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PATENTED OCT. 6, 1903.

F. F. SCHOENSTEIN.
PNEUMATIC SELF PLAYING MUSICAL INSTRUMENT.
APPLICATION FILED MAR. 25, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

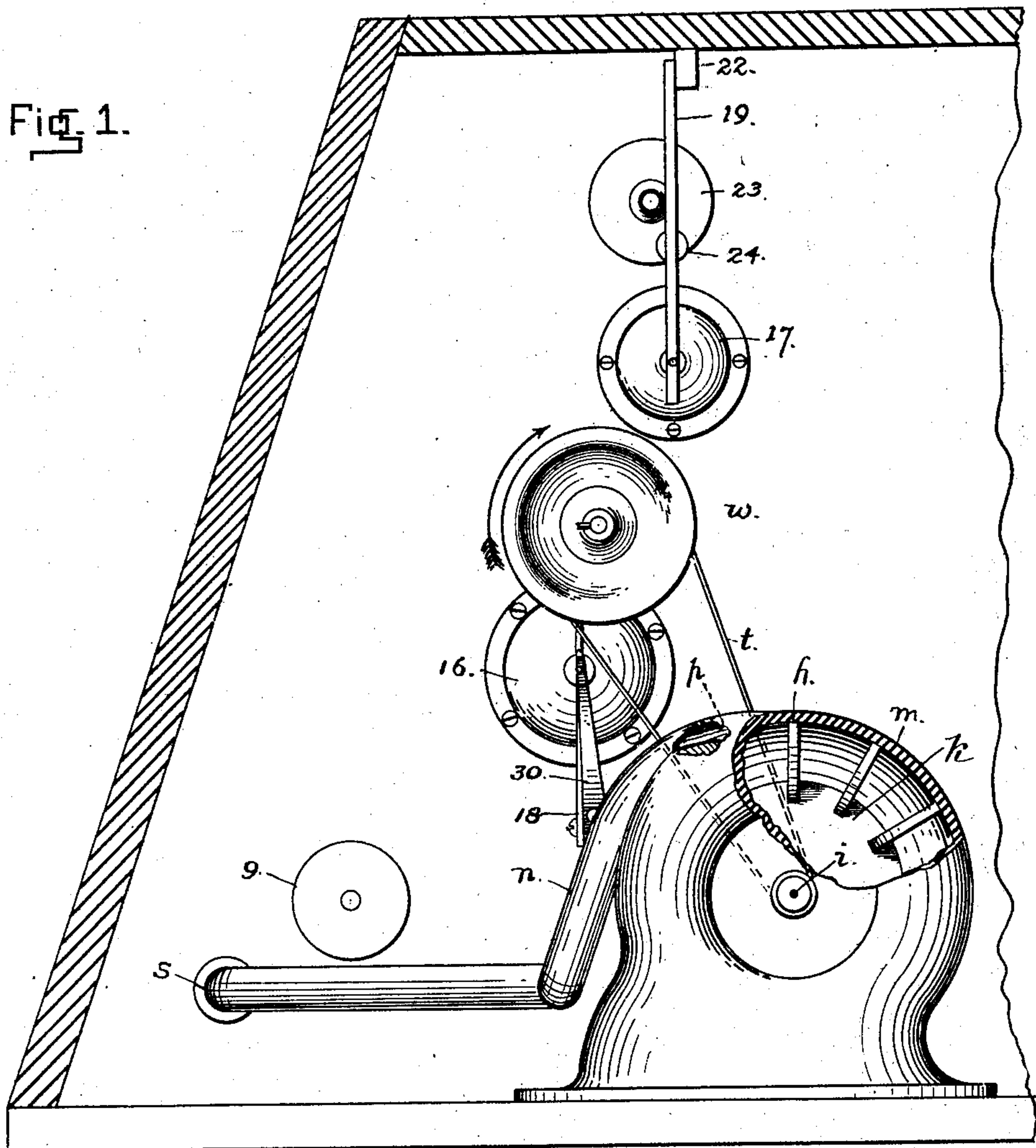
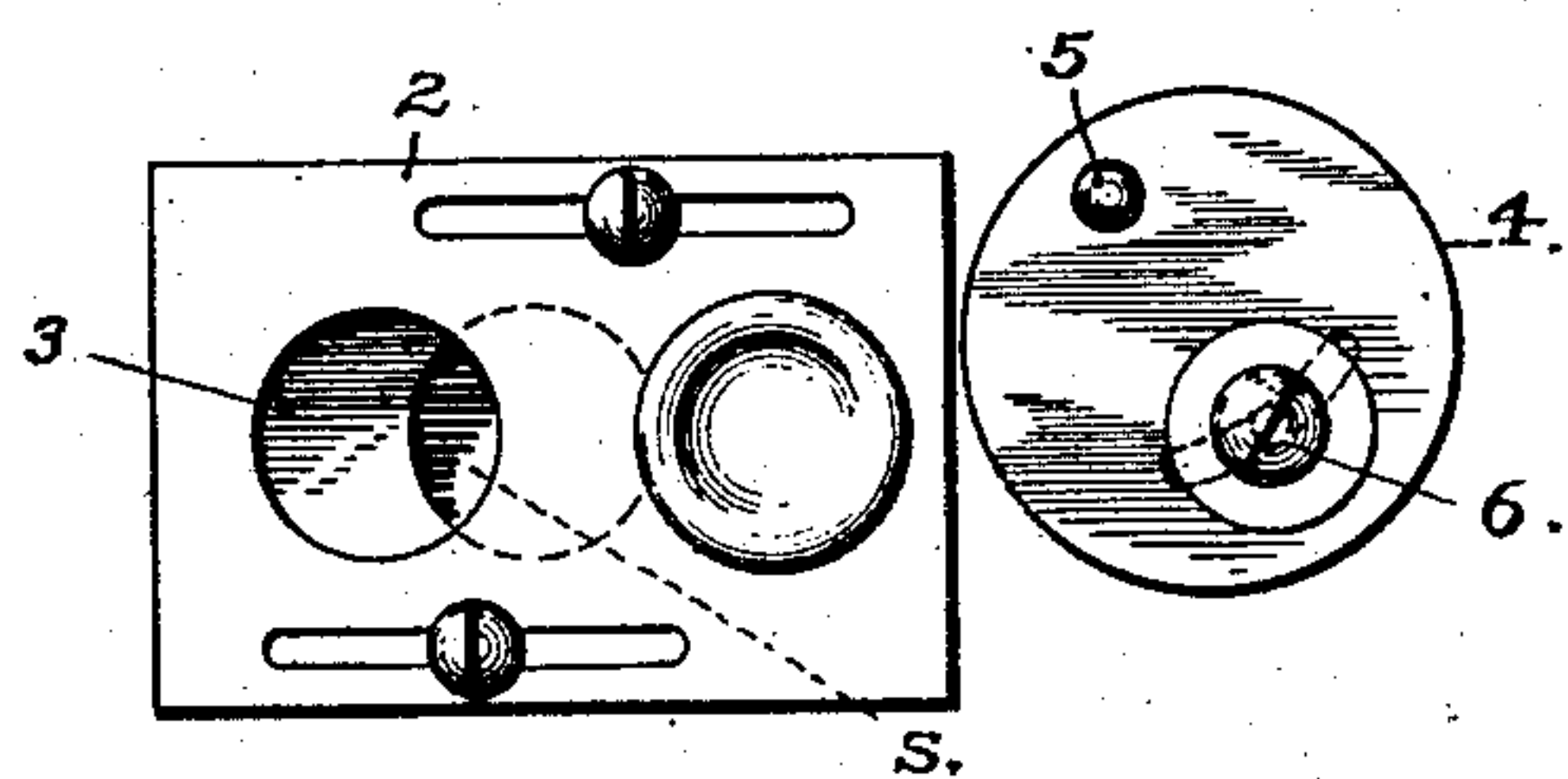


