

J. F. WHITE.
MECHANICAL PIANO PLAYER.
APPLICATION FILED OCT. 18, 1911.

Patented Mar. 11, 1913.

5 SHEETS—SHEET 1.

1,055,847.

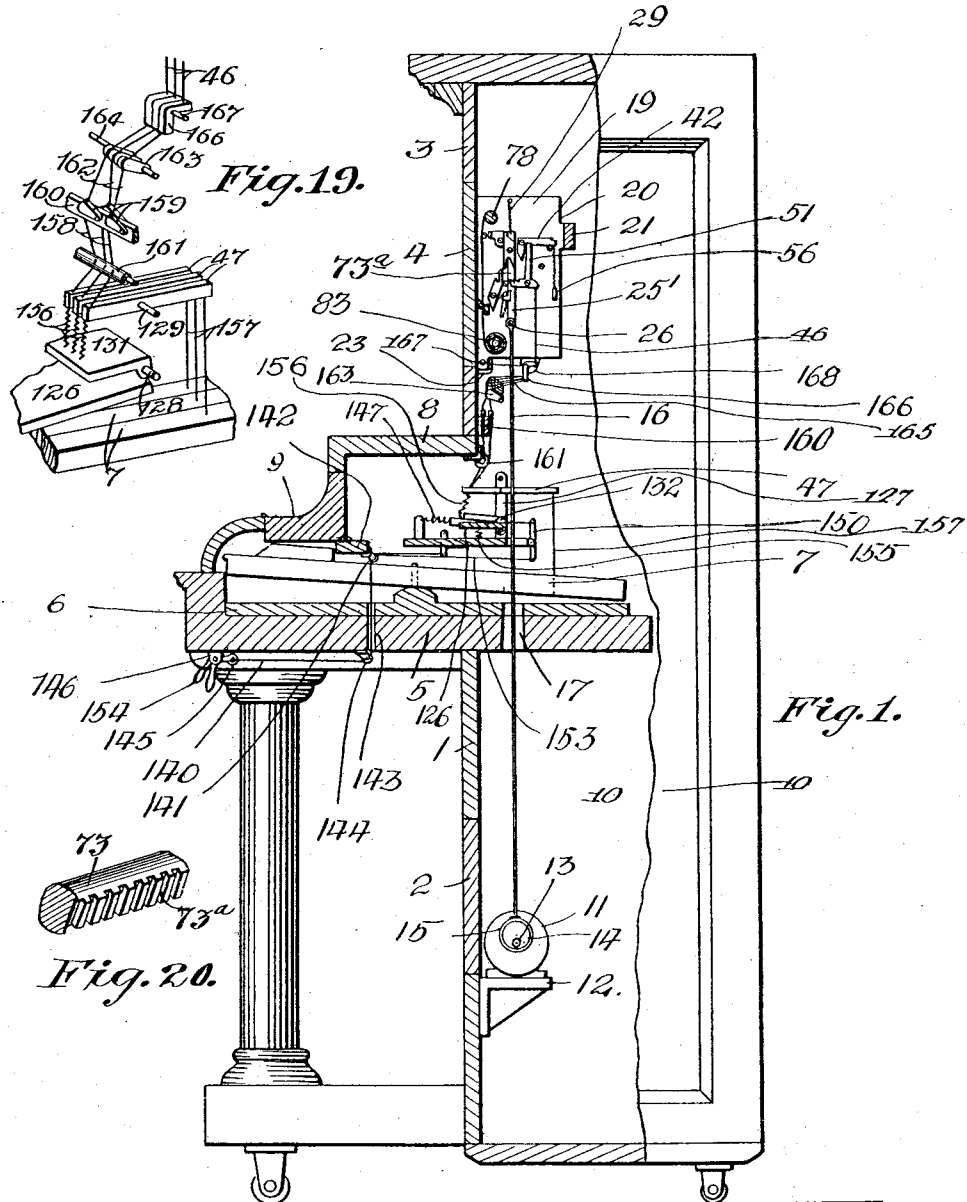


Fig. 19.

Fig. 20.

Fig. 2.

