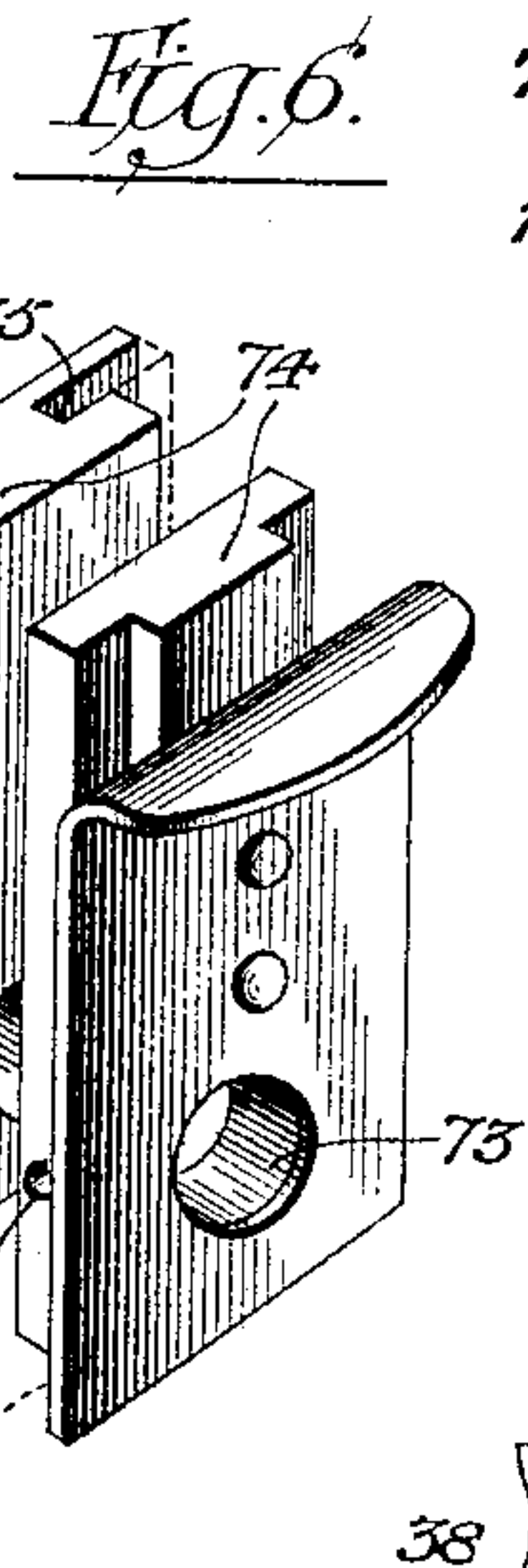
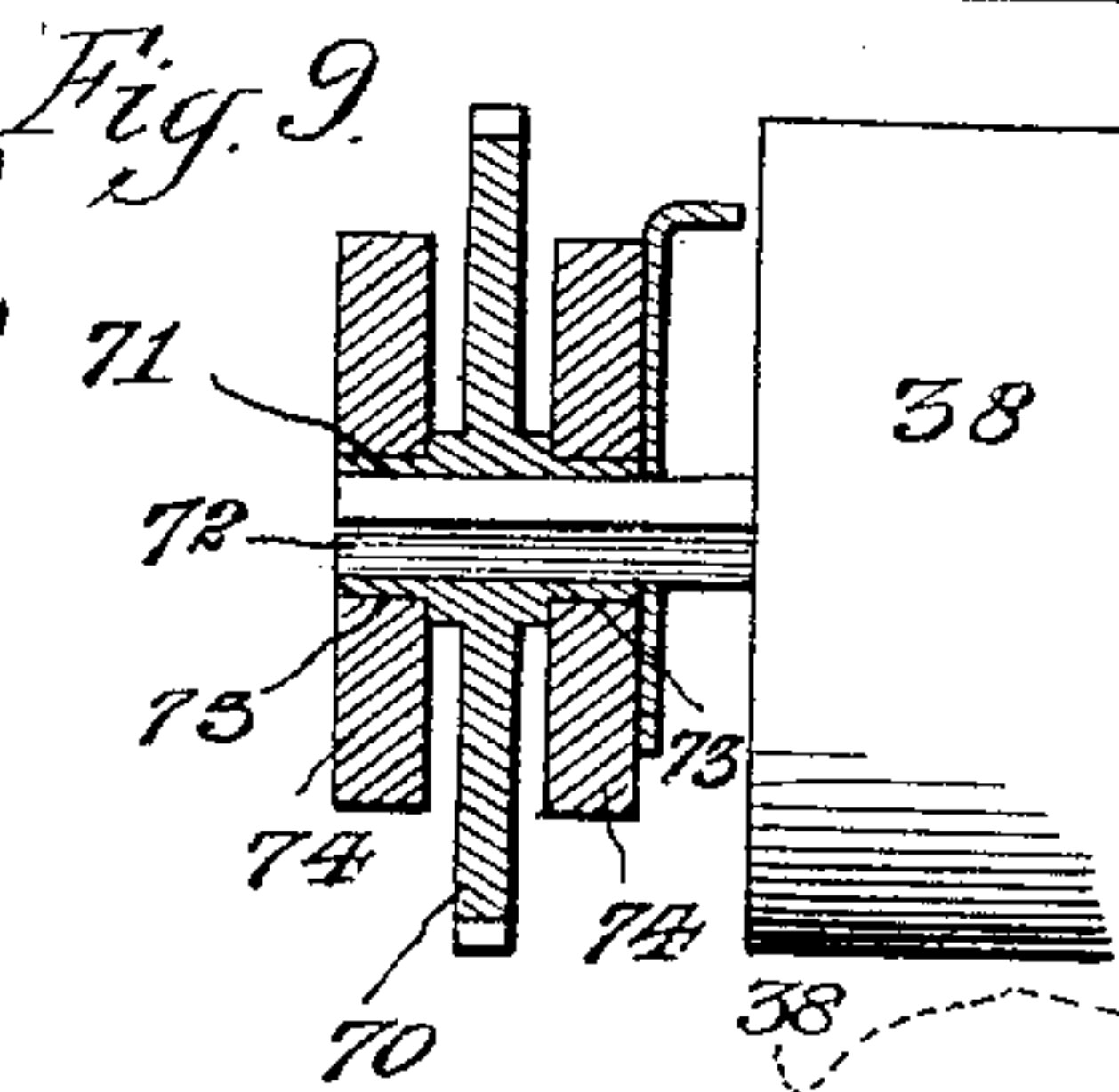