Fig. 5.



Witnesses.

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3 SHEETS—SHEET 2.

Fig. 2.

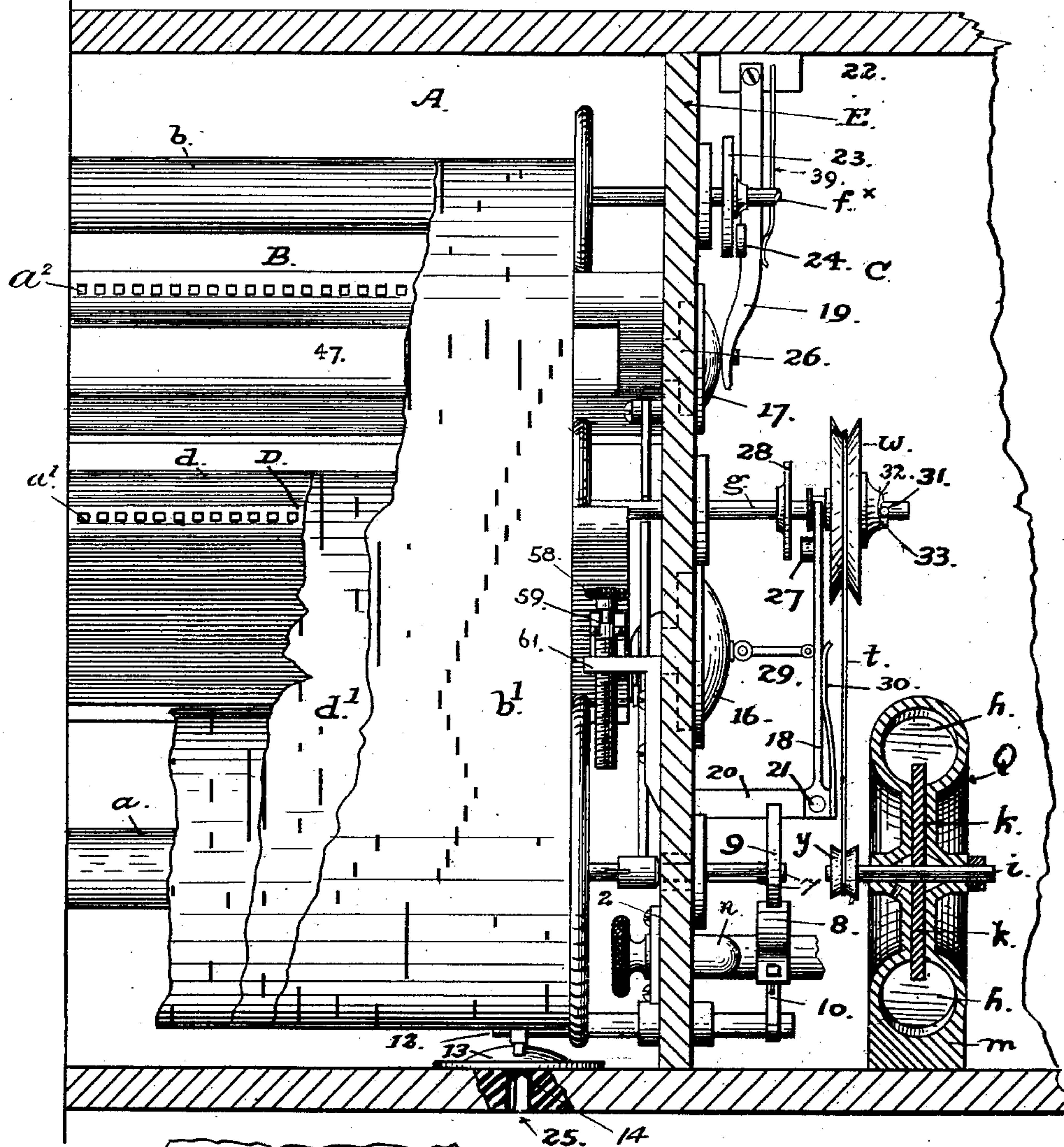
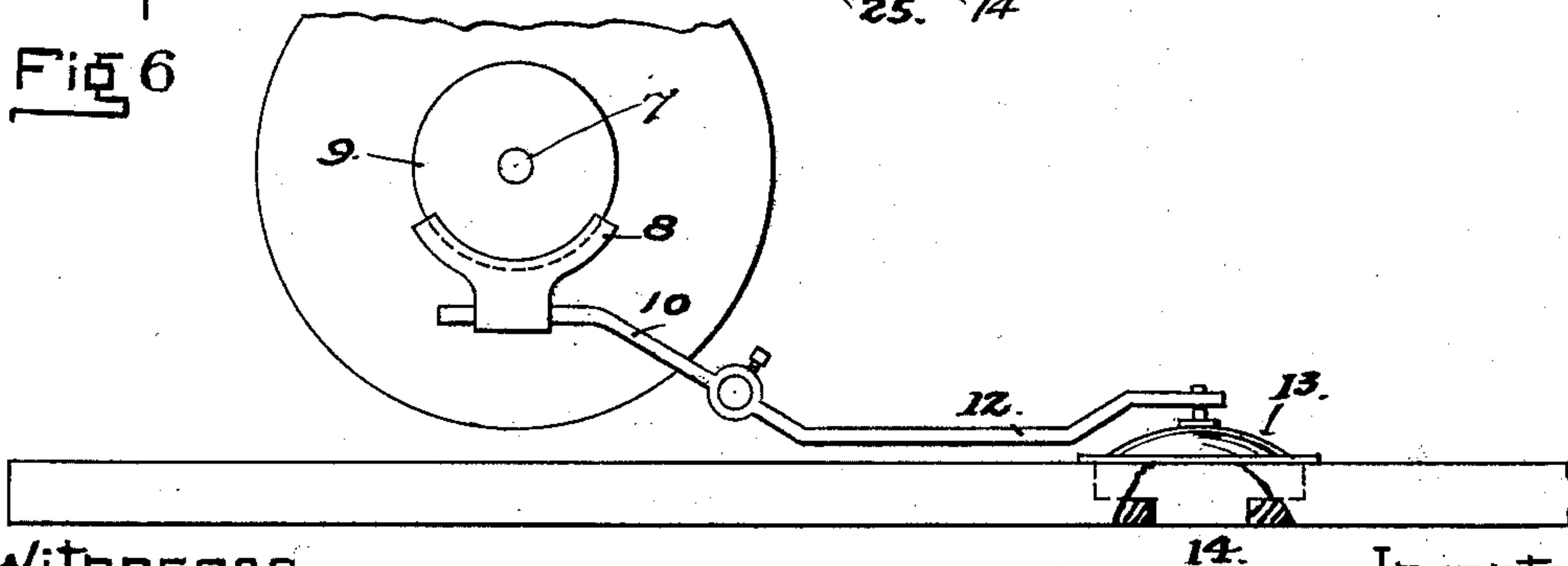


Fig. 6



Witnesses

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3 SHEETS—SHEET 3.