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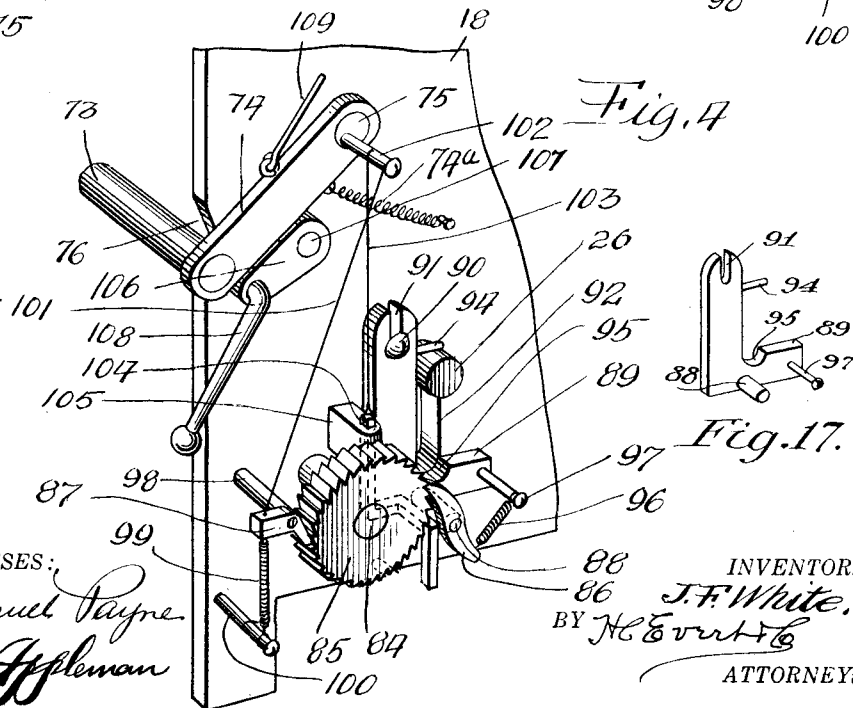
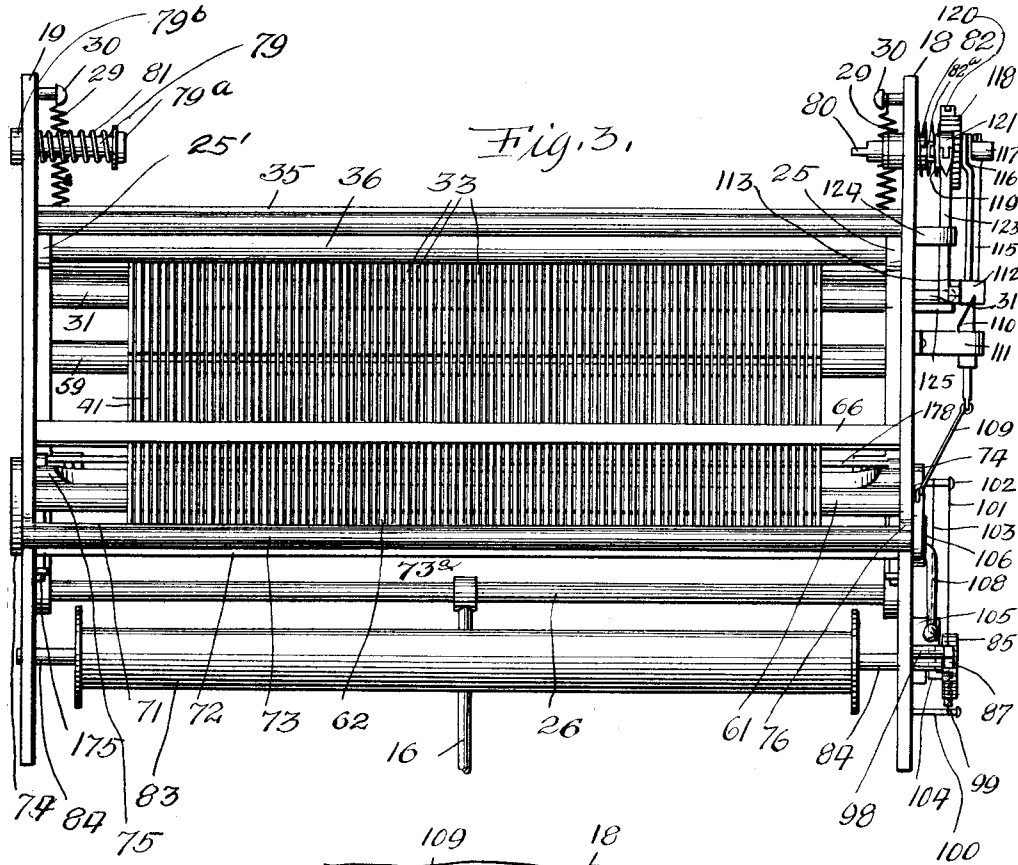
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5 SHEETS—SHEET 2.

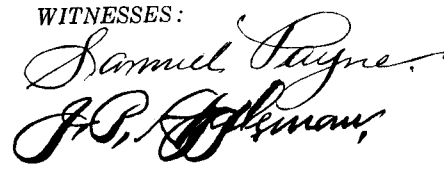


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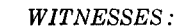
5 SHEETS—SHEET 3.



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6 SHEETS--SHEET 4.



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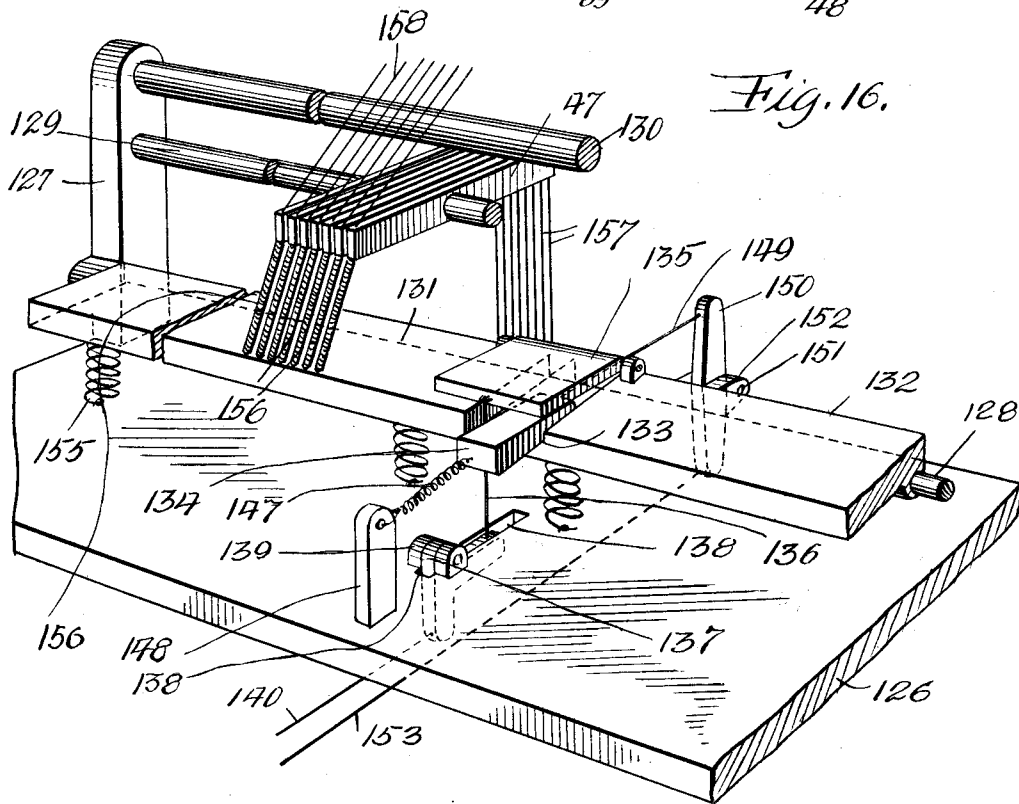
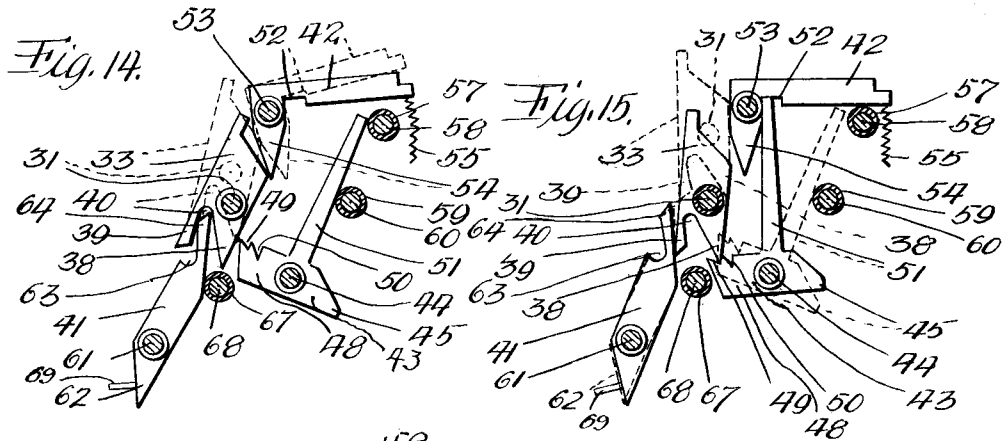
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MECHANICAL PIANO-PLAYER.