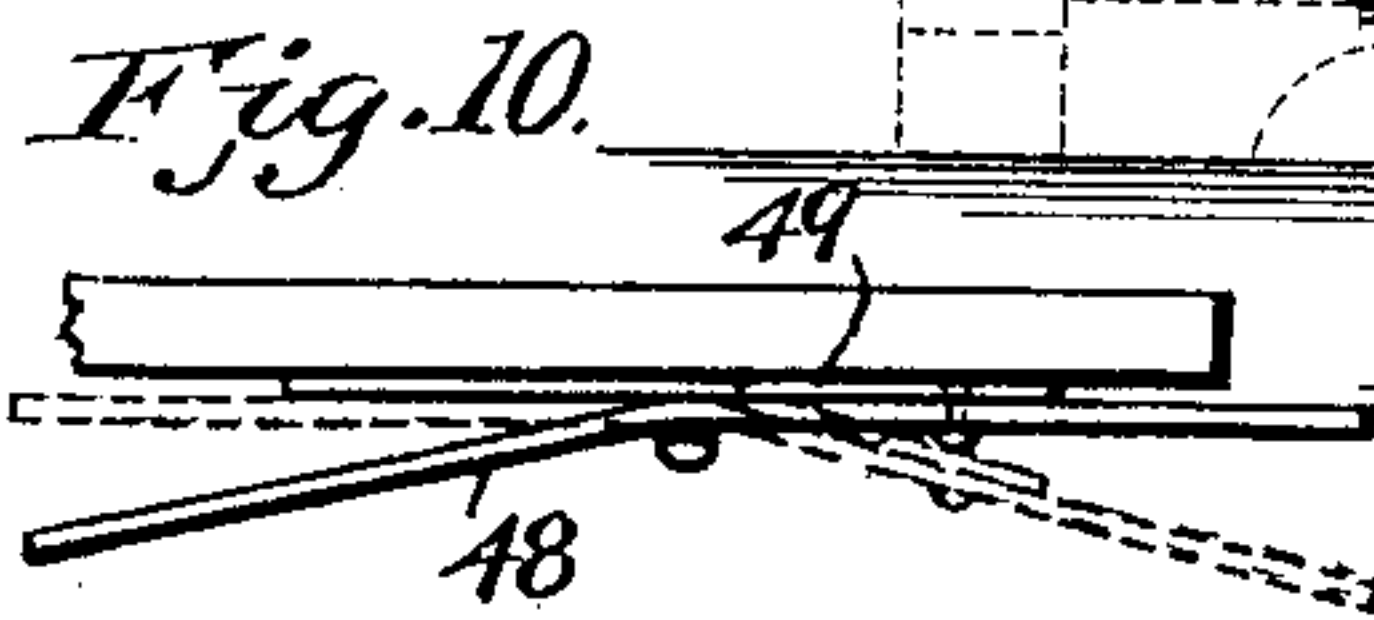
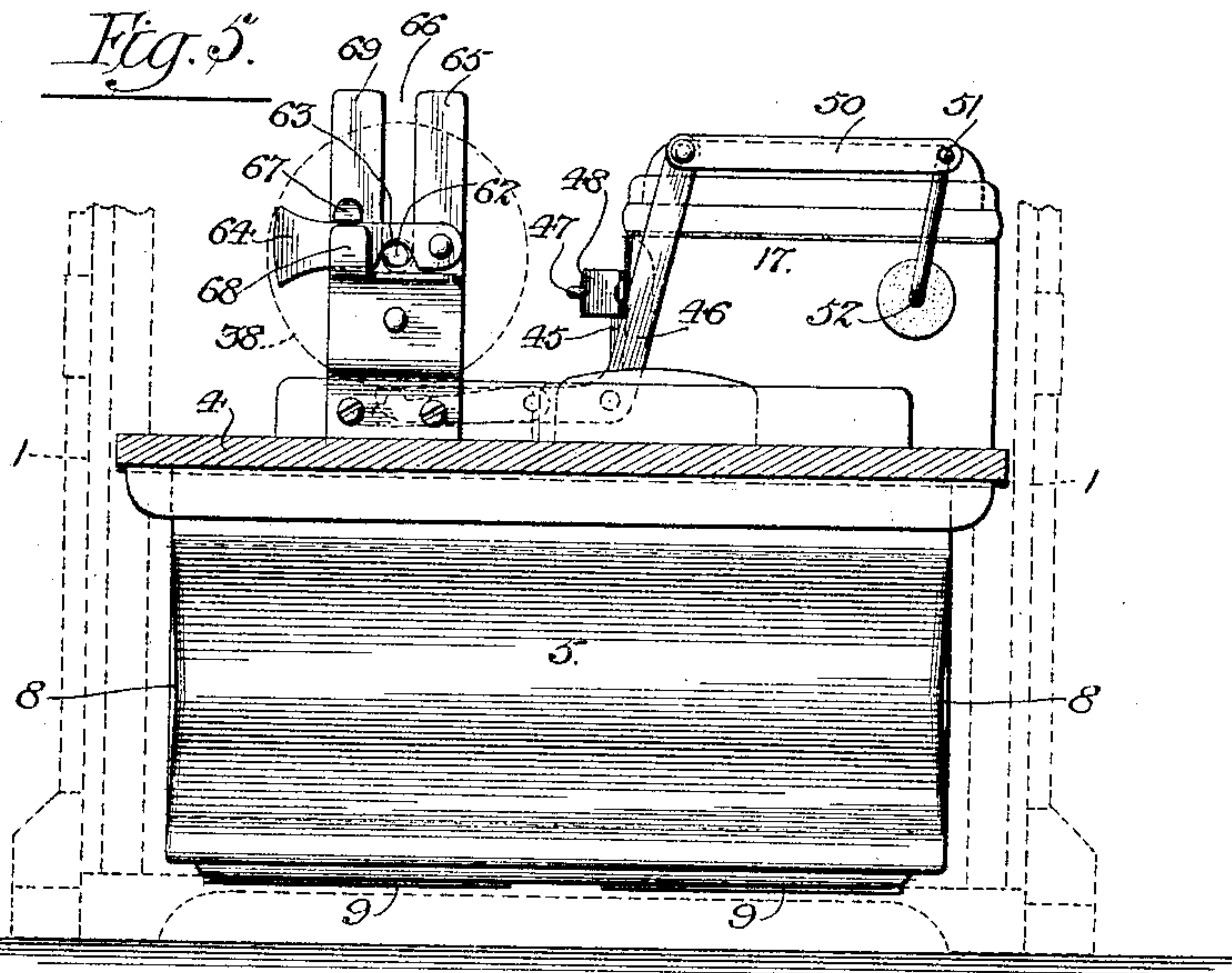
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

