

974,963.

Patented Nov. 8, 1910.

4 SHEETS—SHEET 1.

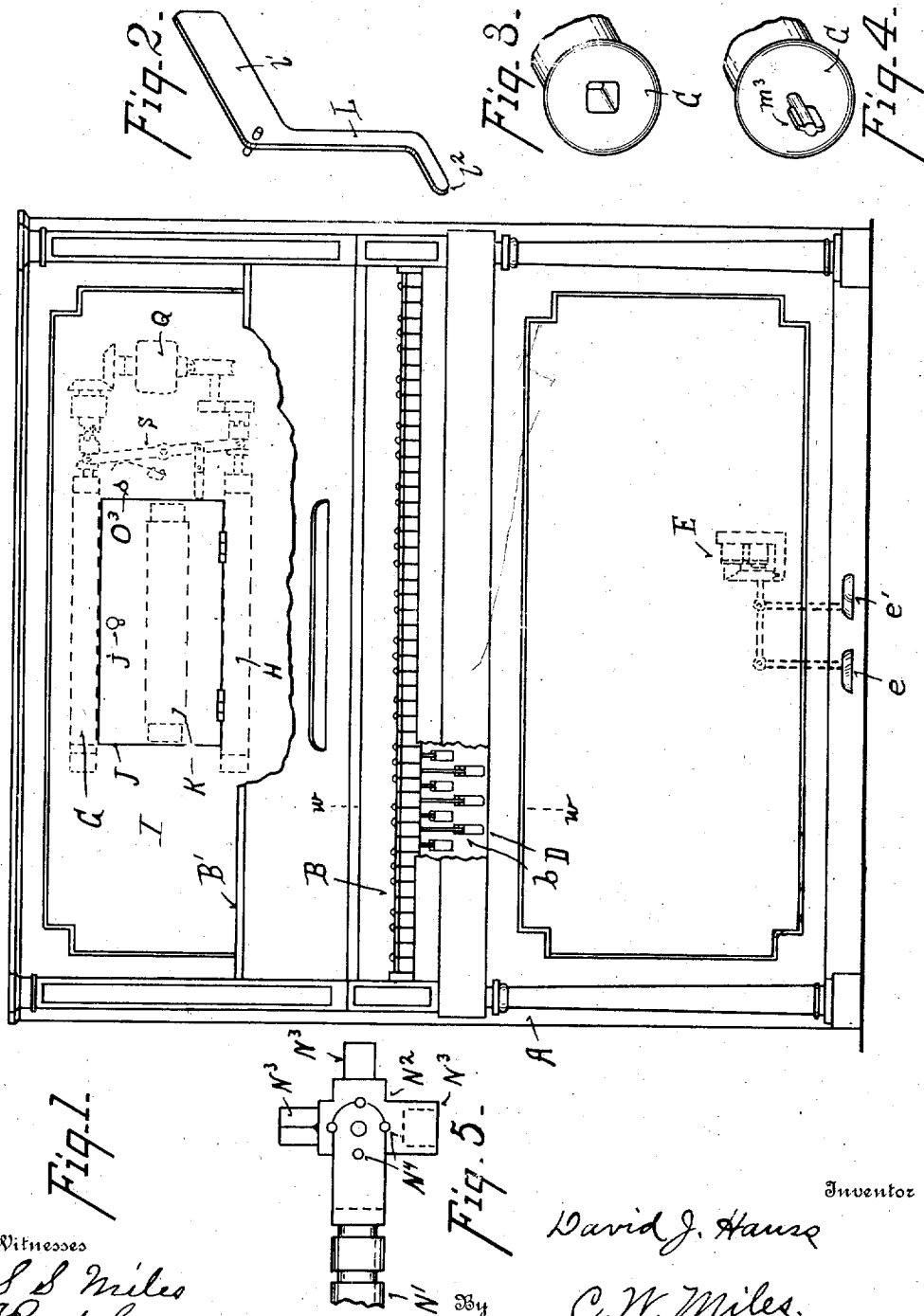
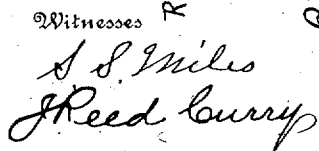


Fig. 1.
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4 SHEETS—SHEET 2.



