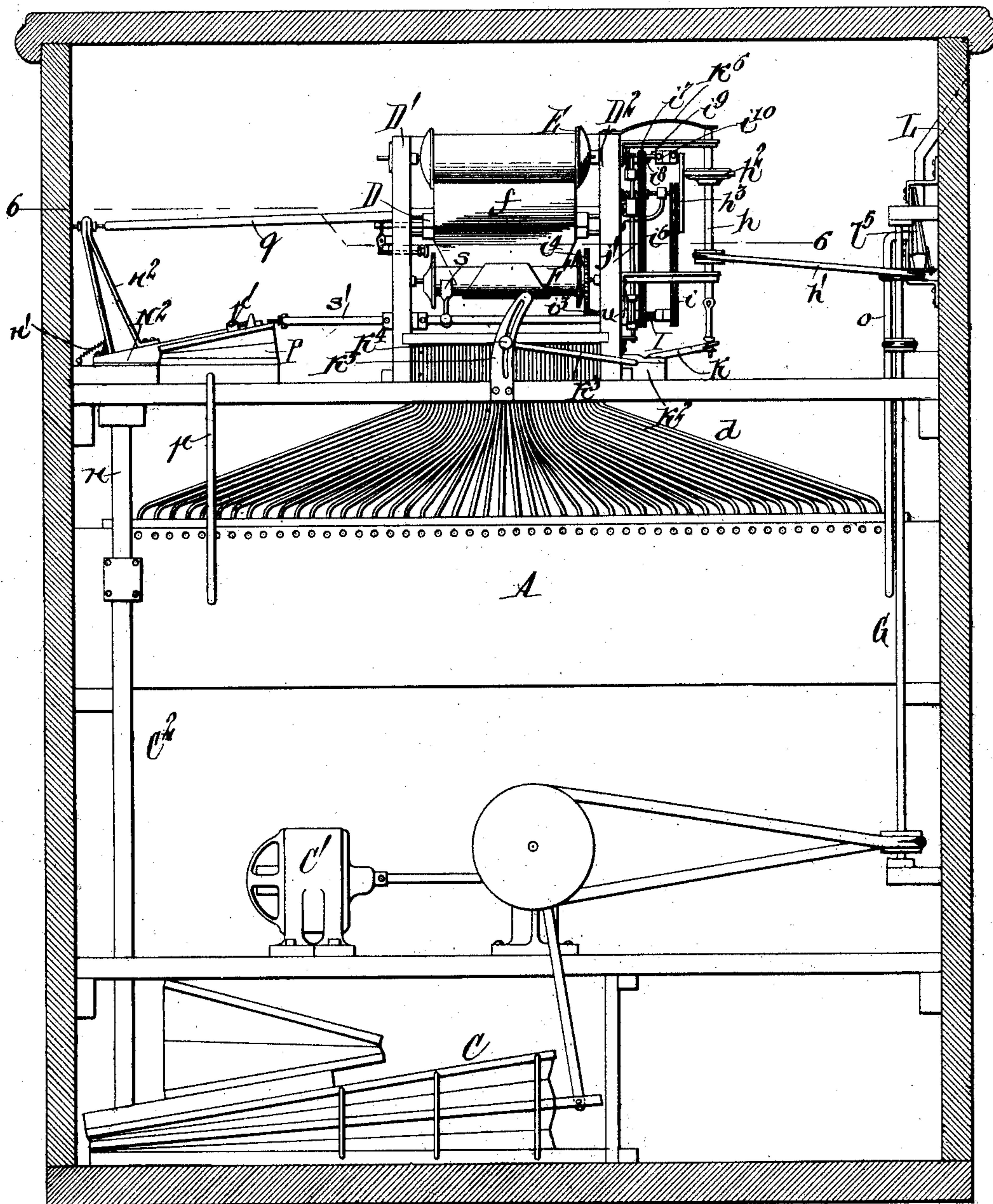


983,374.

4 SHEETS—SHEET 1.

Fig. 1.



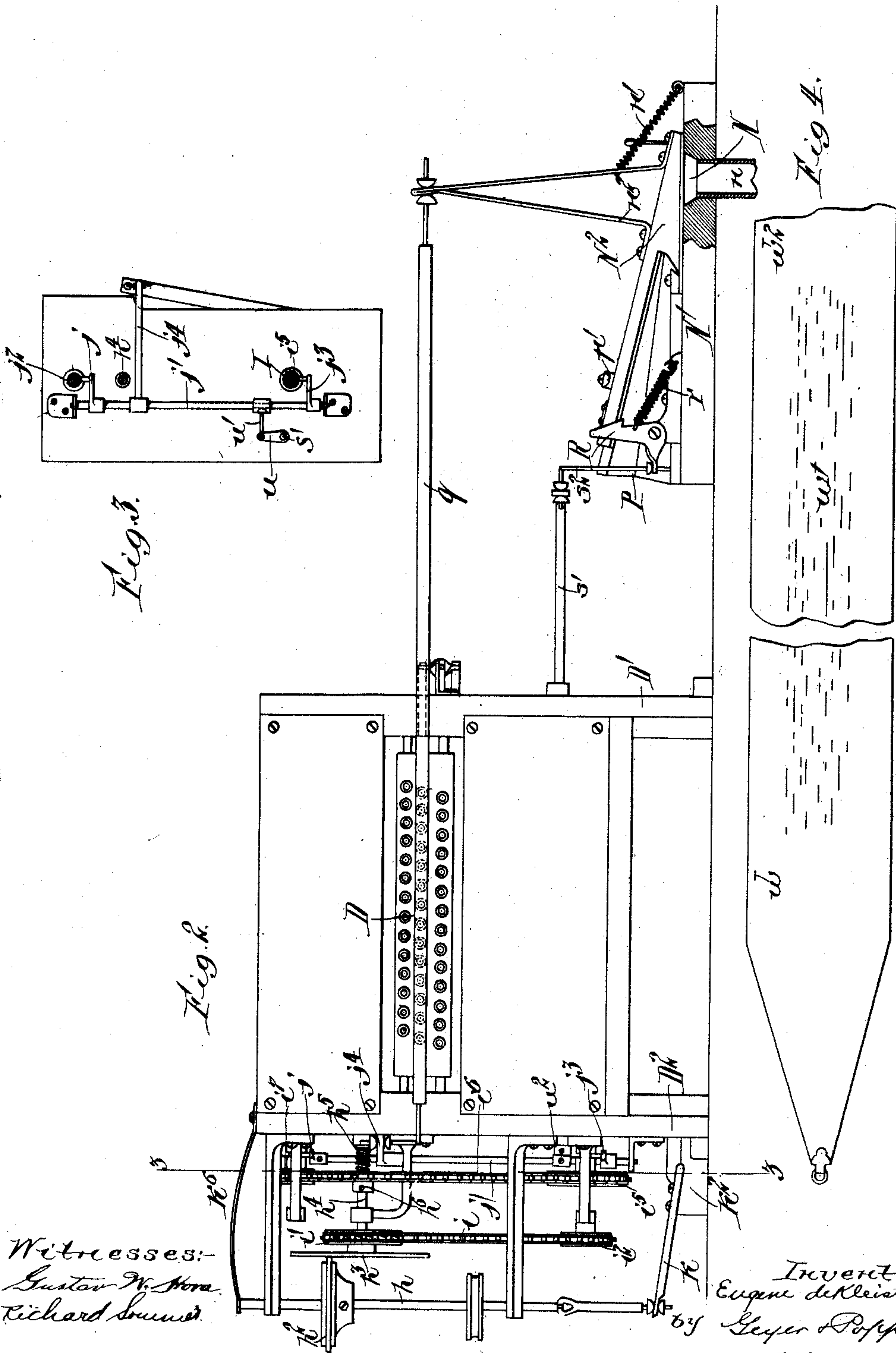
Inventor
Eugene de Kleist
by Geo. Popp
Attorneys.