BENHOF EDWIN BENHARDUS, OF ST. OLAF, MINNESOTA.

MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 638,000, dated November 28, 1899.

Application filed February 14, 1898. Serial No. 670,280. (No model.)

To all whom it may concern:

Be it known that I, BENHOF EDWIN BENHARDUS, a citizen of the United States, residing at St. Olaf, in the county of Otter Tail and State of Minnesota, have invented a new and useful Musical Instrument, of which the following is a specification.

My invention relates to musical instruments, and particularly to a roller-organ wherein the keys which operate the valves of the reed-box are actuated by a roller or cylinder; and the objects in view are to provide simple and efficient means for communicating motion from the keys to the valve, to provide means whereby the roller or cylinder may be mounted and dismounted with facility to enable the same to be changed when desired, to provide means whereby the roller or cylinder may be axially adjusted and held at the desired adjustment to vary the composition by varying the positions of the projections thereon with relation to the keys, and also to provide means for controlling the volume of sound and the different sets of reeds which are included in the reed-box.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view exteriorly of a casing adapted for a musical instrument constructed in accordance with my invention. Fig. 2 is a plan view with the top of the casing omitted. Fig. 3 is a transverse section on the line 3 3 of Fig. 2. Fig. 4 is a partial transverse section on the line 4 4 of Fig. 2. Fig. 5 is a transverse section on the line 5 5 of Fig. 2. Fig. 6 is a detail view in perspective of the journal-box slides for the roller. Fig. 7 is a similar view of the means for locking the cylinder against axial movement at the desired adjustment. Fig. 8 is a detail view of one end of a roller or cylinder, showing a continuously-grooved spindle for advancing the roller axially as it is rotated. Fig. 9 is a detail view of one end of the cylinder to show that trunnion which carries the worm-gear. Fig. 10 is a detail view of the rock-lever and its actuating-spring.

Similar numerals of reference indicate cor-

responding parts in all the figures of the drawings.

The casing 1 is provided with a cover 2, having opposite side-hinged leaves 3, preferably having glass panels. Horizontally disposed within the casing at an intermediate point is a platform 4, beneath which is arranged a wind-chest 5, of which the upper stationary wall consists of said platform, while the lower movable wall 6 is yieldingly held in a depressed position by means of springs 7 or their equivalents, flexible side walls or webbing 8 being employed to complete the wind-chest. Feeders or suction-bellows 9, having discharge-ports 10, fitted with valves 11, are mounted upon the lower or movable wall of the wind-chest (which may be termed the "main bellows") and communicate with the interior thereof through valve-ports 12. These feeders or suction-bellows are actuated by cranks 13 on the driving-shaft 14 through connecting-pitmen 15, as shown in Fig. 4, said driving-shaft being provided with a suitable handle 16.