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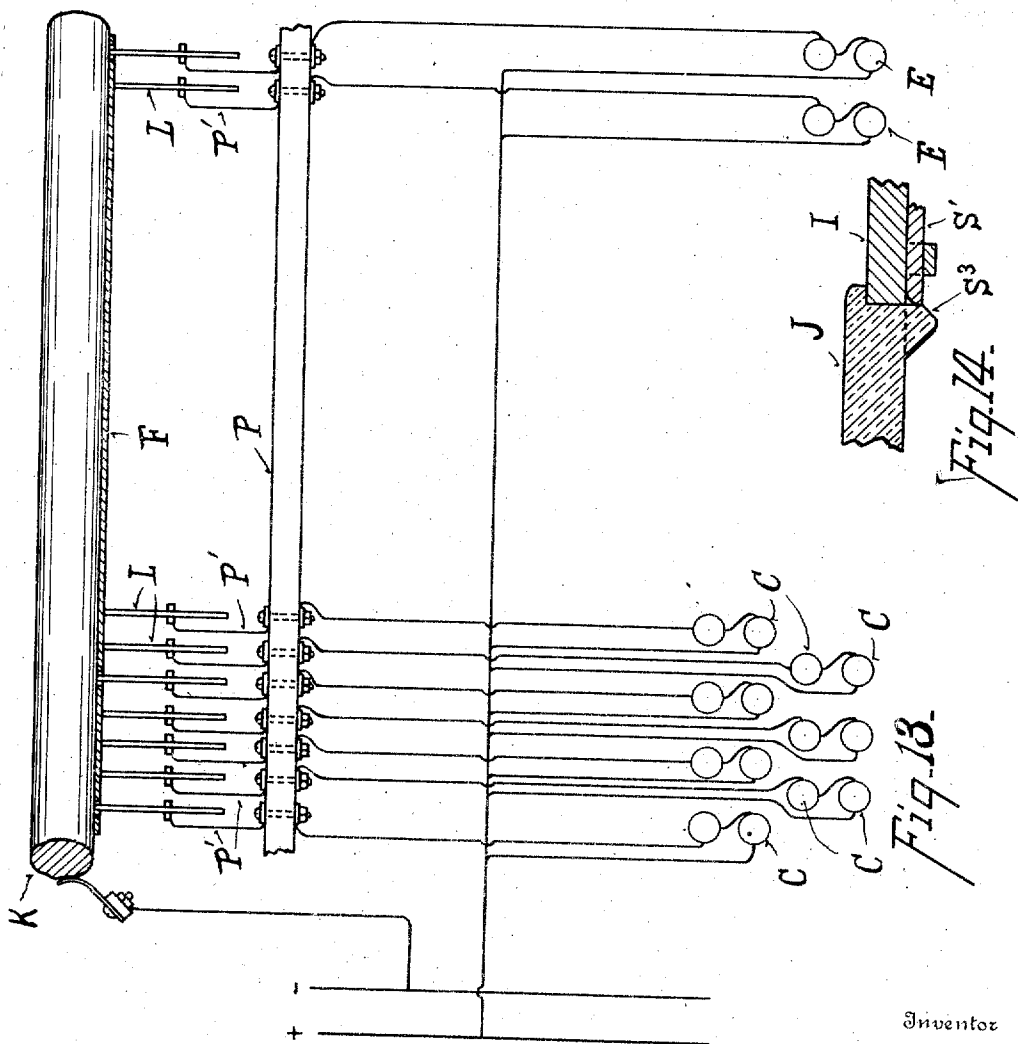
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APPLICATION FILED OCT. 12, 1908.

974,963.

Patented Nov. 8, 1910.

4 SHEETS—SHEET 4.



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ELECTRICAL PIANO.

974,963.

Specification of Letters Patent.

Patented Nov. 8, 1910.

Application filed October 12, 1908, Serial No. 457,224.

To all whom it may concern:

Be it known that I, DAVID J. HAUSS, a citizen of the United States, residing at Aurora, in the county of Dearborn and State of Indiana, have invented certain new and useful Improvements in Electrical Pianos, of which the following is a specification.