1,055,847.

Specification of Letters Patent.

Patented Mar. 11, 1913.

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To all whom it may concern:

Be it known that I, JOHN F. WHITE, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Mechanical Piano-Players, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to mechanical players for musical instruments and to certain improvements in Patent No. 975,187 granted to me November 8th, 1910, also on devices shown in my pending applications for Letters Patent Serial Nos. 462,446 and 596,128, filed November 13th, 1908 and December 7th, 1910.

The present invention aims to simplify the construction of my prior inventions and insure a more positive coöperation of the various parts of the player mechanism.

The invention further aims to provide a mechanical player having a simple form of expression mechanism that is easily controlled by the operator of the piano.

With the above and such other objects in view as may hereinafter appear, the invention resides in the novel construction, combination and arrangement of parts to be hereinafter specifically described and then claimed.

Reference will now be had to the drawings, wherein like numerals denote corresponding parts throughout the several views, in which:—

Figure 1 is an end view of a piano, partly broken away and partly in section, showing the mechanical player partly in elevation and partly in section; Fig. 2 is a front elevation of a portion of the spreading frames of the player; Fig. 3 is a front elevation of a portion of the player mechanism; Fig. 4 is a perspective view of a portion of the selector mechanism; Fig. 5 is an enlarged perspective view of a portion of the player mechanism, showing groups of actuating levers; Fig. 6 is a perspective view of a portion of the rewind mechanism; Fig. 7 is an end view of the player mechanism; Fig. 8 is a vertical sectional view of the same in an inactive position; Fig. 9 is a perspective view of a portion of the selector mechanism illustrating a retracting device; Figs. 10 to 13 inclusive are detail views of the retracting device; Figs. 14 and 15 are detail views

of the actuating levers of the player mechanism, showing by full and dotted lines various positions the actuating levers assume during the operation of the player; Fig. 16 is an enlarged perspective view of a portion of the expression mechanism of the player; Fig. 17 is a perspective view of a detached gravity arm; Fig. 18 is a perspective view of a cross head forming part of the rewind mechanism; Fig. 19 is a perspective view of a train of mechanism forming part of the piano player; Fig. 20 is a detail perspective view of a part of the retaining rod for the selector levers.

Reference will first be had to Fig. 1 of the drawings showing those parts of an upright piano to which the player mechanism is especially related. The reference numeral 1 denotes the lower front panel of a piano case, 2 a movable section of said panel, 3 an upper front panel, 4 a movable section thereof, 5 the key bed, 6 the key board for fulcrumed keys 7, 8 the ledge, 9 a portion of the covering for the keys 7, and 10 the end walls of the piano case, these portions, with the exception of the movable sections 2 and 4 of the panels 1 and 3 respectively being common to the ordinary type of piano. The player mechanism is located in the upper part of the piano case and it is preferable to locate the operating mechanism in the lower part of the case. The operating mechanism comprises an electric motor 11 operable from a suitable source of electrical energy located either in the base of the piano case or at some other remote point with suitable connections with the motor. The motor is supported upon a bracket 12, carried by the inner side of the panel 1 adjacent to the detachable section 2 of said panel. The armature 13 of the motor 11 has an eccentric 14 and loosely mounted upon said eccentric is a band or ring 15 suitably connected to an operating rod 16, said rod extending upwardly through openings 17 provided therefor in the key bed 5 and the board 6 into the upper part of the piano case.