E. DE KLEIST.
PNEUMATIC MUSICAL INSTRUMENT.
APPLICATION FILED APR. 13, 1908.

983,374.

Patented Feb. 7, 1911.

4 SHEETS—SHEET 2.

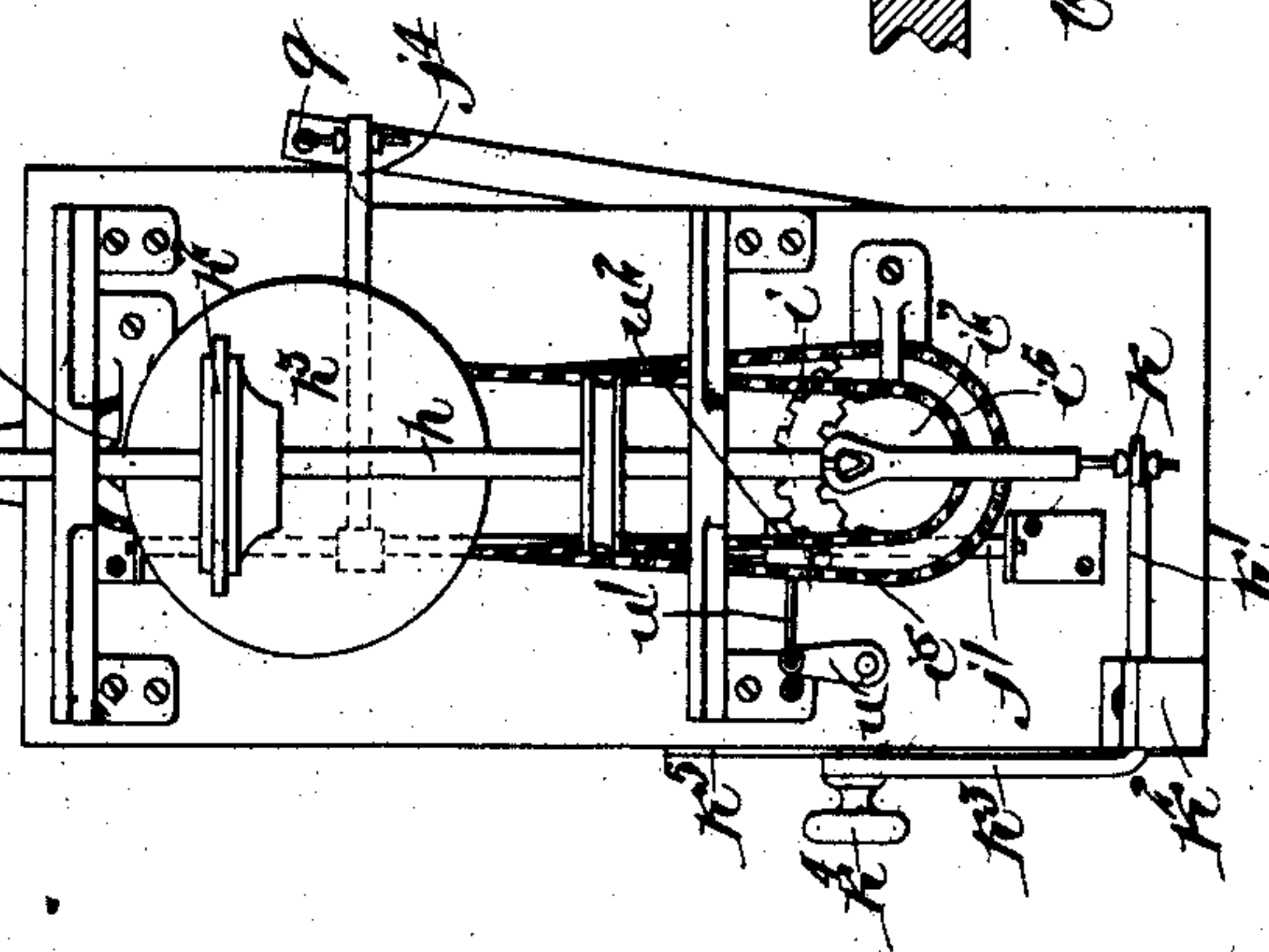
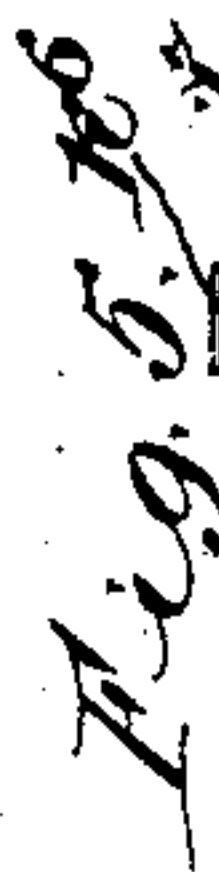
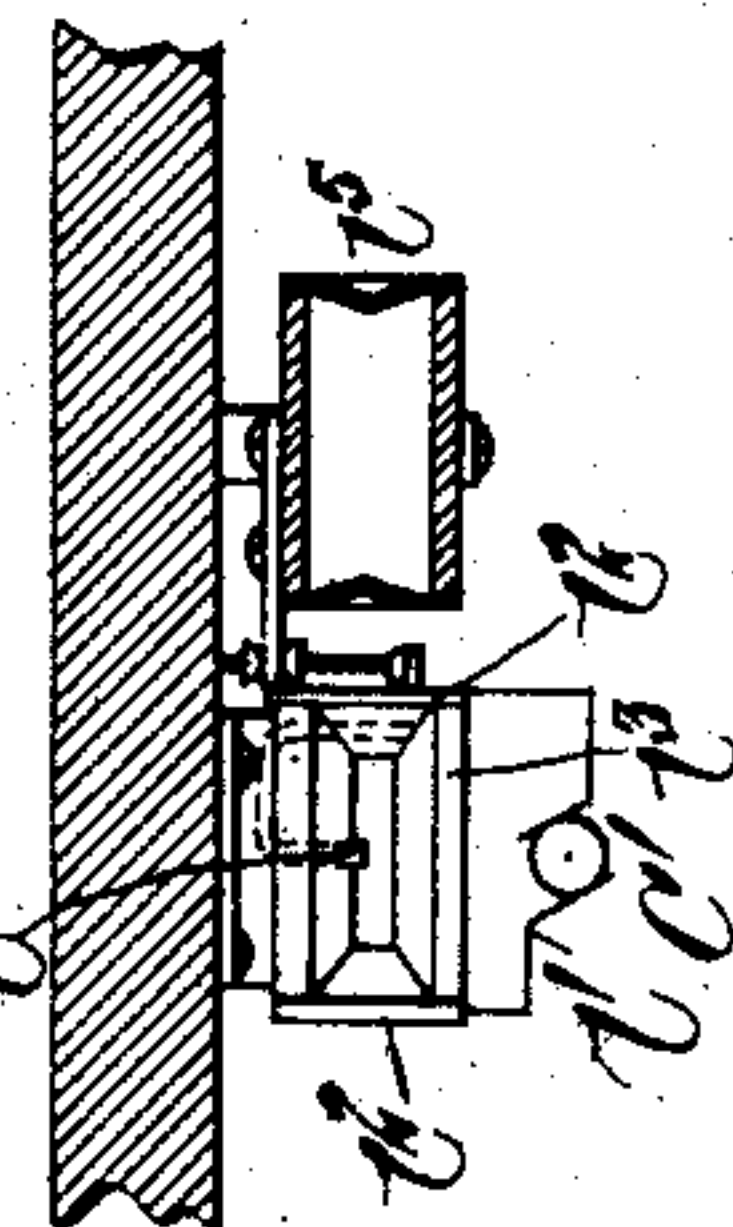