Fig 4

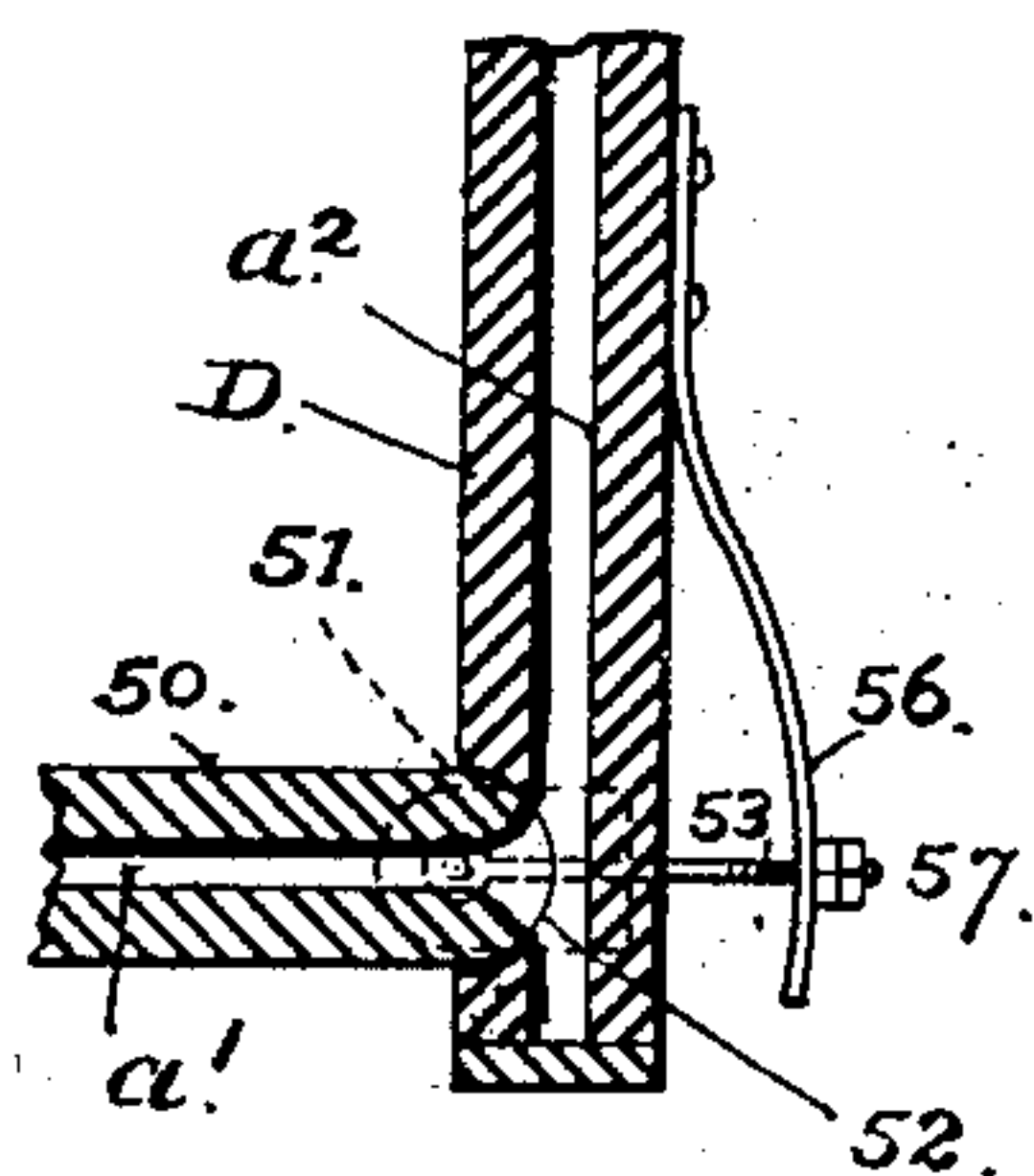
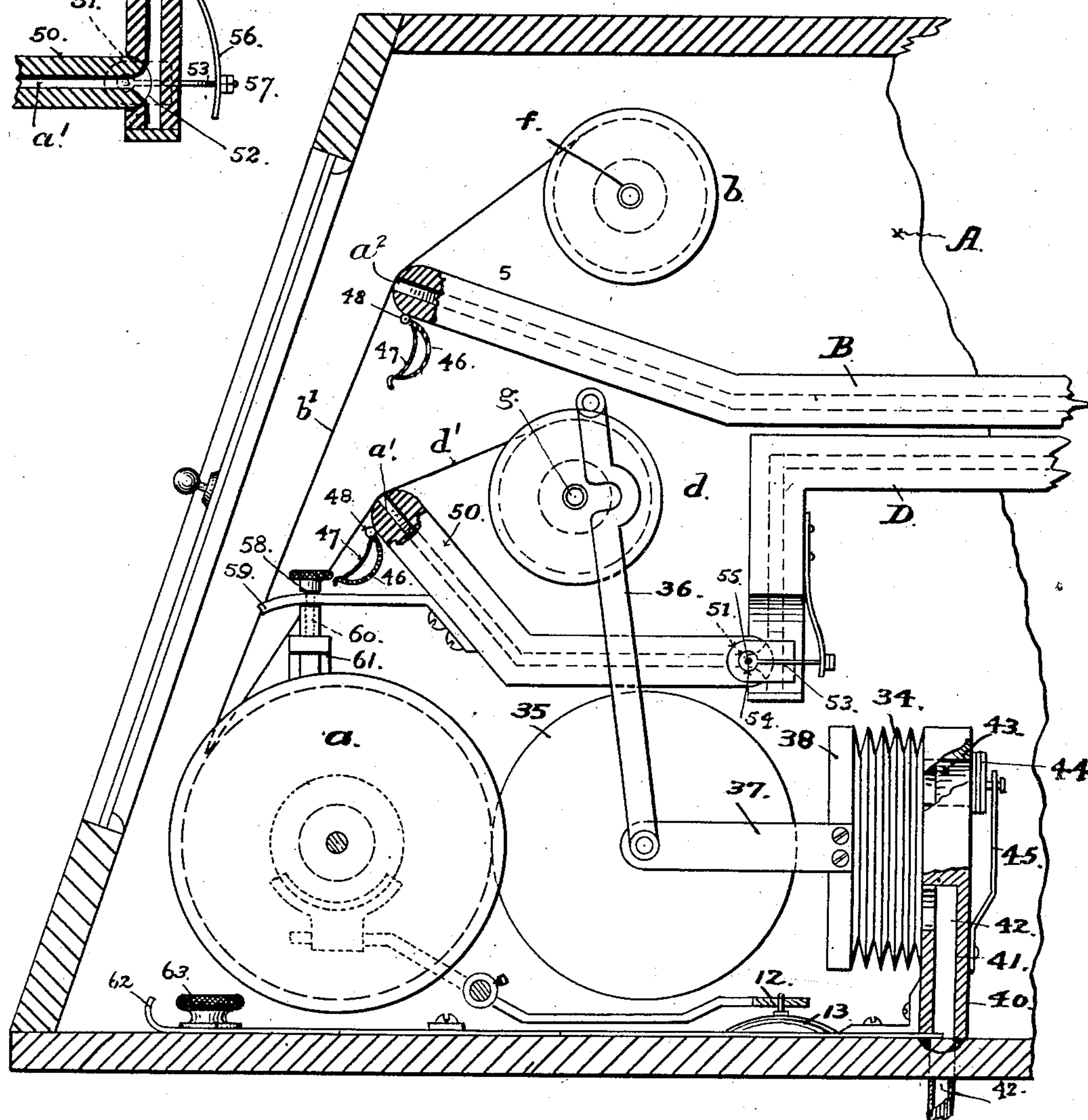