My invention relates to improvements in mechanism for electrically operating pianos and other musical instruments. One of its objects is to provide mechanism for actuating the rollers carrying the perforated sheet of music.

Another object is to provide improved mechanism by means of which the respective electrical circuits are closed as the perforated sheet is fed forward.

Another object is to provide improved means for transposing the key of the music and cutting out of circuit part of the actuating keys when required.

Another object is to provide an improved arrangement of rollers over which the perforated sheet is fed and to prevent injury to the sheet.

It further consists in certain details of form, combination, and arrangement, all of which will be more fully set forth in the description of the accompanying drawings, in which:

Figure 1 is a front elevation of a piano, partly broken away, with my improvements attached thereto. Fig. 2 is a perspective view of one of the fingers by means of which electrical contact is made through the perforations of the sheet. Fig. 3 is a perspective view of the end of one form of sheet roller. Fig. 4 is a similar view of another form of sheet roller. Fig. 5 is a detail view of one form of mechanism employed to engage and drive the sheet roller. Fig. 6 is a rear plan of the sheet-supporting and driving mechanism, partly broken away. Fig. 7 is a section on line *x x* of Fig. 6. Fig. 8 is a perspective view of a portion of the bar carrying the contact fingers. Fig. 9 is a perspective view of one of the springs employed to connect the contact fingers in circuit. Fig. 10 is an enlarged section on line *w w* of Fig. 1 through the key actuating mechanism. Fig. 11 is a detail sectional view of the key actuating mechanism on line

v v of Fig. 10. Fig. 12 is a detail view partly in section of the sheet roller supporting and driving mechanism, and showing a modification of Fig. 5. Fig. 13 is a diagram illustrating the electrical connections. Fig. 14 is a detail horizontal section through the bar *S'* and part of the panel *I* and door *J* along the center of *h* bar *S'* in Fig. 6.

In the accompanying drawings *A* represents the case of a piano of ordinary construction.

B represent the keys and *B'* the lid or fall adapted to be turned down to cover and protect the keys. Beneath the keys is a compartment *b* in which is located a metal plate *b'* preferably of iron which carries a series of electromagnets *C* to actuate the piano keys. I preferably arrange the magnets *C* in two or more rows, and in staggered arrangement, which permits the use of magnets of ample size, and an arrangement of the respective magnets immediately beneath the keys they are to operate. Plate *b'* is provided with projection *c* to which are hinged at *c'* the armatures *D* of the magnets. The poles *c''* of the magnets are preferably provided with flat heads, and the poles *c'''* preferably with heads having beveled faces *c''''*, the free ends of the armatures *D* being also provided with correspondingly beveled faces *d*. The beveled faces permit a greater movement of the armature with a given gap between the armature and pole than otherwise. Arms *d'* project from the armature *D* and are connected or clamped to cords or flexible connections *d''* which are attached at their opposite ends to the piano keys, forming noiseless connections. Thus when an electric current is established through any one of the magnets *C* a corresponding piano key is depressed, while the keys are free to be operated by hand in the usual manner. Electromagnets *E*, of similar construction, are provided to operate the pedals *e e'*.

The electric current to actuate the piano keys is controlled by means of a perforated sheet or roll of paper or similar material *F* which is unwound from a roller *G* onto a roller *H*. The rollers *G H* are detachably held between centers *g g'* and *h h'* journaled

to the rear face of a detachable panel I forming the upper face of the piano frame. The panel I is provided with a door J which is hinged thereto at its bottom, and held in the closed position by a latch j . To the inner face of door J is journaled a metal roller K which when the door J is closed presses against the sheet F, pressing it against a series of contacts L, as indicated in Fig. 7, and when the door J is opened the roller K is out of contact with the sheet F which travels in a direct line from roller G to roller H, and free from the contacts L.