The reed-box 17 is provided with a plurality of registers consisting, in the construction illustrated, of parallel front and rear series of independent reed-cells 18 and 19, fitted with reeds 20, which may be of different or the same pitch, or may be constructed to produce tones of different qualities, as preferred, said reed-cells being in communication through opposite ports 21 with common wind-passages 22. The lower ends of these wind-passages are controlled by valves 23, which are actuated by springs 24 to normally hold them in their closed positions, said valves being hinged at their front ends, as shown at 25, and being guided at points contiguous to their front ends by pins 26. It will be seen that the corresponding reed-cells of the two series are in communication with common air-passages, and hence are controlled by common valves 23, or that corresponding members of the different registers are controlled by the same valve; but each set of reed-cells is controlled by a mute, that of the front series being shown at 27 and that of the rear series being shown at 28, said mutes being hingedly mounted upon the outer walls of the reed-cells and being adapted to close inlet-openings 29 and 30, which respectively

communicate with the reed-cells of the front and rear series. These mutes are arranged in resonance-boxes 31 and 32, formed between the outer walls of the reed-cells and auxiliary or false walls 33, which are parallel with the said walls of the reed-cells, said resonance-boxes being open at their upper sides, as shown at 34, and being fitted with movable dampers 35 and 36, respectively. These dampers consist of flaps hinged at their inner or contiguous edges to swing in a vertical plane, and are adapted to close outwardly by gravity; but in practice I have found it desirable to provide them with actuating-springs 37 (see Figs. 2 and 3) to insure prompt closing when released.

Terminally mounted in suitable bearings is a roller or cylinder 38, provided with circumferential projections 39, preferably consisting of studs or staples, which are adapted to be arranged in any desired relative positions to actuate a series of lever-keys 40, which are mounted for vertical swinging movement respectively in the planes of the valves 23, said keys being provided with pins 41, which extend downward through suitable openings in the platform 4 and bear upon the upper sides of the valves. These keys are provided near their free ends with cam-faced enlargements or projections 42, arranged, respectively, in the paths of the projections on the roller and adapted, by the rotation of the roller in the direction indicated by the arrow in Fig. 3, to be engaged and depressed to unseat the valves 23, and thus allow communication between the several air-passages 22 and the wind-chest.

In addition to the key-operating projections 39 the roller or cylinder 38 is provided with mute-operating projections 43 and 44, in the paths of which are arranged mute-operating levers 45 and 46. Connected by a link 47 with the front mute 27 is a rocker-arm 48, provided with an actuating-spring 49, whereby the front mute is normally held open, and the opposite extremity of the arm 48 is connected with a mute-operating lever 45, which is of bell-crank construction. Hence when the free front end of the lever 45 is depressed the front mute is actuated in opposition to its spring to cut off the inlet-openings 29 and exclude the front set of reeds. The mute-operating lever 46 is also of bell-crank construction and has its upright arm connected by a link 50 with the arm 51 of a rock-shaft 52, which is connected coaxially with the rear mute 28, normally held closed by an actuating-spring 53. Hence when the mute-operating lever 46 is depressed at its free end by the engagement therewith of a projection 44 the rear mute is opened to expose the inlet-openings 30, and thus allow the reeds of the rear series to sound, whereas when the lever 46 is in its normal position said reeds are mute. Furthermore, the roller or cylinder is provided with a damper-operating projection 54, in the plane of which is arranged the free

end of a damper-operating lever 55, connected by a link 56 with a trip-rod 57, fulcrumed, as at 58, to the top wall of the reed-box and provided with lateral pins 58^a for engaging trip-fingers 59, projecting inward from the damper-flaps 35 36. The damper-operating lever is actuated by a spring 60, by which the rear end of said lever is held depressed, and thus the trip-rod 57 is held in such a position as to maintain the dampers open; but when a projection 54 depresses the front end of the damper-operating lever in opposition to its actuating-spring the free end of the trip-rod is elevated to release the trip-fingers 59 and allow the damper-flaps to close automatically. The closing of the dampers, however, does not cut off the sound entirely, for the reason that the resonance-box 31 is adapted to receive a small quantity of air through a vent 61 in the front wall of the resonance-box 31, said vent being utilized as a passage through which the link 47 extends for connection with the front mute 27.