Fig 3



Witnesses

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UNITED STATES PATENT OFFICE.

FELIX F. SCHOENSTEIN, OF SAN FRANCISCO, CALIFORNIA.

PNEUMATIC SELF-PLAYING MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 740,993, dated October 6, 1903.

Application filed March 25, 1903. Serial No. 149,465. (No model.)

To all whom it may concern:

Be it known that I, FELIX F. SCHOENSTEIN, a citizen of the United States, and a resident of the city and county of San Francisco, State of California, have invented a new and useful Improvement in Pneumatic Self-Playing Musical Instruments, of which the following is a specification.

This invention relates to improvements made in mechanically-played musical instruments in which the individual sound-producing devices are operated by mechanism selected and actuated through the medium of a pneumatic tracker-range and a perforated note-sheet; and the improvements comprise certain novel construction and combination of rollers and mechanism to operate and control a plurality of note-sheets, each actuating a separate stop, manual, or department in the same instrument or even in a separate instrument, all as hereinafter more fully described, and pointed out in the claims at the end of this specification.

The drawings that accompany and form part of this specification represent a construction of roll-operating mechanism embodying my improvements as I apply them to an instrument with two tracker-boards for controlling two stops or manuals.

Figure 1 is a vertical section through the compartment containing the motor, driving-pulleys, and brakes of the winding-rollers. Fig. 2 is a vertical section taken longitudinally through the perforated music-sheets, the rolls, and the roll-operating mechanism, including the pneumatic motor and the brakes. Fig. 3 is a vertical section taken on a plane through the roll-holding chamber. Fig. 4 represents in cross-section the adjustable nose of the tracker-board and the means for adjusting it at different angles to secure accurate registration with the perforations in the note-sheet. Fig. 5 is a detail of the adjustable slide for regulating the supply of compressed air or "wind" to the motor that operates the winding-roll of the second note-sheet. Fig. 6 is a detail side elevation of the pneumatic brake on the principal roller.

Instead of winding each note-sheet on a separate storage-roll, from which it is drawn off by a winding-roller, I lay the several sheets one upon the other and wind them upon the

same spool or roll, and by applying pressure upon the sheets during the winding operation by a presser-roller I expel the air from between the layers and insure their being laid in proper operating relation one sheet to the other while being wound on the spool for use. All the note-sheets being laid and wound together on a single storage-roll, they are drawn off in different directions and in such relation to the ends of the tracker-boards in the roll-chamber A that one sheet is separated from the other and is carried over the nose of its tracker-board by a separate winding-roller, to which it is attached in the well-known manner by means of loops or eyes on the edge of the sheet and hooks on the roller, one of these winding-rollers being provided for each note-sheet.

The tracker-boards are arranged in the roll-chamber A in banks or tiers one below another with sufficient space between them to provide room for the winding-rolls. The storage-roll *a* is situated out of vertical line with the winding-rolls *b* *d* above and somewhat to the front of such line, so as to carry the sheets upward and over the nose of the tracker-boards in an abrupt but smooth bend or change of direction.

The principal winding-roller *b*, or the one which draws the topmost sheet from the storage-roll, is driven in the well-known manner by a small electric or pneumatic motor connected to the axle *f* of the roller at one side of the case; but the winding-roller for the note-sheet of the second tracker-board is driven by mechanism that is designed to utilize the power of the wind or pneumatic pressure employed in the instrument. This mechanism is specially constructed to rotate the roller *d* in perfect unison with the other roller, *b*.