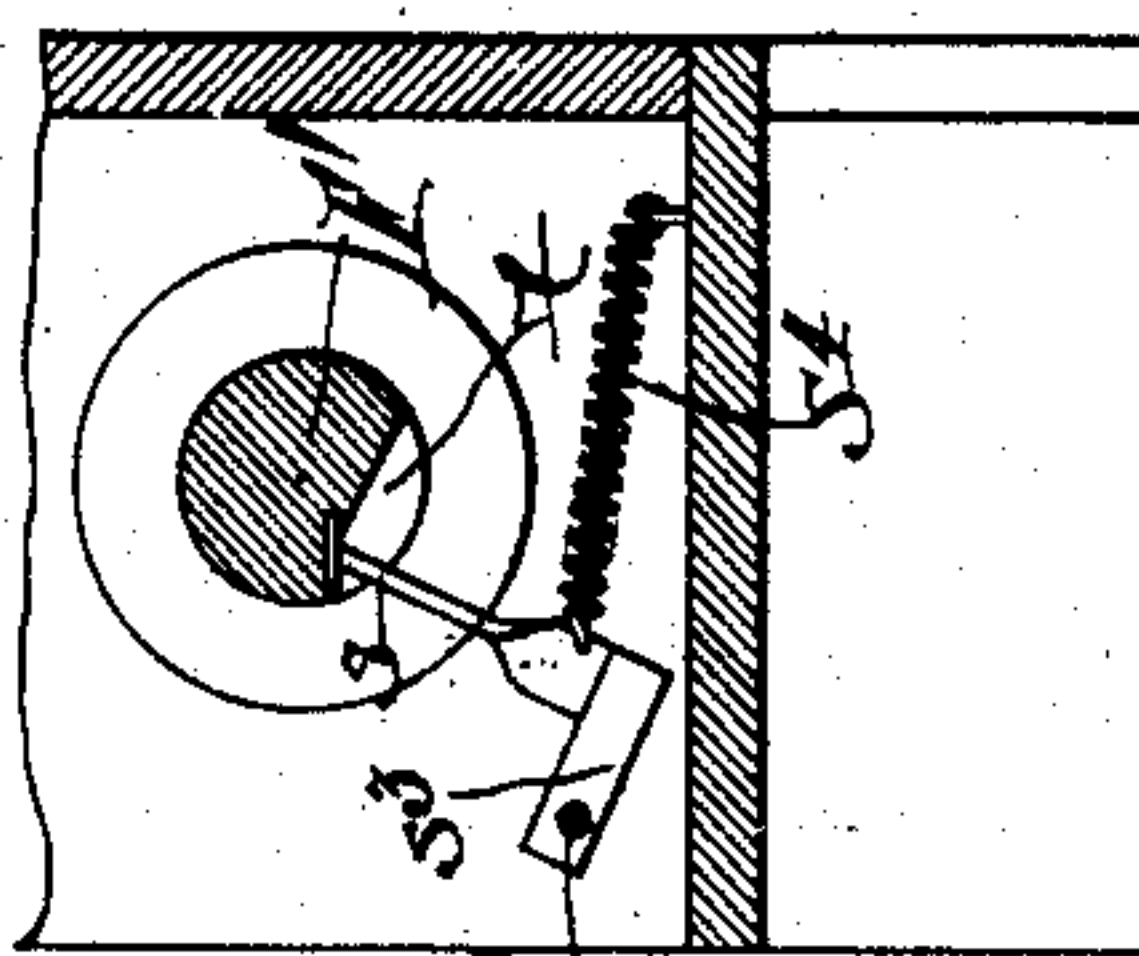
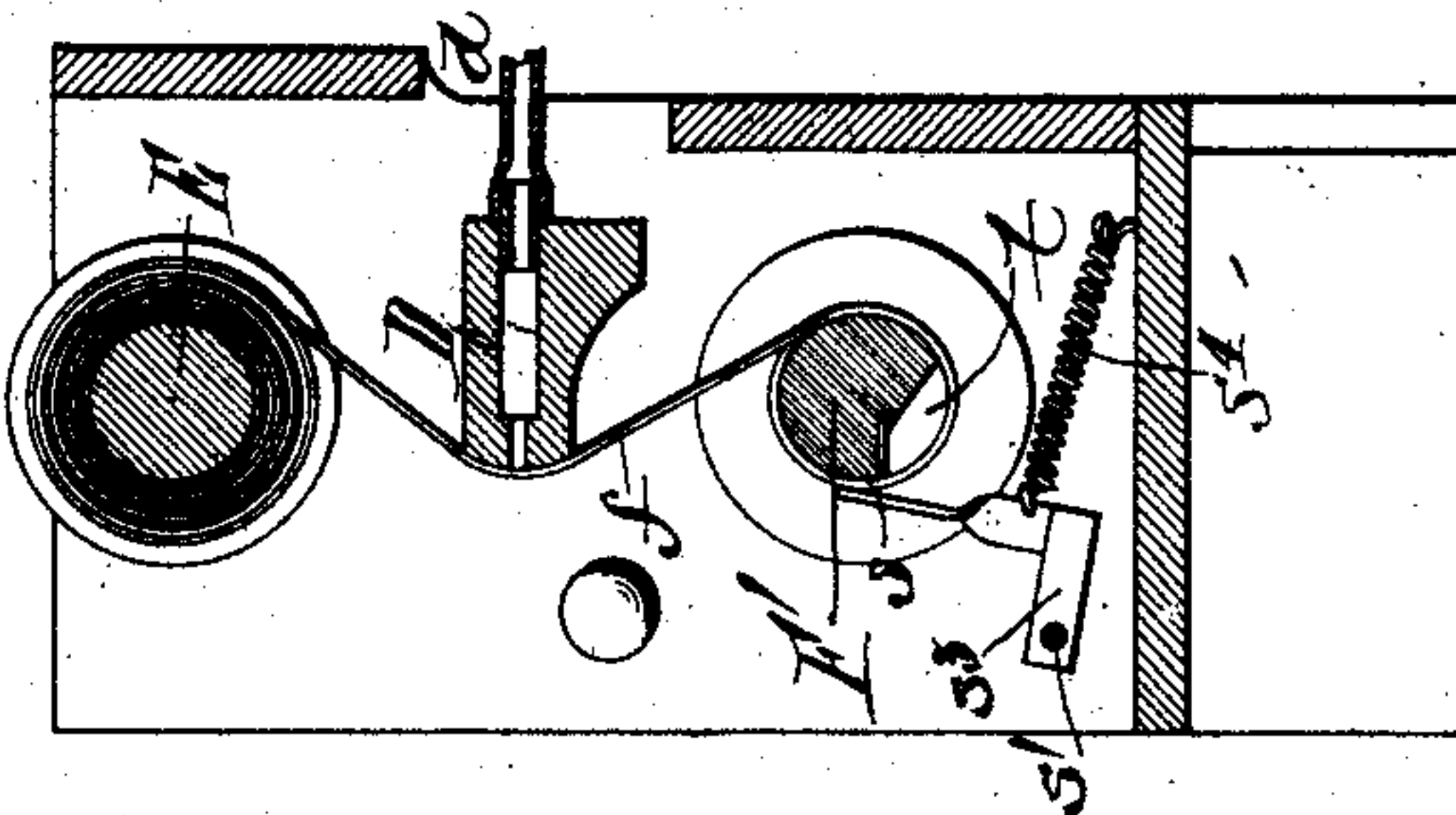
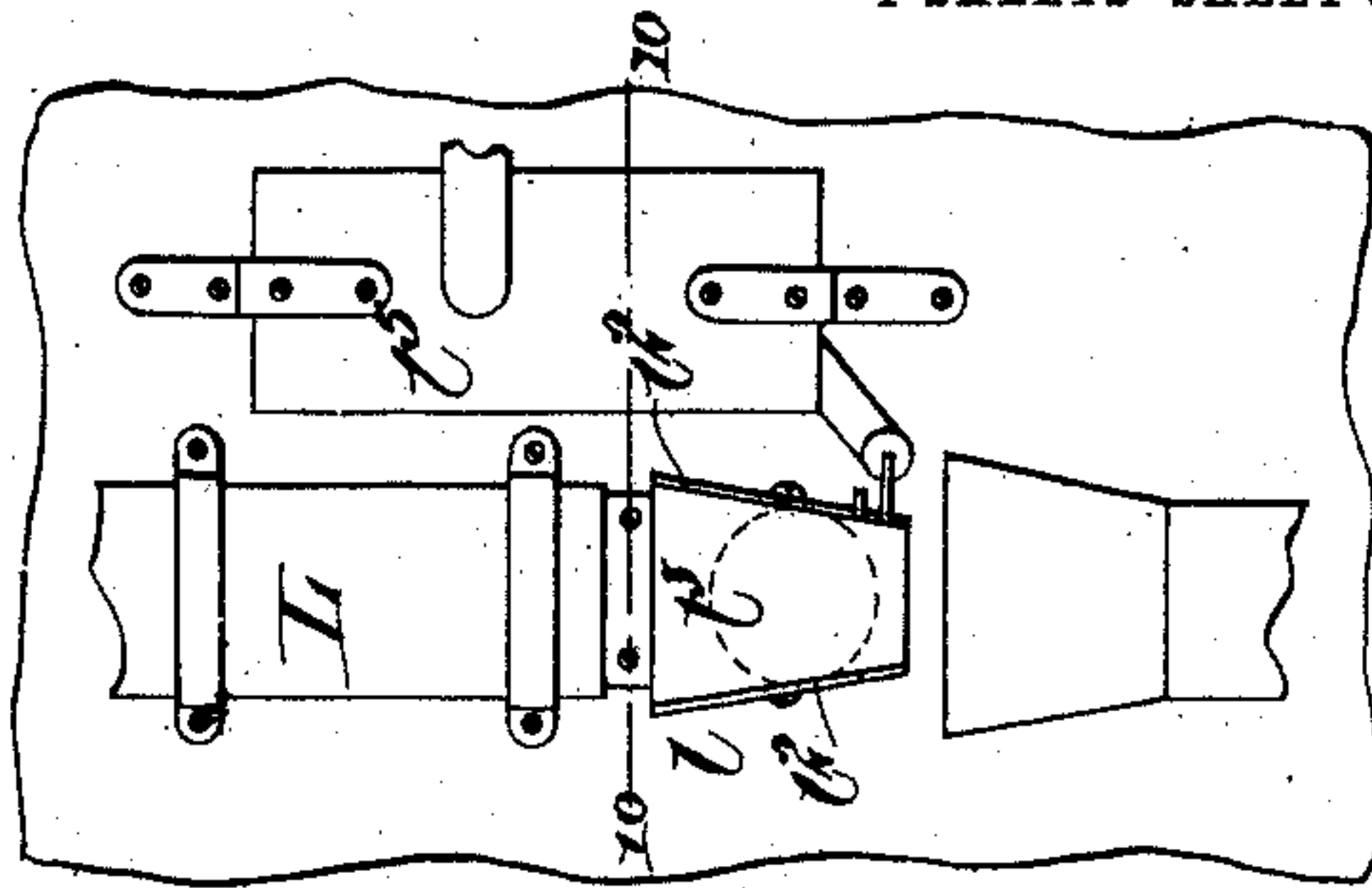