The trunnion 62 at one end of the roller or cylinder 38 is provided with a series of circumferential grooves for engagement by a knife-edge half-bearing 63, carried by a latch 64, said latch being pivoted to a bearing-bracket 65, having a slot 66, in which said trunnion is mounted. The latch is held in its normal position by a beveled stop 67 and an open-ended keeper 68, said stop being carried by a spring-tongue 69, consisting of the portion of the bracket 65 at one side of its slot 66. Thus it will be seen that the tongue 69 is adapted to yield to allow the latch to pass the stop 67 and enter the keeper 68; but after passing the same the stop returns to its normal position to prevent accidental vertical displacement of the latch, and thus maintain its knife-edge half-bearing in engagement with one of the circumferential grooves of the trunnion and lock the roller or cylinder against axial displacement while allowing free rotary movement thereof.

Various means may be employed for communicating rotary motion to the roller or cylinder, but that illustrated in the drawings consists of a worm-gear 70, of which the hub is provided with a cross-sectionally angular seat 71 for the reception of the contiguous angular trunnion 72 at the opposite end of the roller from the trunnion 62. Said hub of the worm-gear is extended to fit in bearings 73, formed in bearing-slides 74, and said slides are grooved at opposite sides, as shown at 75, (see Fig. 6,) to engage parallel guide-arms 76 of a contiguous bracket 77. (See Fig. 4.) Obviously these bearing-slides may be dismounted from the bracket by upward sliding movement, but they are held in their normal depressed positions by means of locking-levers 78, (see Figs. 2, 4, and 6,) having terminal studs 79 to engage sockets 80 in the slides. (See Fig. 6.) The driving-shaft 14 carries a worm 81, which meshes with the worm-gear 70.

From the above description it will be seen

that both the valve-operating keys and the mute and damper operating keys or levers are actuated by suitable projections on the roller or cylinder and that in this way a plurality of series of reeds differing in pitch, volume, or quality of tone may be controlled automatically by the roller, the entire construction being arranged in compact form, desirable as securing portability. Furthermore, although but one set of projections is shown upon the roller or cylinder a number of sets, corresponding with the number of circumferential grooves in the holding-spindle 62, may be applied to adapt a single roller to produce a plurality of compositions, the interval between the planes of contiguous sets of projections corresponding with the intervals between said grooves, whereby the composition may be changed by varying the axial position of the roller and locking it at the desired adjustment.

In Fig. 8 I have shown a slightly different form of holding-spindle 62^a, wherein a continuous spiral circumferential groove is provided for engagement by the holding-latch 64, whereby as the rotation of the roller proceeds it is fed axially to produce a composition of greater length than can be produced by a single revolution of the roller. Obviously with this construction the projections on the roller or cylinder must also be applied in spiral series.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. An instrument of the class described having a sounding mechanism including a plurality of registers, each comprising a plurality of sounding members, a set of valves, each of which controls the corresponding members of the several registers, mutes, one for each register, yieldingly held respectively open and closed, a cylinder, and cylinder-controlled means for respectively actuating said mutes and valves, substantially as specified.

2. An instrument of the class described having a plurality of sets of reed-cells, a wind-chest in communication with the reed-cells, valves for controlling the communication between the wind-chest and the corresponding reed-cells of the different sets, independent mutes for controlling the admission of air to the sets of reed-cells, yielding means for holding said mutes respectively open and closed, valve and mute keys respectively connected with the valves and mutes, and a cylinder provided with valve and mute projections for actuating respectively said valve and mute keys, substantially as specified.

3. An instrument of the class described, having a sounding mechanism including a plurality of independent registers, each compris-

ing a plurality of sounding members, a set of valves, each of which controls the corresponding members of the several registers, mutes, one for each register, means for yieldingly holding said mutes respectively open and closed, dampers, one for each register, a cylinder, and cylinder-controlled mechanism for respectively and independently actuating said valves, mutes and dampers, substantially as specified.