The principal motor connected to the axle *f* may be of any well-known form, such as is already used in these instruments where a traveling music-sheet is employed. No description of such motor is herein given for the reason that the driving mechanism which is connected to the second winding-roller *d* in this construction is well adapted to work with any driving mechanism for the other roller, *b*, whether the last-named roller be actuated mechanically, as by a spring, or by wind sup-

plied by the bellows-action of the instrument, or by electricity.

In the simplest form and application of my improvement the storage-roll *a* has a capacity 5 for two note-sheets *b' d'*, and the ends of the two tracker-boards *B D* are inclosed with the rollers in the roll-chamber *A*, the required degree of pneumatic pressure being maintained in the chamber when it is closed by working 10 the pedals of the bellows-action by which the instrument is operated.

The compartment *C*, separated from the roll-chamber *A* by a partition *E* at one end, is provided for the pneumatically-driven motor *G*, the pulleys connecting it with the winding-roller and the pneumatic brakes. A 15 similar compartment at the opposite end of the case (not shown in the drawings) incloses the principal motor for the roller *b*.

20 The motor *G* (shown in Figs. 1 and 2) consists of a wheel formed of circular disks *h*, fixed to the periphery of a disk *k*, that is fast on the shaft *i*, and a stationary inclosing case *m*, having an inlet *p*, located at the periphery, 25 through which a stream of air is delivered in the required direction tangent to the blades of the wheel. A tube or passage *n*, connecting the inlet *p* with an aperture *s* in the side of the roll-chamber *A*, carries a stream of air 30 from the roll-chamber into the casing, thus utilizing that pressure to drive the motor wheel as well as to actuate the pneumatics of the strikers or other sound-producing devices of the instrument. Power is transmitted 35 from the wheel to the roller *d* by an endless belt *t* and two sheaves *w y*, one on the axle *g* of the roller *d* and the other, *y*, fast on the motor-wheel shaft. The end of the tube *n* at the inlet-aperture *s* is covered by a slide- 40 plate 2, by the adjustment of which the supply of air to the wheel is always under control, and the speed of the roller *d* is capable of being regulated both to rotate the roller *d* in perfect time with the roller *b* and also to 45 secure perfect tension on the note-sheet at all times without excessive strain. The slide 2 has an aperture 3 of the full dimensions of the inlet *s*, and the extent of its movement in one direction is regulated by an adjustable 50 stop consisting of a flat disk 4, loosely hung on a pivot 5 and held in any given position of adjustment by a clamp-screw 6, working in a curved slot. The arrangement of this slide and the stop is shown in Figs. 2 and 55 5. After the inlet *s* is uncovered by moving the slide to the right (see Fig. 5) to give the required area of opening the stop-disk 4 is set forward to touch the end of the slide, and being held in that position by tightening the screw 6 the disk furnishes a certain and definite gage for resetting the slide to the 60 same position after it has been moved in the opposite direction for temporarily reducing the speed of the roller to follow any change of speed in the principal motor, as in producing a change in tempo in the piece being 65 played.

The principal roller *a* and the winding-rollers are controlled each by a friction-brake that is thrown on and operated automatically 70 to arrest the motion of the roller on the instant that the power is thrown off. The purpose of this attachment is to prevent the perforated sheets from unwinding or running slack, as they would be liable to do if a reverse motion of the rollers should take place 75 or one roller should continue to turn while the other was stationary at the end of the winding operation, for it will be obvious that unless the sheets are drawn from the storage-roller at the same rate of motion and 80 are rewound on it in exactly the same relation the set of sound-producing devices controlled through one note-sheet and its tracker-board will not be operated in proper time or 85 relation to those which are operated through the other sheet and its tracker-board. Each roller, therefore, is controlled by a friction-brake which is thrown in or out of action on 90 the instant that the pressure in the chamber *A* is changed in degree either below that required to actuate the instrument or is raised from that condition up to working pressure again. As soon as the air in the chamber is 95 reduced below its effective working pressure the brakes are automatically thrown on and the rollers are locked and cannot turn until the roll-chamber is closed and the pressure or wind has been raised to the required working point again. 100

The brake controlling the storage-roller *a* has a shoe 8 with a curved face fitting the rim of a friction-disk 9, that is fast on the shaft 7 in the compartment *C*, to which the 105 axle of the roller *a* in the compartment *A* is coupled. The shoe is fixed on the arm 10 of a rock-shaft having a second arm or rigid member 12 extending from the shaft over a diaphragm 13, that is situated over a pocket 14 in the floor of the compartment. Communication 110 between the roll-chamber and the pocket 14 is provided through an aperture and a suitable connecting-passage 25, so that the diaphragm will respond to the changes of pressure or tension produced in the atmosphere of the chamber. As the pressure therein is raised to the working degree the diaphragm 13 will expand and raise the arm 12, 115 or as the pressure drops below the working point the diaphragm will be correspondingly affected, and by drawing down the arm 12 it will throw the brake on the disk 9. The brakes applied to the winding-rollers are similarly operated by pneumatic diaphragms 16 120 17 through the medium of pivoted levers 18 19, the lever 18 being supported in line with the diaphragm 16 by a bracket 20, to which its lever is attached by a pivot 21, and the other lever, 19, being pivoted to a hanger 22, from which it depends in line with the center 130 of its actuating-diaphragm 17.