As the rollers G carrying the perforated sheet F, and which have heretofore been operated pneumatically, may be obtained in commerce of different lengths and with the sheets of different widths and perforated to actuate a different number of keys, and as the ends of different rollers are adapted to be engaged by centers of different construction, I provide engaging members, Figs. 6 and 12, adapted to engage rolls of different lengths, and also having centers or clutch members of different forms to engage different styles of rollers ordinarily found in commerce. These engaging members comprise a spindle m splined to the driving shaft m' , and at its forward end m^2 recessed and adapted to engage the stud m^3 of a roller such as shown in Fig. 4. The spindle m is splined to sleeve N which is driven thereby and journaled in box n . The spindle m is adjustable endwise in the sleeve N and locked to its adjusted position by a latch n' engaging either one of the grooves n^2 . The sleeve N is adjustable endwise to accommodate rolls of different lengths and locked to its adjusted position by means of latch n^3 carried by box n engaging annular grooves n^4 . At the opposite end roller G is supported by stud g' carried by an endwise adjustable rod g^2 locked to its adjustable position by latch g^3 . The roller H is supported by mechanism similar to that employed to support roller G. When in the position shown in Fig. 12 the hollow rectangular stud engages a corresponding recess in the end of a roller such as shown in Fig. 3, while the end m^2 of spindle m is retracted. As shown in Fig. 6 the end m^2 is in engagement with stud m^3 of roller G and the stud g is retracted.

In the modification, Fig. 5, the sleeve N' is driven by the shaft and adjustable endwise as shown in Fig. 12; its forward end, however, is armed with a member N² pivotally attached thereto and having a plurality of arms N³ to engage the ends of different rollers. The member N² may be turned to bring any one of arms N³ to position for use and locked to such position by pins N⁴.

A bar of insulating material O is supported upon studs O' O² carried by panel I and

provided with slots to provide for endwise movement of bar O for the purposes of transportation. The stud O' is rotatable by means of a handle O³ on the front of panel I and is provided with a cam o which engages pins o' o^2 to shift bar O endwise. Means other than shown may be employed if desired to shift bar O endwise. Bar O has cut therein a series of slots o^3 corresponding in number to the keys of the instrument. In the slots o^3 are mounted a series of contacts or fingers L which are pivoted by means of short pins resting in the slot l of bar O. The weighted ends l' of fingers L cause the ends l^2 of said fingers to normally press against and ride upon the sheet F and to enter any perforations therein so as to contact with the metal roller K and thereby close an electric circuit through one of the magnets C to actuate the keys.

Where narrow music sheets are employed or where it is desired to cut part of the keys out of circuit, I provide a slot o^4 in bar O in which slot are seated bars o^5 which may be moved independently or if desired arranged to slide in unison with the endwise movements of the members N and g^2 . The inner ends of bars o^5 serve to lift such fingers L as they come in contact with out of contact with the sheet on roller K, and thus cut the corresponding keys out of circuit.

P represents a detachable bar supported at its ends in brackets p , which brackets are preferably attached to the rear of panel I. The bar P is provided with a series of spring fingers P' which as the bar P is placed in position bear upon the respective fingers L above their pivot point as shown in Fig. 7. These springs P' may if desired be permitted to rest upon the pivot pins of the respective fingers L. The bar P has attached thereto and in electrical contact with springs P' a series of electric wires leading from the respective magnets C while a common return wire is in electrical contact with roller K. Thus the bar P may be readily detached and replaced as desired, and gives ready access to the bar O and fingers L which may be independently detached and replaced.

I preferably employ an electric motor Q to drive the rollers G H. A worm Q' on the motor shaft engages and drives a worm wheel Q² which in turn drives a gear Q³ transmitting motion to a gear Q⁴ loose on the shaft Q⁵ which serves by means of clutch members Q⁶ Q⁷ to drive the roller H at a slow rate of speed while the sheet is being moved in the direction to play the music. At the opposite end of the motor shaft is a beveled friction gear R which drives a beveled friction gear R' loose on shaft m' which shaft by means of clutch members R² R³ serves to drive the roller G

at a comparatively rapid rate to rewind the sheet onto roller G after the piece has been played. A pivoted lever S serves to shift the clutch members Q⁶ R³ to reverse the feed of the sheet. A spring R⁴ serves to normally throw the clutch members R² R³ into engagement, while a bar S' attached to lever S by a link S² engages an incline S³ on the side of door J by which bar S' is shifted endwise to throw clutch members Q⁶ Q⁷ into engagement (see Figs. 6 and 14). Thus when the door J is open clutch members R² R³ are in engagement to wind the sheet on roller G and the roller K is out of contact with the sheet and the sheet away from the fingers L so as not to be liable to be injured thereby, while when door J is closed clutch members Q⁶ Q⁷ are in engagement to drive roller H, and the roller K presses the sheet into contact with fingers L, which are not liable to injure the sheet when the sheet is feeding toward roller H.