Reference will now be had to Figs. 1, 3, 5, 7 and 8, wherein there is illustrated the player mechanism that is located in the upper part of the piano case in proximity to the movable section 4 of the upper panel 3 of said piano case, whereby said movable section can be swung to an open position and the selector mechanism of the player placed into a playing condition. The player mech-

anism is mounted between two end plates 18 and 19 connected by a longitudinal bar 20 suitably secured to a longitudinal frame 21 connecting the end walls 10 of the piano case. The end plates 18 and 19 have depending apertured lugs 22 and these lugs can be connected to brackets 23, carried by the inner side of the panel 3, adjacent to the opening closed by the movable section of said panel. Slidably arranged against the inner sides of the plates 18 and 19 are the ends of a reciprocatory frame best shown in Figs. 3, 7 and 8, comprising side bars 25' and 25 having the lower ends thereof connected by a longitudinal rod 26, and connected to this rod, intermediate the ends thereof, is the upper end of the operating rod 16. The upper ends of the bars 25' and 25 have heads 27 and connected to said heads, by screws 28, are the lower ends of retractile springs 29 having the upper ends thereof connected to screws or pins 30, carried by the inner sides of the plates 18 and 19. These springs are adapted to retain the reciprocatory frame normally in an elevated position, said frame being lowered once in each revolution of the eccentric 14 of the motor 11. The bars 25' and 25 are connected by a longitudinal pivot rod 31, one end of said rod extending through a slot 32 provided therefor in the end plate 18 for a purpose that will presently appear. The opposite end of said pivot rod extends into a similar slot in the plate 19, the ends of said rod guiding the reciprocatory frame in its movement between the end plates 18 and 19. Pivotally mounted upon the rod 31 are operating levers 33, corresponding in number to the keys 7 of the piano. The upper ends of these levers are reduced and connected by coiled retractile springs 34 to a bar 35 connecting the heads 27 of the bars 25' and 25. The upper ends of the levers 33 normally engage a cylindrical cushion 36, carried by a rod 37, connecting the heads 27 of the reciprocatory frame, said cushion limiting the movement of the operating levers 33 in one direction, as will presently appear. The lower ends of the operating levers are cut away in order to provide beveled prongs 38 and 39, the cut away portion of each lever providing a slot 40. The operating levers are spaced apart by spacing washers 40^a to insure independent action of the loosely mounted operating levers.

Associated with the operating levers 33 shown in Fig. 5 are pivoted selector levers 41, pivoted releasable locking levers 42 and pivoted key actuating levers 43 and strike levers 47 corresponding in number to said operating levers and the keys 7 of the piano. The key actuating levers are spaced similar to the operating levers upon a rod 44 connecting the end plates 18 and 19, said levers 65 having rearward extensions 45 connected to

cords 46, the purpose of which will hereinafter appear. The key levers 43 have forward extensions 48 provided with notches 49 and 50 adapted to receive the prongs 38 of the operating levers 33. The key levers 70 also have vertical extensions 51 normally engaging in the notches 52 provided therefor in the lower edges of the locking levers 42. These locking levers are equally spaced upon a rod 53 connecting the end plates 18 and 19, said levers having the forward ends thereof provided with depending extensions 54, and the rear ends of said levers connected to coiled retractile springs 55 secured to a bar 56 connecting the end plates 18 and 19. 75 The locking levers 42 are limited in their downward movement by a cylindrical cushion 57, carried by a rod 58, connecting the end plates 18 and 19, and the key levers are limited in their movement by a cylindrical cushion 59, carried by a rod 60 connecting the end plates 18 and 19. 85

The selector levers 41 are equally spaced upon a rod 61 connecting the end plates 18 and 19, said selector levers having the lower ends thereof beveled, as at 62 and the upper ends thereof cut away, as at 63 to provide beveled prongs 64. The selector levers 41 are arranged in groups with the groups divisioned or separated by arms 65, carried by a bar 66 connecting the end plates 18 and 19, said arms preventing a wobbling or sagging movement of said levers. The selector levers are limited in their movement by a cylindrical cushion 67, carried by a rod 68 100 connecting the end plates 18 and 19.

The lower beveled ends 62 of the selector levers 41 have outwardly projecting pins 69 extending into a tapering slot 70 formed by tracker bars 71 and 72 connecting the plates 18 and 19. Located in front of said bars, in proximity to the slot 70, is a retaining rod 73 having one side notched or slotted as at 73^a, as best shown in Fig. 8, to provide clearance for the pins 69. The retaining rod 73 has 110 the ends thereof supported by cranks 74 mounted upon a rod 75, journaled in the plates 18 and 19, said plates being cut away or slotted, as at 76 to provide clearance for the retaining rod 73. The rod 73 is held 115 normally in a lowered position by coiled retractile springs 74^a connecting the cranks 74 and the plates 18 and 19. The rod 75 has a flat surface 75^a adapted to engage the rear edges of the selector levers 41. 120

Movably arranged between the rod 73 and the tracker bars 71 and 72 is a sheet of perforated paper 77 similar to the sheet of paper at present used in connection with various types of piano players. The sheet of 125 perforated paper is wound upon a roll 78 detachably and revolvably supported between the plates 18 and 19. The ends of the roll are detachably supported by pintles 79 and 80, the former being yieldably supported in 130

the end plate 19 and the latter revolubly supported in the end plate 18 by a clutching member 82. The pintle 79 has heads 79^a and 79^b and encircling said pintle, between the head 79^a and the plate 19, is a compression spring 81. The opposite end of the perforated sheet 77 is detachably connected in the ordinary and well-known manner to a takeup roll 83 mounted upon a shaft 84, journaled in the end plates 18 and 19. The shaft 84 protrudes through the end plate 18 and is provided with a ratchet wheel 85. Engaging the teeth of said ratchet wheels are pawls 86 and 87, the former being pivotally supported by a pin 88, carried by an L-shaped gravity arm 89 slidably held against the outer side of the end plate 18 by a screw 90. The L-shaped arm 89 is slotted, as at 91 to receive the screw 90 and said arm is located adjacent to a slot 92 through which protrudes the end of the rod 26. The end of the rod 26 engages the under side of a pin 94 carried by the upper end of the arm 89. The arm 89 is cut away, as at 95 to provide clearance for the end of the rod when said rod is lowered by the motor 11.