Witnesses:
Gustav W. Horn
Richard L. Brown

Inventor
Eugene de Kleist
by
Geyer & Poff
Attorneys

983,374.

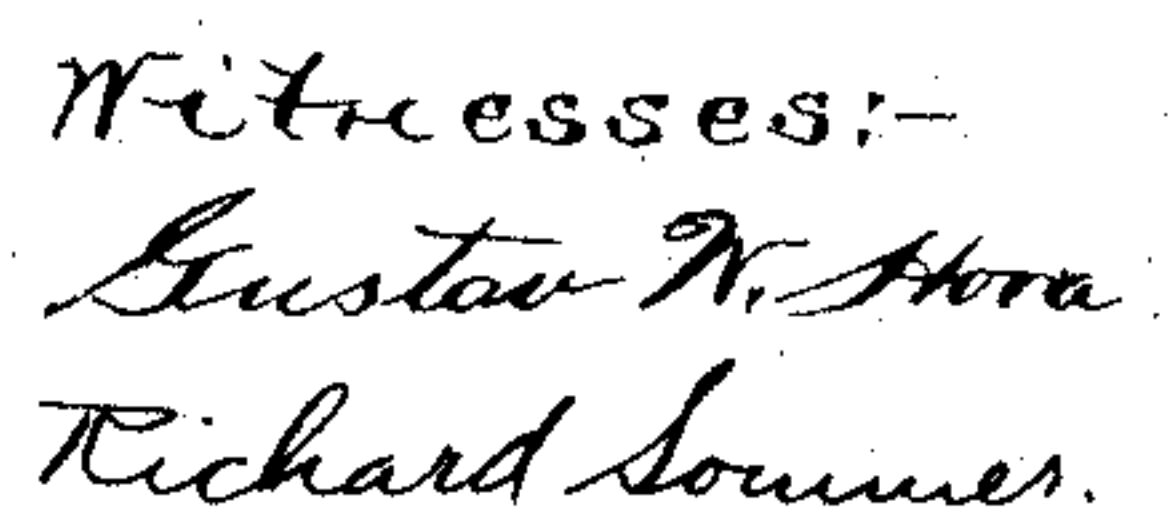
4 SHEETS—SHEET 3.



Inventor
Eugene deKleist,
by Geyer & Popp
Attorneys

983,374.

4 SHEETS—SHEET 4.



Inventor
Eugene de Kleist,
by Geiger Popp
Attorneys.

UNITED STATES PATENT OFFICE.

EUGENE DE KLEIST, OF NORTH TONAWANDA, NEW YORK, ASSIGNOR TO THE RUDOLPH WURLITZER COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

PNEUMATIC MUSICAL INSTRUMENT.

983,374.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed April 13, 1908. Serial No. 426,673.

To all whom it may concern:

Be it known that I, EUGENE DE KLEIST, a citizen of the United States, residing at North Tonawanda, in the county of Niagara and State of New York, have invented a new and useful Improvement in Pneumatic Musical Instruments, of which the following is a specification.