4. An instrument of the class described, having a sounding mechanism including a plurality of independent registers, each comprising a plurality of sounding members, a set of valves, each of which controls the corresponding members of the several registers, mutes, one for each register, means for yieldingly holding each of said mutes in one of its adjusted positions, one of the same being held open dampers, one for each register, a cylinder having surface projections, and valve, mute and damper keys, respectively connected with said valves, mutes and dampers, and respectively arranged in the paths of said projections of the cylinder, substantially as specified.

5. An instrument of the class described, having a plurality of sets of reed-cells, a wind-chest in communication with the reed-cells, valves for controlling the communication between the wind-chest and the corresponding reed-cells of the several sets, independent mutes for controlling the admission of air to the sets of reed-cells, yielding means for holding said mutes respectively open and closed, valve and mute keys respectively connected with the valves and mutes, and a cylinder having valve and mute projections for cooperating, respectively, with said valve and mute keys, substantially as specified.

6. An instrument of the class described, having a plurality of sets of reed-cells, a wind-chest in communication with the reed-cells, valves for controlling the communication between the wind-chest and the corresponding reed-cells of the several sets, independent mutes for controlling the admission of air to the sets of reed-cells, yielding means for holding one of said mutes closed, yielding means for holding another mute open, and including a spring-actuated rocker-arm 48 connected to the mute, levers respectively connected with the spring-closed mute and said rocker-arm, mute-keys respectively connected with said levers, valve-keys, and a cylinder having valve and mute projections for cooperating respectively with the valve and mute keys, substantially as specified.

7. An instrument of the class described, having a plurality of sets of reed-cells, a wind-chest in communication with the reed-cells, valves for controlling the communication between the wind-chest and the corresponding reed-cells of the several sets, independent resonance-boxes with which the reed-cells communicate by inlet-openings, dampers for closing the open sides of said resonance-boxes,

yielding means for normally holding the dampers closed, mutes for controlling said inlet-openings of the reed-cells, a trip-bar 57 for engaging adjacent trip-fingers 59 on the dampers, a damper-key connected with said trip-rod, and a cylinder operatively connected with the valves and mutes and having damper projections for engaging said damper-key to release the dampers, substantially as specified.

8. An instrument of the class described, having a plurality of sets of reed-cells, a wind-chest in communication with the reed-cells, valves for controlling the communication between the wind-chest and the corresponding reed-cells of the several sets, mutes for controlling the admission of air to the reed-cells, resonance-boxes with which the reed-cells communicate by inlet-openings, spring-closed dampers for closing the open sides of the resonance-boxes and provided with trip-fingers extending toward each other, a pivotal trip-rod for simultaneously engaging said trip-fingers, a cylinder operatively connected with the valves and mutes, a damper-lever arranged in the path of projections on the cylinder, and connections between the damper-lever and said trip-rod, substantially as specified.

9. A musical instrument having reed-cells, a wind-chest, and valves for controlling the communication between the wind-chest and the cells, of a bracket slotted whereby a spring-tongue is formed, a cylinder mounted for axial adjustment with one of its trunnions in

the slot of said bracket, said trunnion being circumferentially grooved and the cylinder being operatively connected with the valves, a pivotal latch having a knife-edge half-bearing for engaging a groove of said trunnion, and a stop carried by the spring-tongue of the bracket for engaging and maintaining the latch in engagement with the groove of the cylinder-trunnion, substantially as specified.

10. A musical instrument having reed-cells, a wind-chest, and valves for controlling the communication between the wind-chest and the reed-cells, of spaced brackets, one of which is provided with pairs of parallel guides, a cylinder operatively connected with said valves, bearing-slides mounted upon the guides of said bracket, a worm-gear having its hub mounted in bearings in said slides and provided with a cross-sectionally angular bore, one of the trunnions of the cylinder being cross-sectionally angular to fit in the bore of the worm-gear, and the other trunnion thereof being mounted in a fixed bearing for axial adjustment, locking devices for securing the cylinder at the desired axial adjustment, and a worm and actuating devices for communicating motion to the worm-gear, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

BENHOF EDWIN BENIARDUS.

Witnesses:

J. G. SHONT,

C. F. HANSON.