The pawl 86 is normally retained in engagement with the ratchet wheel 85 by a coiled retractile spring 96 connected to a pin 97, carried by the lower end of the L-shaped arm 89. The pawl 87 is pivotally mounted upon a pin 98 carried by the end plate 18 and said pawl is normally retained in engagement with the ratchet wheel 85 by a coiled retractile spring 99 connected to a pin 100, carried by the end plate 18. The pawl 87 is connected by a cord 101 to an eccentrically mounted pin 102, carried by the end of the rod 75, and said eccentric pin 102 is connected by a cord 103 to the upper end of a kick-off member 104, slidably mounted in a bracket 105 carried by the end plate 18. The kick-off member 104 extends under the pawl 86 to move said pawl out of engagement with the ratchet wheel 85, when said kick-off member is elevated by an upward movement of the pin 102. This pin, through the medium of the cord 101, moves the pawl 87 out of engagement with the ratchet wheel 85 simultaneously with the release movement of the pawl 86.

The crank 74 supported at the end plate 18 is elevated by a small crank 106 pivotally mounted upon a pin 107, carried by the end plate 18. The crank 106 has a handle 108, in proximity to the detachable section 4 of the upper panel 3, whereby the retaining rod 73 can be elevated when the perforated sheet 77 is to be rewound upon the roll 78. The upper edge of the crank 74, at the end plate 18, is connected by a rod 109 to the lower end of a vertical wedge 110 movably mounted in a bracket 111, carried by the end plate 18. The upper end of the wedge is adapted to engage a hinged member 112,

pivotally connected to an outwardly extending lug 113, carried by one end of a cross head 114. One end of the cross head 114 is cut away, as at 123^a to provide clearance for the rounded protruding end of the rod 31. The member 112 has a vertical arm 115 with the upper end thereof forked, as at 116 to span the end of a shaft 117, journaled in the end plate 18 to support the pintle 80 and the clutch member 82. Mounted upon the shaft 117 is a ratchet wheel 118 having the inner face thereof provided with a clutch member 119 adapted to engage the member 82. Encircling said clutch member, between the ratchet wheel 118 and the end plate 18, is a coiled spring 82^a holding said clutch members normally apart. Engaging the ratchet wheel 118 are pawls 120 and 121 pivotally connected, as at 122 to the upper ends of rods 123 carried by the cross head 114, said rods being slidably mounted in guides 124, carried by the end plate 18. The rods 123 are movably supported in bearings 124, carried by the end plate 18 (Fig. 6). The pawls 120 and 121 are held in engagement with the ratchet wheel 118 by coiled retractile springs 120^a and 121^a connecting said pawls and the rods 123.

The hinged member 112, when swung inwardly toward the cross head 114 by an upward movement of the wedge 110, engages the rounded protruding end of the pivot rod 31, whereby said member and the cross head 114 will be elevated. The cross head 114 is lowered by a retractile spring 114^a connecting the lug 113 and the plate 18. It is through the medium of the spring 114^a and an up stroke of the rod 31 that the cross head 114 is vertically reciprocated, when said hinged member 112 is held in the path of the rod 31 by the wedge 110. A downward movement of the cross head 114 and the member 112 is limited by a stop pin 125, carried by the end plate 18, as it is not necessary for the rods 123 to make the same length of stroke as the operating levers 33. The stroke of the rods 123 is sufficient for the purposes for which they are intended as will hereinafter appear.

Reference will now be had to Figs. 1, 2 and 16 showing the expression mechanism and the connection between the keys 7 and the key levers 43. Connecting the end walls 10 of the piano case above the keys 7 is a platform 126 having the ends thereof provided with vertical bearings 127. Connecting said bearings are rods 128, 129 and 130. Pivotally mounted upon the rod 128 are two tension boards 131 and 132, the combined length of these boards being equivalent to the length of the platform 126. At the confronting ends of said boards, the board 132 is cut away to provide a wedge-way 133 upon which is slidably mounted a wedge

134. The upper surface of this wedge engages a pivoted plate 135, carried by the confronting ends of the boards 132 and 133 at the rear edges of said boards. The forward edge of the plate 135 is connected by a cord 136 to one end of a bell crank lever 137 pivotally mounted in a slot 138 provided therefor in the platform 126, said lever being pivotally supported between lugs 139 carried by the upper surface of the platform 126. The opposite end of the bell crank lever 137 is connected to a cord 140 extending over a sheave 141, carried by the support 142 of the covering or lid 9, said cord extending downwardly through openings 143 provided therefor in the bed 5 and the board 6. The cord 140 extends under a sheave 144, carried by the key bed 5, adjacent to the lower end of the opening 143. The cord 140 extends forwardly under the key bed 5 and is connected to an expression lever 145 pivotally connected, as at 146, to the under side of the key bed contiguous to the front edge thereof. The wedge 134 is connected by a retractile spring 147 to a post 148, carried by the platform 126. The spring 147 is connected to the forward large end of the wedge 134 and the rear small end thereof is connected by a cord 149 to the upper end of a lever 150. The lever 150 is pivotally mounted by a pin 151 between lugs carried by the rear edge of the platform 126. The lower end of the lever 150 is connected to a cord 153, and this cord passes over sheaves arranged beside the sheaves 141 and 144, said cord having the end thereof connected to a second operating lever 154 located adjacent to the operating lever 145. Arranged between the tension boards 131 and 132 and the platform 126 are a plurality of compression springs 155, and connected to the forward edges of said tension boards, by retractile springs 156, are the forward ends of strike levers 47, these levers having the rear ends thereof connected by cords 157 to the keys 7 of the piano. The strike levers 47 are fulcrumed upon the rod 129 and the rod 130 limits the upward movement of the rear ends of said strike levers, although said rod serves more as a brace or tie for the bearings 127. Connected to the forward ends of the strike levers 47 are cords 158 having the upper ends thereof connected to pivoted guides 159, carried by both sides of a bar 160 supported by the inner side of the panel 3. The cord 158 passes over sheaves 161 carried by the ledge 8. The guides 159 are connected by cords 162 to couplers 163 pivotally mounted upon a curved rod 164, carried by the end walls 10 of the piano. The couplers 163 are connected by cords 165 to bell crank levers 166 pivotally mounted upon a rod 167 carried by depending bearings 168 of the end plates 18 and 19. The bell crank levers 168 are connected to the lower ends of the cords

46. The guides 159, rods 164 and 167, couplers 163 and bell crank levers 166 constitute a spreading frame or means whereby the connections from the key levers 43 can be distributed to the various strike levers 47.