This invention relates to automatic musical instruments in which the pneumatic action is controlled by a perforated music-sheet provided with automatic rewinding means, and more particularly to electrically-driven instruments of this class in which the motor circuit is closed by a coin which is detained in a chute or hopper for a sufficient time to cause the instrument to play one or more tunes, at the end of which period the coin is automatically released to break the motor-circuit and stop the instrument. A coin-releasing mechanism of this kind is shown and described in Letters Patent of the United States No. 713,653, granted to me November 18, 1902.

One of the objects of my invention is to improve the driving and rewinding mechanism and its automatic controlling devices, with a view of simplifying their construction and facilitating repair and renewal of the parts.

A further object is to simplify the means for rendering the pneumatic action inoperative during the rewinding of the music-sheet.

In the accompanying drawings consisting of 4 sheets: Figure 1 is a sectional front elevation of an automatic piano embodying the invention, the piano action and strings being omitted for clearness. Fig. 2 is a rear elevation, on an enlarged scale, of the tracker-mechanism and the driving gear of the music rolls. Fig. 3 is a transverse section of said gear in line 3—3, Fig. 2. Fig. 4 is a plan view of a fragment of the music sheet. Fig. 5 is an end view of said driving gear. Fig. 6 is an enlarged horizontal section in line 6—6, Fig. 1. Figs. 7 and 8 are cross sections of the tracker mechanism showing different positions of the finger which coöperates with the take-up roll. Fig. 9 is a fragmentary face view of the coin-controlling devices, on an enlarged scale. Fig. 10 is a cross section thereof in line 10—10, Fig. 9. Fig. 11 is a diagrammatic transverse section, on an enlarged scale, of

the wind chest and tracker mechanism. Fig. 12 is a fragmentary sectional elevation, on an enlarged scale, of the connection between the music roll and the driving mechanism.

Similar letters of reference indicate corresponding parts throughout the several views.

A indicates the wind chest containing a pneumatic action of any suitable construction, and B, Fig. 11, the motor pneumatics which operate the customary stickers *b* which in turn act upon the piano action, not shown.

C indicates the pump or main suction bellows which is operated by an electric motor *C*¹, and *C*² is a tube connecting the exhaust chamber of the wind chest with said bellows.

D is the tracker board, preferably arranged above the wind chest, and *d* the usual flexible tubes leading from the tracker ducts to the respective chambers of the pneumatic action.

E indicates the music roll and *F*¹ the take-up roll upon which the perforated music sheet *f* is wound. The music-roll and take-up rolls E, *F*¹ are journaled in the uprights *D*¹, *D*², as usual, and are driven alternately by a gearing, preferably constructed as follows: G is an upright shaft suitably supported in the case of the instrument at one side of the tracker mechanism and constantly driven in the same direction from the motor *C*¹ by belts and pulleys, as shown, or by any other suitable gearing. *h* is a counter-shaft supported by brackets projecting from the adjacent upright *D*² and driven from the upright shaft G by a belt *h*¹ running around pulleys secured to said shafts. On the counter-shaft *h* is mounted a friction wheel *h*² which engages the face of a friction disk *h*³ secured to the outer end of a horizontal shaft *h*⁴ slidingly supported in a bracket carried by the upright *D*². The friction disk is constantly pressed against the friction wheel by a spring *h*⁵, Fig. 2, applied to the shaft *h*⁴ between a collar *h*⁶ thereof and the upright *D*². I is a horizontal shaft journaled in the lower portion of the upright *D*² and driven from the upper horizontal shaft *h*⁴ by a sprocket chain *i* running around sprocket wheels *i*¹, *i*² secured to said shafts. To the shaft I is secured a gear pinion *i*³ which meshes with a gear wheel *i*⁴ secured to the shaft of the take-up roll, the shaft I being free to slide in its bearing for throwing its pinion into

and out of gear with the gear wheel of said roll. To the lower horizontal shaft is secured a second sprocket wheel i^5 which is connected by a sprocket chain i^6 with a sprocket wheel i^7 loosely journaled on the shaft of the music roll E and having clutch pins i^8 adapted to interlock with similar pins i^9 carried by a collar i^{10} secured to said shaft. As shown in Figs. 2 and 3, the sliding sprocket wheel i^7 is shifted by an arm j^1 projecting from an upright rock shaft j^1 and having a pin which engages an annular groove j^2 in the hub of said wheel while the pinion shaft I is shifted simultaneously with said sprocket wheel by a similar arm j^3 on said rock shaft having a pin which enters an annular groove in the hub of the sprocket wheel. By this construction and arrangement, the music roll E is thrown out of gear with the driving mechanism when the take-up roll F^1 is moved into gear, and vice versa. The upright rock shaft j^1 is supported on the upright D^2 and provided with an actuating arm j^4 which is operated by the mechanism hereinafter described. It will now be understood that when the upper sliding sprocket wheel i^7 and the pinion shaft I are shifted inwardly, the music roll E is thrown out of gear with the driving mechanism and the take-up roll F^1 is moved into gear therewith, as shown in the drawings, thus driving the take-up roll from the friction disk h^3 through the sprocket chain i and said pinion shaft and causing the music sheet to be wound upon the take-up roll, the friction disk being driven in the proper direction for this purpose. When said sliding sprocket wheel and the pinion shaft I are shifted outwardly, the take-up roll is thrown out of gear and the music-roll is driven forwardly through the pinion-shaft I, the sprocket chain i^6 and sliding sprocket wheel i^7 , thus rewinding the music sheet upon the music roll. To permit the speed of the music and take-up rolls to be varied for different tempos, the friction wheel h^2 is movable toward and from the center of the friction disk. In the preferred construction shown in the drawings, the shaft h of this friction wheel is made vertically adjustable in its bearings and raised or lowered by an arm h carried by a rock shaft h^1 supported in a block h^2 , Figs. 1, 2 and 5. The front end of this shaft carries an arm h^3 having a clamping screw h^4 which passes through a slotted segment h^5 secured to the shelf which supports the tracker mechanism, as seen in Fig. 1. A spring h^6 which bears upon the upper end of the shaft h serves to reliably depress the same in adjusting it.