The brake on the upper roller *b* consists of a friction-disk 23, fast on the axle *f*^x of the roller, and a shoe 24 on the lever 19, set in

position to make contact with the face of the disk 23. The outer end of the lever rests upon and is attached to the center of the diaphragm 17, and the latter communicating with the wind in the roll-chamber through the pocket 26, over which the diaphragm is fixed, its inflation takes place and is maintained as long as the conditions remain the same. While the working pressure continues in the roll-chamber, the lever holds the shoe out of contact with the disk 23. The necessary movement and pressure to throw on and hold the brake is produced by a spring 39, acting against the back of the lever as soon as the wind-pressure falls. The brake for the roller *d* is of similar construction, excepting that the lever 18 has the additional function of connecting and disconnecting the driving-power at the same time that it puts on or throws off the brake. A shoe 27 on the lever 18, in line with a friction-disk 28, fast on the axle of the roller *d*, is held away from the disk by the inflated diaphragm 16, to the center of which the lever is attached by a rigid connection 29, or as the diaphragm is collapsed the lever is pressed against the friction-disk by a flat spring 30. The upper end of the lever is forked and loosely fitted to a grooved hub on the pulley *w*, that carries the driving-belt, and the pulley is connected to the axle of the roller *d* by a slip-clutch composed of a pin 31, fixed in the axle, and an incline 32 on the end of the hub, terminating in a square shoulder 33. In the longitudinal movement of the pulley as the lever moves toward the friction-disk the shoulder on the hub of the pulley is drawn away from the pin in the axle, thereby disconnecting the pulley and the axle and immediately arresting the motion of the roller. This action of the brake-lever takes place as often as the diaphragms are collapsed, and as those parts are always under the influence of the pneumatic conditions existing in the roll-chamber they are adjusted to throw on the brakes and hold them as soon as the pressure in the chamber drops below the working pressure. The result of this manner of controlling the brakes by the pneumatic pressure obtaining in the roll-chamber relieves the player of all care or attention with respect to the winding-rollers and makes the mechanism more nearly automatic in its action.

In order to insure the necessary even winding of the note-sheets as they are taken from and also rewound on the storage-roller *a*, a presser-roller 35 is suspended by means of hangers 36 behind the storage-roller, and its axle is connected by a rigid arm 37 on each side to a movable board 38, having behind it an inflatable diaphragm or bellows 34. A stationary head or channel-board 40, with an upright channel 41 supporting the bellows 34, communicates through a conducting tube or passage 42 with the bellows in the lower part of the instrument that is worked by the ped-

als. The pressure within the bellows 34 and passage 42 is regulated by a slide 62, held by a clamp-screw and adjustable from the front of the roll-chamber.

When the roll-chamber is closed and the wind therein is raised to working pressure, the bellows 34 remains in a state of deflation or compression by reason of the pressure maintained against the front of the movable board 38, and the presser-roller is held away from the music-roll *a* or rests against it without exerting any pressure.

To prevent the pressure of the roller 35 from becoming excessive or for being applied to the periphery of the music-roller above a given degree, an outlet-aperture 43 in the back of the channel-board is closed by a valve 44, held to a seat in the aperture by a spring 45, as seen in Fig. 3. This relief-valve covering the aperture confines the air in the bellows until the pressure is increased above the point or degree called for, when the relief-valve opens and reduces the pressure. The addition of the relief-valve prevents the inflatable diaphragm 34 from being unduly strained if the roller 35 be pressed away from the music-roll *a* too quickly or with an abrupt movement in placing or in removing the roll.

Usually the presser-roller 35 corresponds in length to the distance longitudinally between the heads or flanges of the storage-roll; but instead of having a continuous cylindrical surface from end to end the roller may be composed of several short rollers or broad-rim disks fast on the same shaft and spaced thereon, so as to present roller-faces to bear on the roller note-sheet at the ends nearest the flanges and on one or more intermediate portions of the periphery.

The traveling head or front board is the same length as the axis of the presser-roll; but the bellows-fold may be of less length and may be placed in the middle of the traveling head 38.

In an instrument of this character having two or more tracker-boards and cooperating note-sheets controlled by separate rollers it is desirable, and even necessary sometimes, to be able to throw one tracker-board out of action without interrupting or interfering with the operation of the other tracker-board and its note-sheet, and for that purpose the nose of the tracker-board is provided with a cap or shield 46 of proper length to extend over the ends of all the air-ducts in the nose and having an elastic packing or lining 47 on the inside, formed of sheet-rubber or other material sufficiently elastic to stretch and conform to the shape of the rounded nose of the tracker-board. The cap is attached to the board by a hinge 48, so as to be turned back and stand out of the way of the note-sheet when not in use. As all the note-sheets used in the instrument are stored on the same roller, it will be obvious that the whole number of sheets must be unwound and rewound