When the bar O is shifted endwise to change the key of the music, the free ends of spring fingers P' have sufficient spring movement sidewise to retain their positions in contact with the respective members L. The member K is preferably a roller journaled to door J, but may if desired be a stationary member mounted on door J in place of a rotating member.

The mechanism illustrated and described is applicable for operating other musical instruments, and is capable of considerable modification without departing from the principle of my invention.

Having described my invention, what I claim is:

1. In a mechanism of the character described, a perforated sheet, a pair of stationarily journaled sheet-feeding rollers, a series of contact fingers, a door hinged to the casing of the instrument and opening outwardly, a contact member mounted upon said door and adapted when said door is closed to engage and press the sheet into contact with said contact fingers, and a plurality of electrical circuits adapted to be closed by the contact of said fingers with said contact member.

2. In a mechanism of the character indicated, a supporting member, a perforated sheet, a pair of sheet feeding rollers rotatably supported upon said supporting member, a series of contact fingers, a door hinged to said supporting member, a contact member carried by said door and adapted when said door is closed to press the perforated sheet into engagement with said contact fingers, a motor, transmitting-mechanism receiving motion from said motor and adapted to rotate the respective sheet feeding rollers in opposite directions, and clutch mechanism

actuated by the movements of said door to reverse the direction of feed of said sheet when said door is opened or closed.

3. In a mechanism of the character indicated, a casing and supporting member, a perforated sheet, a pair of sheet-feeding rollers rotatably supported upon said supporting member, a bar carried by said supporting member, a series of contact-fingers pivotally supported by said bar, a movable contact adapted to press the sheet into contact with said contact fingers, and a detachable bar carrying a series of spring fingers, said spring fingers resting upon the pivotal portion of said contact fingers in electrical contact with said contact fingers.

4. In a mechanism of the character indicated, a supporting member, a sheet of music, a pair of sheet-feeding rollers rotatably supported upon said supporting member, a bar carried by said supporting member and adapted to be shifted endwise relative to said frame, means for shifting said bar, a series of contact fingers carried by and pivotally mounted on said bar, a series of spring fingers pressing upon the pivotal portion of said contact fingers to secure independent electrical contact with the respective contact fingers, and a movable contact member adapted to press said sheet into engagement with said contact fingers.

5. In a mechanism of the character indicated, a supporting member, a sheet of music, a pair of sheet-feeding rollers rotatably supported upon said supporting member, a bar of insulating material carried by said supporting member and provided with a series of vertical recesses, a series of contact fingers pivotally supported upon said bar and supported within and limited as to movement by said recesses, a bar of insulating material detachably supported in rear of said first named bar, a series of spring fingers carried by said last named bar, the free ends of said fingers resting on and establishing electrical contact with the pivotal portion of said fingers, and a movable contact member adapted to press said sheet into contact with said fingers.

6. In a mechanism of the character indicated, a supporting member, a sheet of music, a pair of sheet feeding rollers rotatably supported upon said supporting member, a bar of insulating material carried by said supporting member, a series of contact fingers pivotally supported upon said bar and adapted to contact with said sheet, and means carried by and adjustable on said bar to shift one or more of said contact fingers out of engagement with said sheet.

7. In a mechanism of the character indicated, a supporting member, a sheet of music, a plurality of sheet supporting and

feeding rollers, a bar carried by said supporting member, a plurality of contact fingers pivotally supported upon said bar and weighted to hold the points of said contact fingers in engagement with one face of the sheet, a door opening outwardly relative to said supporting member, and a contact member carried by said door and adapted when said door is closed to engage the opposite

face of said sheet to press the sheet into contact with said fingers. 10

In testimony whereof I have affixed my signature in presence of two witnesses.

DAVID J. HAUSS.

Witnesses:

WALTER F. MURRAY,
C. W. MILES.