Reference will now be had to Figs. 8 to 13 inclusive showing a retracting device that is employed for moving the selector levers during an upward stroke of the reciprocatory frame and a downward movement of the perforated sheet of paper 77, said retracting device being employed whereby the perforated sheet of paper is not liable to injury by the pins 69. The retracting device is located in the rear of the selector levers 41 and below the rod 68. The inner sides of the bars 25' and 25 are provided with brackets 169 having apertured lugs 170. Pivotally connected to said lugs are dogs 171 having pins 172 extending over the lugs 170 and connected by coiled retractile springs 173 to said lugs. Adapted to engage the dogs 171 are pins 174, carried by arms 175 pivotally connected, as at 176 to the inner sides of the end plates 18 and 19. The upper ends of the arms 175 are connected by a rod 178 and the lower ends of said arms are connected by retractile springs 179 to the inner sides of the end plates 18 and 19. The rod 178 is adapted to engage the upper rear edges of the selector levers 41 and move the lower ends of said levers rearwardly, thus withdrawing the pins 69 from openings in the perforated sheet 77 or out of contact with said sheet.

Operation: As illustrated in Fig. 1, the reciprocatory frame embodying bars 25', 25 and connecting rod 26 is in an elevated position, and I will assume that the perforated sheet of music 77 is in position for use. As the sheet of perforated paper moves in front of the tracker bars 71 and 72, the pins 69 are released by the openings or slots in the sheet of paper, that is, pins normally held by the solid portion of the sheet of paper 77 are permitted to extend through the sheet of paper when a slot or opening is encountered. The selector levers 41 are held in a releasable position by the sheet of paper 77 whereby when the lower beveled ends of the levers are released by openings in the sheet of paper and engage the bars 71 and 72, the beveled prongs 64 of said levers will be in the path of the beveled prongs 39 of the operating levers.

The downward movement of the reciprocatory frame places the retractile springs 29 under tension and carries the operating levers 33 downwardly, causing the beveled prongs 39 of said operating levers to impinge the beveled prongs 64 of the selector levers 41. The selector levers 41 are held by the cushion 67 upon the rod 68 and the operating levers are caused to tilt, as best shown in Fig. 14. The prongs 64 ride into

the slots 40 of the operating levers, while the prongs 38 of said operating levers are in proximity to the rod 68. The operating levers are gradually tilted during the movement of the reciprocatory frame and the upper ends of said levers engage the depending extensions 54 of the locking levers 42. The locking levers 42 are tilted, thereby releasing the vertical extensions 51 of the key levers 43, said key levers being limited in their movement by the cushions of the rods 58 and 60. When the key levers 43 are tilted, the cords 46, 158 and their connection tilt the strike levers 47, through the medium of the bell cranks 166, cords 165, couplers 163, cords 162, and guides 159. The strike levers 47 elevate the rear ends of the keys 7 through the medium of the cords 157, this movement of the keys being as though the forward ends thereof were struck with the fingers. The keys having the same connections with the hammers as the keys of an ordinary piano, said hammers, corresponding in number to the number of selector levers released, will be actuated. The reciprocatory frame having completed its downward stroke, said frame is elevated by the springs 29 previously placed under tension by a downward stroke of the reciprocatory frame, the tension of the springs being sufficient to elevate said frame. As said frame is carried upwardly, the end 93 of the rod 26 engages the pin 94 of the arm 89. The arm 89 is raised together with the pawl 86, and this pawl engaging the ratchet wheel 85 causes the shaft 84 to partially revolve and wind the perforated sheet of paper 77 upon the roll 83. The perforated sheet of paper is intermittently moved and during its winding movement upon the roll 83, a rearward rotation of said roll is prevented by the pawl 87. The pawls 86 and 87 remain in engagement with the ratchet wheel 85 during the winding of the perforated sheet and are only moved out of engagement therewith when said sheet is to be wound upon the roll 78.

After the piece of music has been played, the operator elevates the handle 108, crank 106 and cranks 74, best shown in Fig. 4, thereby moving the retaining rod 73 outwardly and turning the rod 75 whereby the lower ends of the selector levers will be moved out of engagement with the sheet of paper 77. As the cranks 74 are elevated, the rod 109 elevates the wedge 110 causing the upper end thereof to push the hinged member 112 inwardly toward the cross head 114. This movement of the hinged member shifts the ratchet wheel 118 toward the end plate 18 (see Fig. 3) placing the clutch members 82^a and 119 in engagement with each other. The wedge 110 shifts the hinged member 112 into the path of the protruding end of the rod 31, and as the reciprocatory

frame is operated, an up stroke of the frame causes the pawl 121 to revolve the ratchet wheel 118 and a down stroke of the reciprocatory frame allows the spring 114^a to lower the cross head 114, whereby the pawl 120 will continue the rotation of the ratchet wheel 118. As the ratchet wheel 118 is revolved, the sheet of perforated paper 77 will be rewound upon the roll 78 and then said roll can be removed from the player.

It will be noted in connection with the rewinding mechanism that the cross head 114 is cut away, as at 123^a as best shown in Figs. 7 and 18 to provide clearance for the end of the rod 31, whereby the end of this rod will not actuate the rewinding mechanism, except when the hinged member 112 is shifted into the path of the end of the rod 31. When the rewinding mechanism is inactive, the cross head 114 rests upon the pin 125. Immediately upon the wedge 110 being lowered by the elements 108, 106, 73, 74 and 75 being restored to their normal position, the spring 82 separates the clutch members, thus placing the rewind mechanism in an inactive position. When the cranks 74 are elevated to place the rewind mechanism in an active position, the cords 101 and 103 move the pawls 87 and 86 out of engagement with the ratchet wheel 85, as shown in Fig. 4, thereby allowing the roll 83 to unwind while the sheet of paper 77 is wound upon the roll 88. The pawl 86 is moved out of engagement with the ratchet wheel 85 through the medium of the kick-off member 104 that extends under said pawl.