L Figs. 1 and 9, indicates the coin chute, and l the coin hopper or intercepting device which controls the circuit l^1 (Fig. 10) in which the electric motor C^1 is included. This controlling device is preferably con-

structed substantially as shown and described in the Letters Patent hereinbefore referred to and consists of the hopper l arranged to receive the deposited coin from the chute L and having opposite metallic walls l^2 forming the terminals of the motor-circuit, these walls being electrically connected by the coin which bears edgewise against them and being arranged so closely together that the coin cannot drop through the throat between them. The other two walls of the hopper are of insulating material and one of them consists of a hinged door l^3 through which the intercepted coin is discharged laterally by an ejecting finger l^4 carried by the door and extending through a slot in the wall opposite the door, so that when the latter is opened, the ejector pushes the coin out of the hopper, breaking the circuit and stopping the motor and the instrument. The hopper-door is controlled by a pneumatic l^5 having its movable board suitably connected with the door. The pneumatic is controlled by a series of perforations in the music sheet and a corresponding valve mechanism of the pneumatic action in such manner that the pneumatic is collapsed and caused to open the hopper-door at the end of every tune on the sheet, except the last one, so as to cause the instrument to play a tune for each deposit of a proper coin. Fig. 11 shows this valve mechanism which comprises the customary double puppet valve m , m^1 , controlling the usual air and exhaust ports m^2 , m^3 which communicate respectively with the air chamber M and the exhaust chamber M^1 of the wind chest, the latter chamber being connected with the main suction bellows C by the tube C^2 . The pneumatic l^5 is connected by a tube o with the exhaust and flushing channel o^1 of the corresponding valve mechanism. When a perforation of the music sheet registers with the tracker duct corresponding to the coin controlling pneumatic l^5 , the corresponding puppet valve is elevated or reversed, in a well known manner, placing said pneumatic in communication with the exhaust chamber M^1 of the wind chest and collapsing it, while when an imperforate portion of the sheet passes over said duct, the puppet valve descends, placing said pneumatic in communication with the air chamber M and expanding it.

N, Fig. 2, is a flushing port or passage preferably formed in a fixed block N^1 and connected with the exhaust chamber M^1 of the wind-chest by a tube n . This port is open to the atmosphere at its upper end except when closed by a flushing valve N^2 , preferably of the rocking type shown. This valve is closed by the atmospheric pressure thereon aided by a spring n^1 attached at one end to the block N^1 and at its other end to an arm or standard n^2 secured to the valve.

After the last tune of the music sheet has been played, this flushing valve is automatically opened by a pneumatic P, so as to flush the exhaust chamber of the wind chest during the subsequent rewinding of the music sheet and prevent the instrument from playing during this operation. The pneumatic P is controlled by a properly arranged perforation in the music sheet and a corresponding valve mechanism of the wind chest identical with the valve mechanism of the coin controlling pneumatic L^5 , shown in Fig. 11, p indicating the tube which connects said pneumatic with the exhaust and flushing channel of said valve mechanism. As best shown in Figs. 2 and 5, the actuating arm j^1 of the shaft j^1 is connected with the upper end of the valve arm or standard n^2 by a rod q , by which connection the motion of the music and take-up rolls is reversed simultaneously with the opening of the flush valve N^2 , causing the music sheet to be rewound upon the music roll. As shown in Figs. 2 and 6, the movable upper board of the pneumatic P has an actuating arm p^1 which extends across the tail of the flushing valve.

R is a lock or catch which automatically interlocks with the tail of the flushing valve N^2 when the same is opened and retains it in that position during the rewinding of the music sheet. This catch is yieldingly held in engagement with said valve by a spring r and is disengaged therefrom at the end of the rewinding operation by the action of a finger s cooperating with the take-up roll and secured to a horizontal rock shaft s^1 . This shaft is journaled transversely in the uprights D^1 , D^2 on the front side of the take-up roll and is provided at its left hand end with an arm s^2 which is connected with the tail of the locking catch R, which latter is in the form of a bell crank lever. The finger s is rigidly connected to the free end of an arm s^3 secured to the rock shaft s^1 , as shown in Figs. 7 and 8. The finger extends upwardly from this arm and bears against the convolutions of the music sheet opposite a transverse groove or recess t in the take-up roll, the finger being drawn toward said roll by a spring s^4 . So long as said groove remains covered by the music sheet during the rewinding of the latter, the finger is held in the retracted position shown in Fig. 8, allowing the locking catch R to remain in engagement with the open flushing valve, but as soon as the groove is uncovered by the complete unwinding of the sheet from the take-up roll, the finger is drawn into the groove by its spring s^4 , as shown in Fig. 7, thus rocking the shaft s^1 in the proper direction to withdraw the catch from the flushing valve and allowing the latter to close, as shown in Fig. 2. By this movement of the flushing valve, the upright ac-

tuating shaft j^1 of the driving gear is turned in the proper direction to throw the music roll out of gear and the take-up roll into gear with the driving mechanism, thus causing the music sheet to again travel forwardly. The finger s and the rock shaft carrying it are preferably employed to aid in effecting this movement of the shaft j^1 . For this purpose, said shaft s^1 is provided with a rock arm u , (Figs. 1, 3, 5 and 6), which is connected by a rod u^1 with an arm u^2 secured to the shaft j^1 , and the rear end of the groove t in the take-up roll is abrupt or substantially radial to the roll, as shown in Figs. 7 and 8. By this construction, immediately after the finger s enters said groove, said abrupt end strikes the upper end of the finger and depresses it to the position shown in Fig. 7, thereby positively rocking the shaft s^1 in the proper direction to shift the parts of the driving gear to the position shown in the drawings.