at the same time, even though it may be desired at times to bring but one of the note-sheets into action, as where one set of stops or one department is to be played or in tuning the instrument, and consequently all the note-sheets may travel over their respective tracker-boards; but only that one which is covered by closing the cap over its nose will be thrown out of action. Provision is made also for adjusting one or more of the tracker-boards to secure perfect registration of the note-sheets both with relation to their own tracker-board and also with relation to each other, so as to produce perfect accord and action between the sheets by making the outer end and nose-carrying portion of the tracker-board a separate piece, as seen at Figs. 4 and 5, with an upwardly-turned end 50 and connecting this separate section or member to the main board D by a hinge-joint 51. This joint is formed by fitting the rounded end of the movable section 50 to a socket 52 of the same circular shape in the front face of the stationary section of the board, with the ducts a' in the movable section in line and accurately registering with those a^2 in the stationary section. A rod or link 53, with an eye 54 to take a central pin 55 on each side of the movable member, is connected to a spring 56 on the back of the stationary member of the board by a nut 57 on the screw-threaded end of the rod, by which means the rounded end of the movable section is drawn back to a close seat in the socket. Swinging on this point as a center the upwardly-turned nose can be moved forward or backward to meet and register with the perforations sooner or later in the motion of the note-sheet, and thus be made by adjustment to operate in harmony or required time or relation to the note-sheet traveling on the other set of ducts. A set-screw 58, working through a bar 59, secured to the movable section of the tracker-board and into a threaded socket 60 in a stationary bracket 61, furnishes a ready means for adjusting the movable section up or down and holding it in position. This screw is accessible through the opening in the case where the storage-roller is inserted and removed. The axles of the last-named rollers are fitted in the well-known manner to sockets in the ends of the case, one of which is situated in the inner end of the short shaft that extends through the partition C and carries the brake-disk on its outer end.

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

1. In a mechanical musical instrument having a plurality of tracker-boards, the combination of a storage-roll, a plurality of note-sheets laid thereon, a winding-roller for each note-sheet said rollers being placed in operative relation to the tracker-boards to separate the note-sheets and draw them over their respective tracker-boards, mechanism connected with the winding-rollers to turn them at

the same speed, means for controlling the storage-roller, and means for locking the winding-rollers when the power ceases to turn them.

2. The combination, with a mechanical musical instrument having a plurality of tracker-boards, of a plurality of note-sheets, a common storage-roller, a winding-roller for each note-sheet adapted by its position to draw the note-sheet over the tracker-board with which such sheet coacts, power-driven mechanism for operating one winding-roller, pneumatically-operated means for rotating the winding-rollers of the other note-sheets, said means being operated by the pneumatic pressure employed to actuate the playing mechanism, and means for regulating the supply of such pneumatic power to the winding-roller mechanism to control and vary the speed thereof.

3. The combination with a plurality of tracker-boards each adapted to operate a set of sound-producing devices and cooperating note-sheets; of a common storage-roller, a winding-roller for each note-sheet, means for rotating said winding-rollers with equal rate of speed, a presser-roller having continuous contact with the periphery of the storage-roller, and a pneumatically-operated brake to each winding-roller, said brake being operatively connected with the pneumatic pressure employed to operate the instrument, and a pneumatically-operated means controlled by the same pressure, connecting the winding-roller and its rotating mechanism automatically as the pressure is brought up to the required working degree and disconnecting them as the pressure falls below that degree.

4. The combination with a plurality of tracker-boards and cooperating note-sheets; of a common storage-roller, a separate winding-roller for each note-sheet, said winding-rollers being arranged with relation to the tracker-boards to separate the note-sheets and draw them over their respective tracker-boards, means for rotating the winding-roller of the uppermost note-sheet in the roll, and a pneumatically-actuated motor for the remaining sheet or sheets, comprising a rotatable wheel, an inclosing casing, an air-nozzle in the casing adapted to deliver a stream of air against the wheel, a tube connecting said nozzle with the body of air employed to operate the playing mechanism, means for regulating the area of said tube, a pulley on the axle of the motor-wheel, a belt connecting said pulley with a pulley on the axle of the winding-roller, and means for connecting and disconnecting the winding-roller pulley.

5. The combination with a principal tracker-board and its cooperating note-sheet, of a second tracker-board, a separate note-sheet to cooperate therewith, and means for operating and controlling the said note-sheets, comprising a common storage-roller for the note-sheets, a winding-roller for each sheet, adapted by its position to carry the note-sheet in-

dividual thereto in operative relation to its tracker-board, power-driven means adapted to actuate the principal winding-roller, a separate motor for actuating the winding-roller
5 of the remaining note-sheet, means for connecting and disconnecting said motor, a brake on each roller, and means operated through changes in the pneumatic pressure in the roll-chamber to put on the brakes when such pressure drops below a predetermined point.
10

6. In a pneumatic musical instrument of the character described, a tracker-board having an adjustable nose-carrying section comprising a stationary section hinged thereto at
15 the rear and means for adjusting the outer end of the movable section at varying angles.

7. In a pneumatic musical instrument a tracker-board comprising a stationary section, and a movable section attached thereto and

means for adjusting the outer end of the movable section and holding it at varying angles. 20

8. A mechanical musical instrument having a plurality of tracker-boards, a plurality of note-sheets, a storage-roller common to all the note-sheets, a winding-roller for each note-sheet, means connected with the winding-rollers for moving them at the same rate of speed, and means for applying pressure against the sheets on the storage-roller in the rewinding movement. 25

In testimony whereof I have signed my name in the presence of two subscribing witnesses. 30

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