The above description treats of the manner in which the releasable selector levers 41, operating levers 33, locking levers 42 and key levers 43 are actuated by a down stroke of the reciprocatory frame 24, and said levers are restored to their normal position in the following manner, reference being had to Figs. 8, 14 and 15. As the reciprocatory frame is moved, only those selector levers that have been released by the sheet of perforated paper are engaged by the operating levers, those selector levers held by the sheet of perforated paper allowing the operating levers to ride clear in the rear of the said selector levers. On the upstroke of the reciprocatory frame, the operating levers 33 release the locking levers 42 and said locking levers are restored to their normal position by the retractile springs 55. As the reciprocatory frame makes a down-stroke, the prongs 39 of the operating levers 33 will ride over the prongs 64 of the selector levers 41 that are in the path of said operating levers, and the key levers 43 representing said selector levers will not be struck by the operating levers. Such is the action of all selector levers and their complementary levers that are in an

active position, that is, being used by the pins 69 projecting in the slots or openings of the perforated sheet of paper 77.

Now assuming that an active selector lever is restored to its normal position upon the up stroke of the reciprocatory frame, then the key lever 43 associated with said selector lever is partially restored to its normal position by the spring 156 of the strike lever 47 pulling downwardly upon the cords that connect the strike lever 47 to the key lever 43. This construction is best shown in Fig. 16. When the key lever is partially restored to its normal position, the vertical extension thereof engages the under side of the locking lever 42 adjacent to the notch 52. On a down stroke of the reciprocatory frame, the prong 38 of the operating lever engages in the notch 49 of the key lever, thereby tilting the key lever sufficiently to cause the upper end thereof to ride into the notch 52, where it is locked by the lever 42. In performing this operation, the operating lever 33 is slightly tilted upon the rod 31, and immediately upon an upstroke of the reciprocatory frame, the operating lever assumes a vertical position, whereby the prong 38 will ride in the notch 50. This notch provides sufficient clearance whereby the key lever will not be actuated until the complementary selector lever is again released.

It will be observed that the operating levers have four functions or distinctive movements, first, that of being positioned by the selector levers; second, that of engaging in the notches 49 of the key levers to restore said levers to their normal position; third, that of engaging the locking levers to release the key levers, and fourth, that of moving freely of all of the selector, locking and key levers, particularly during the rewinding operation of the perforated sheet of paper 77. There will be times during the reproduction of a piece of music, that certain sets of selector, operating, locking and key levers will be in operation or in active positions, while other sets of levers will be in inactive positions. This particular movement of the various cooperating levers is somewhat similar to that described in my pending application, and reference will now be had to certain improvements that insure a more positive operation of the player, without resorting to a complicated construction. First, there is the expression mechanism illustrated in Figs. 1 to 16 inclusive. To increase the tension of the springs 156 in connection with half of the strike levers 47 and half of the keys 7, the tension board 132 is made in two parts, whereby one part can be moved independently of the other to increase the tension of one half of the springs 156 or relieve the tension of said springs. In this manner the stroke of the

strike levers 47 can be controlled for obtaining a hard or soft stroke of the keys 7. When the wedge 134 is pulled inwardly or released whereby the spring 147 can pull outwardly upon said wedge, one or the other of the tension boards 131 or 132 is moved. When the lever 145 is moved, the pivoted plate 135 is pulled downwardly, bearing directly upon the tension board 131 and bearing upon the board 132 through the medium of the wedge 133, thereby lowering both boards to produce a loud stroke of all the strike levers 47. By holding the lever 145 and moving the lever 154, the wedge 134 can be shifted to lower the tension board 132 independently of the board 130, and by releasing the wedge 134, the lever 145 can be lowered to move the plate 135 and the tension board 131 independently of the board 132. There are simply two expressions obtained in connection with the player, both of which are controlled by the operator of the player manipulating the levers 145 and 154.

Reference will now be had to the retracting device shown in Figs. 8 to 13 inclusive, this device being employed for moving the selector levers upon each up stroke of the reciprocatory frame, whereby the pins 69 will be positively removed from the perforated sheet of paper 77. By moving the selector levers, it is impossible for the pins 69 to tear or injure the paper during its movement. As the reciprocatory frame makes a down stroke, the dogs 171 ride over the pins 174, as shown in Fig. 11, and after the frame has completed the down stroke, the dogs 171 are located below the pins 174, as illustrated in Fig. 12. When the reciprocatory frame makes an up stroke, the dogs 171 engage the pins 174, as shown in Fig. 13, tilting the arms 175 and causing the rod 178 thereof to engage the upper ends of the selector levers 41 and shift said levers whereby the pins 69 thereof will be retracted. Immediately upon the reciprocatory frame reaching the limit of its up stroke, the arms 175 and the rod 178 are restored to their normal position by the springs 179.

To recapitulate, it will be observed that I have devised a player embodying a selector mechanism in connection with a movable perforated sheet of paper, a series of actuating levers controlled by the selector mechanism, means for operating said levers with the same means employed for intermittently moving the perforated sheet of paper during the operation of the player and when the paper is to be rewound. Associated with these elements is an expression mechanism manually controlled and a selector retracting mechanism that is automatic in its operation for the purpose for which it is intended.

What I claim is:—

1. A piano player comprising a reciprocatory frame, operating levers carried thereby, a movable sheet of perforated paper, releasable selector levers released by said perforated sheet of paper to assume a position in the path of said operating levers to tilt the operating levers, actuating levers released and tilted by a movement of said operating levers, and spring actuated strike levers released by said actuating levers.