It should be borne in mind that the coin deposited for playing the last tune of the sheet is not discharged when the sheet is fully wound upon the take-up roll, nor during the rewinding of the sheet, otherwise the motor would come to a standstill and the sheet would not be rewound automatically. However, the coin is finally discharged during the initial forward travel of the music sheet following its rewinding operation, by a perforation w in the sheet cooperating with the tracker duct corresponding to the coin-controlling pneumatic L^5 and located a short distance in advance of the perforations w^1 which control the motor pneumatics of the sound-producing parts of the instrument, as shown in Fig. 4. As soon as said perforation w passes over the tracker-board, after the rewinding operation the pneumatic L^5 is collapsed and the coin is discharged, stopping the motor.

w^2 indicates one of the perforations in the sheet which cause the instrument to be stopped after playing one of the several pieces on the sheet except the last.

The operation of the instrument is as follows: In the normal condition of the instrument, the flushing valve L^5 is closed and the driving gear is in position to drive the take-up roll, as shown in the drawings. After the music roll E has been put in place and the music sheet attached to the take-up roll in the usual manner, the rolls are turned by hand far enough to move the head coin-discharge perforation w past the tracker board. Upon now depositing a coin in the chute, the motor-circuit is closed, causing the music sheet to be wound upon the take-up roll. At the end of the first tune, one of the perforations w^2 corresponding to the coin-discharge pneumatic L registers with the corresponding duct of the tracker board, collapsing said pneumatic, discharging the

coin and stopping the instrument. Another coin being deposited in the chute, the instrument plays the second tune and at the end thereof the coin is discharged as before, this action being repeated for each coin, except the one deposited to play the last tune which is retained in the hopper *l* during the remaining operations of the cycle. After the last tune has been played and just before the sheet is fully taken-up by the roll *E*¹, the perforation thereof which controls the opening-pneumatic *P* of the flushing valve *N*² registers with the corresponding tracker-duct, collapsing said pneumatic, opening the flushing valve and at the same time throwing the take-up roll out of gear and the music roll into gear with the driving mechanism through the connection *q* of the shaft *j*¹ with said valve. The music sheet is now automatically rewound and the wind chest is at the same time flushed, rendering the motor pneumatics *B* inactive. The flushing valve is meanwhile locked in that position by the catch *R*. The moment that the sheet is fully unwound from the take-up roll, the finger *s* enters the uncovered groove *t* of said roll, retracting the locking catch *R*, allowing the flushing valve to close and simultaneously reversing the movement of the take-up and music rolls to again propel the music sheet forwardly. The sheet now travels in that direction just far enough to carry its final coin-releasing perforation *w* past the tracker board, when the coin-discharging pneumatic *l*⁵ is again collapsed, the coin discharged and the instrument stopped before the sheet advances far enough to repeat the tunes without the deposit of further coins.

By utilizing the initial forward travel of the rewound music sheet to effect the discharge of the coin after the last piece has been played, the construction of the automatic controlling devices is materially simplified.

The locking catch *R* of the flushing valve positively holds the latter open against the tendency of the atmospheric pressure to close it and thereby also prevents the parts of the driving gear from accidentally shifting out of place.

I claim as my invention:

1. In an instrument of the character described, the combination with a wind chest, a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, of roll-driving mechanism, shiftable members for alternately connecting said rolls with the driving mechanism, and a flushing device for the wind-chest controlled by the tracker-mechanism and controlling said shiftable members.

2. In an instrument of the character described, the combination with a wind chest,

a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, of roll-driving mechanism, shiftable members for alternately connecting said rolls with the driving mechanism, a flushing valve for the wind chest controlled by the tracker-mechanism, and means for operatively connecting said shiftable members with the flushing valve.

3. In an instrument of the character described, the combination with a wind chest, a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, of roll-driving mechanism, shiftable members for alternately connecting said rolls with the driving mechanism, a shaft connected with said shiftable members and having a rock-arm, a flushing valve for the wind-chest controlled by the tracker-mechanism and having a projecting arm, and a connection between the arm of said valve and said rock-arm.

4. In an instrument of the character described, the combination with a wind chest, a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, of roll-driving mechanism, shiftable members for alternately connecting said rolls with the driving mechanism, a flushing valve for the wind chest controlled by the tracker-mechanism, means for operatively connecting said shiftable members with the flushing valve, means for locking said valve in its open position, and releasing means for said locking means controlled by the take-up roll.

5. In an instrument of the character described, the combination with a wind chest, a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, said take-up roll having a recess, roll-driving mechanism, shiftable members for alternately connecting said rolls with the driving mechanism, a flushing valve for the wind chest controlled by the tracker-mechanism and controlling said shiftable members, a lock for retaining said valve in its open position, and a releasing finger for said lock coöperating with said recess.

6. In an instrument of the character described, the combination with a wind chest, a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, said take-up roll having a recess, roll-driving mechanism, shiftable members for alternately connecting said rolls with the driving mechanism, a flushing valve for the wind chest controlled by the tracker mechanism and controlling said shiftable members, a lock for retaining said valve in its open position, a rock shaft arranged parallel with the take-up roll and carrying a finger arranged to

enter the recess in said roll when the music sheet is unwound therefrom, and means for operatively connecting said lock with said rock-shaft.

5 7. In an instruments of the character described, the combination with a wind chest, a pneumatic action and tracker mechanism including a perforated music-sheet and music and take-up rolls, said take-up roll
10 being provided with a recess having an abrupt end, of driving mechanism having shiftable members for alternately connecting said rolls therewith, a rock shaft carrying a finger arranged opposite the recess of
15 the take-up roll, and means for operatively connecting said shiftable members with said rock shaft.

8. In an instrument of the character described, the combination with a wind chest, a
20 pneumatic action and tracker mechanism in-

cluding a perforated music-sheet and music and take-up rolls, said take-up roll being provided with a recess having an abrupt end, of driving mechanism having shiftable
25 members for alternately connecting said rolls therewith, an actuating shaft connected with said shiftable members, a flushing valve for the wind-chest controlled by the tracker-mechanism, a lock for retaining said
30 valve in its open position, a rock shaft carrying a finger arranged opposite the recess of the take-up roll, and means for operatively connecting said rock-shaft with said lock and said actuating shaft.

Witness my hand this 9th day of April, 35
1908.

EUGENE DE KLEIST.

Witnesses:

O. F. GEYER,
E. M. GRAHAM.