2. A piano player comprising a reciprocatory frame, operating levers carried thereby, a movable sheet of perforated paper, releasable selector levers released by said perforated sheet of paper to assume a position in the path of said operating levers to tilt the operating levers, and a series of levers actuated by a movement of said operating levers and including spring actuated levers for moving the keys of a piano.

3. A piano player comprising a reciprocatory frame, operating levers carried thereby, a movable sheet of perforated paper, selector levers released by said perforated sheet of paper to assume a position in the path of said operating levers to tilt the operating levers, actuating levers located in the path of said operating levers and released by a tilting movement of said operating levers in one direction, means carried by said actuating levers and engaged by said operating levers when moved in another direction for restoring said actuating levers to their normal position, and spring actuated strike levers released by said actuating levers for moving the keys of a piano.

4. A piano player comprising a reciprocatory frame, operating levers carried thereby, a movable sheet of perforated paper, selector levers normally held inactive by said perforated sheet of paper and released by perforations in said paper to assume a position in the path of said operating levers to tilt the operating levers, actuating levers located in the path of said operating levers and adapted to be operated by a movement of said operating levers, spring actuated strike levers released by a movement of said actuating levers, and means carried by said actuating levers and engaged by said operating levers for restoring said actuating levers to their normal position.

5. A piano player comprising a reciprocatory frame, operating levers carried thereby, a movable sheet of perforated paper, selector levers normally held inactive by said perforated sheet of paper and released by perforations in said paper to assume a position in the path of said operating levers to tilt the operating levers, actuating levers located in the path of said operating levers and adapted to be operated by a movement of said operating levers, spring-actuated

strike levers operatively connected to piano keys and released by a movement of said actuating levers, means carried by said actuating levers and engaged by said operating levers for restoring said actuating levers to their normal position, and an expression mechanism including movable tension boards manually operated to control the force of the stroke of the keys of the piano produced by said strike levers.

6. A piano player comprising a frame, means for vertically moving said frame, a series of operating levers carried thereby and moving with said frame, a movable sheet of perforated paper, a series of selector levers normally engaging and normally held by said sheet of paper and released by perforations thereof to assume a position in the path of said operating levers and tilt said levers, actuating levers released by a movement of said operating levers, and means carried by said actuating levers and engaged by said operating levers on the downward movement of the frame for restoring said actuating levers to their normal position.

7. A piano player comprising a frame, means for vertically moving said frame, a series of operating levers carried thereby and moving with said frame, a movable sheet of perforated paper, a series of selector levers normally engaging and normally held by said sheet of paper and released by perforations thereof to assume a position in the path of said operating levers and tilt said levers, actuating levers released by a movement of said operating levers, means carried by said actuating levers and engaged by said operating levers on the downward movement of the frame for restoring said actuating levers to their normal position, and means actuated by a movement of said frame for intermittently moving said sheet of paper.

8. A piano player comprising a reciprocatory frame, operating levers carried thereby and capable of tilting relatively to said frame, a movable perforated sheet of paper, a series of selector levers held against said sheet of paper and released by the perforations of said sheet to assume a position in the path of said operating levers, means for reciprocating said frame whereby said operating levers will be tilted by said selector levers, key-operating means, and normally-locked actuating levers corresponding in number to the keys of a piano and actuated by said operating levers for operating said key operating means.

9. A piano player comprising a reciprocatory frame, operating levers carried thereby and capable of tilting relatively to said frame, a movable perforated sheet of paper, a series of selector levers held against said sheet of paper and released by the perfora-

tions of said sheet of paper to assume a position in the path of said operating levers, means for reciprocating said frame whereby said operating levers will be tilted by said selector levers, actuating levers actuated by said operating levers, strike levers normally held by said actuating levers and released by a movement of said actuating levers, and means for moving said strike-levers.

10 10. A piano player comprising a frame, operating levers carried thereby and capable of tilting relatively to said frame, a movable perforated sheet of paper, a series of selector levers held against and released by the perforations of said sheet of paper to assume a position in the path of said operating levers, means for vertically moving said frame whereby said operating levers are tilted by said selector levers, actuating levers in the path of said operating levers, strike levers normally held by and released by a movement of said actuating levers, means for imparting movement to said strike levers when said operating levers are tilted, means carried by said actuating levers and engaged by said operating levers on the down stroke of said frame to restore said actuating levers to a normally locked position, and means for locking said actuating levers.

30 11. A piano player comprising a frame, operating levers carried thereby and capable of tilting relatively to said frame, a movable perforated sheet of paper, a series of selector levers held against and released by the perforations of said sheet of paper to assume a position in the path of said operating levers, means for vertically moving said frame whereby said operating levers are tilted by said selector levers, actuating levers in the path of said operating levers, strike levers normally held by and released by a movement of said actuating levers, means

for imparting movement to said strike levers when said operating levers are tilted, means carried by said actuating levers and engaged by said operating levers on the down stroke of said frame to restore said actuating levers to a normally locked position, means for locking said actuating levers, and means actuated by said frame for intermittently moving said sheet of perforated paper.

12. A piano player comprising a frame, operating levers carried thereby and capable of tilting relatively to said frame, a movable perforated sheet of paper, a series of selector levers held against and released by the perforations of said sheet of paper to assume a position in the path of said operating levers, means for vertically moving said frame whereby said operating levers are tilted by said selector levers, actuating levers in the path of said operating levers, strike levers normally held and released by a movement of said actuating levers, means for imparting movement to said strike levers when said operating levers are tilted, means carried by said actuating levers and engaged by said operating levers on the down stroke of said frame to restore said actuating levers to a normally locked position, means for locking said actuating levers, means actuated by said frame for intermittently moving said sheet of perforated paper, and a device actuated by said frame for retracting said selector levers during a stroke of said frame.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN F. WHITE.

Witnesses:

KARL H. BUTLER,
CHRISTINA T. HOOD.