

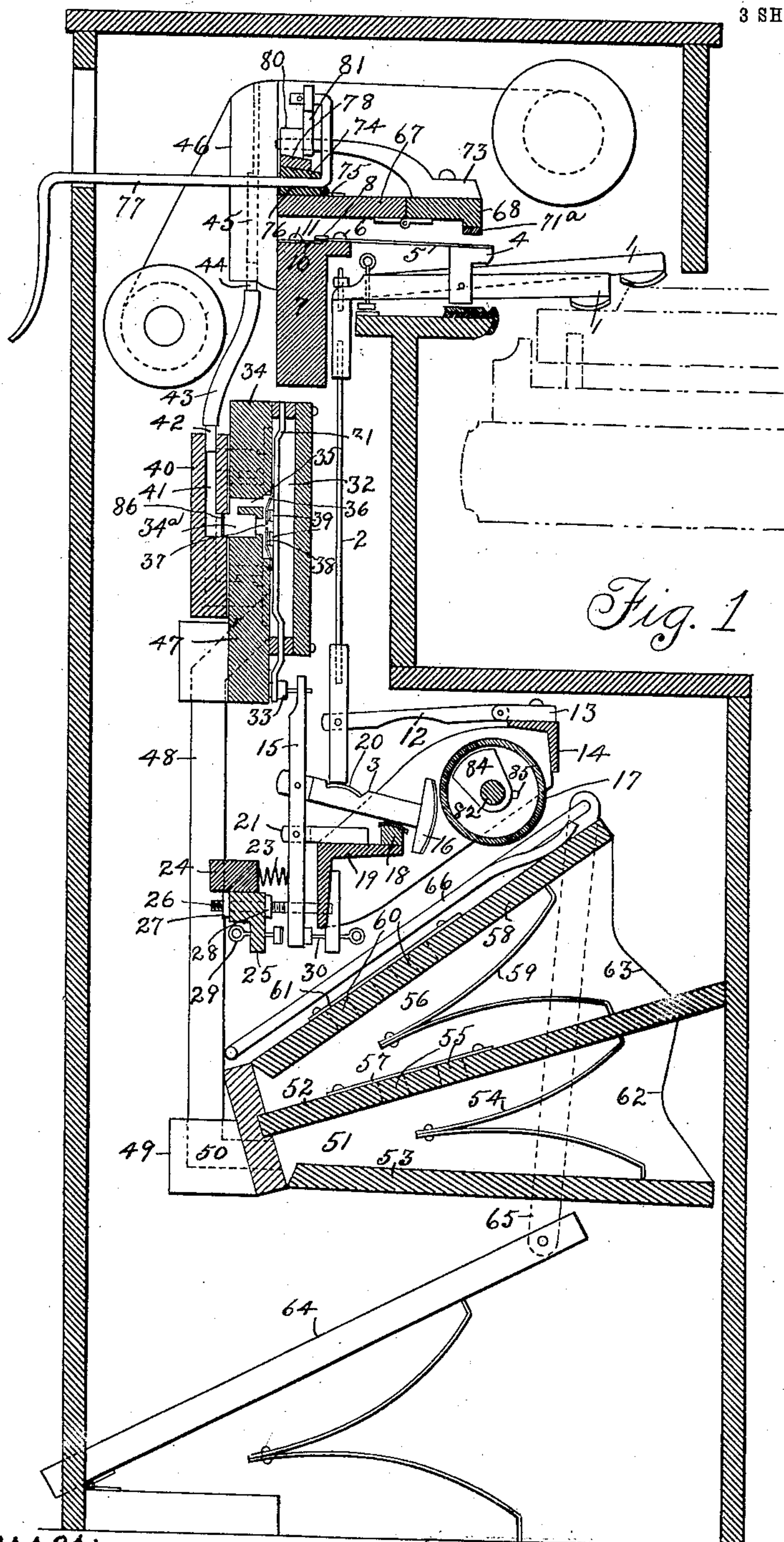
No. 828,293.

PATENTED AUG. 7, 1906.

F. P. SMITH.  
AUTOMATIC ATTACHMENT FOR PIANOS.

APPLICATION FILED DEC. 23, 1902.

3 SHEETS—SHEET 1.



Witnesses:  
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Henry Watson

Inventor:  
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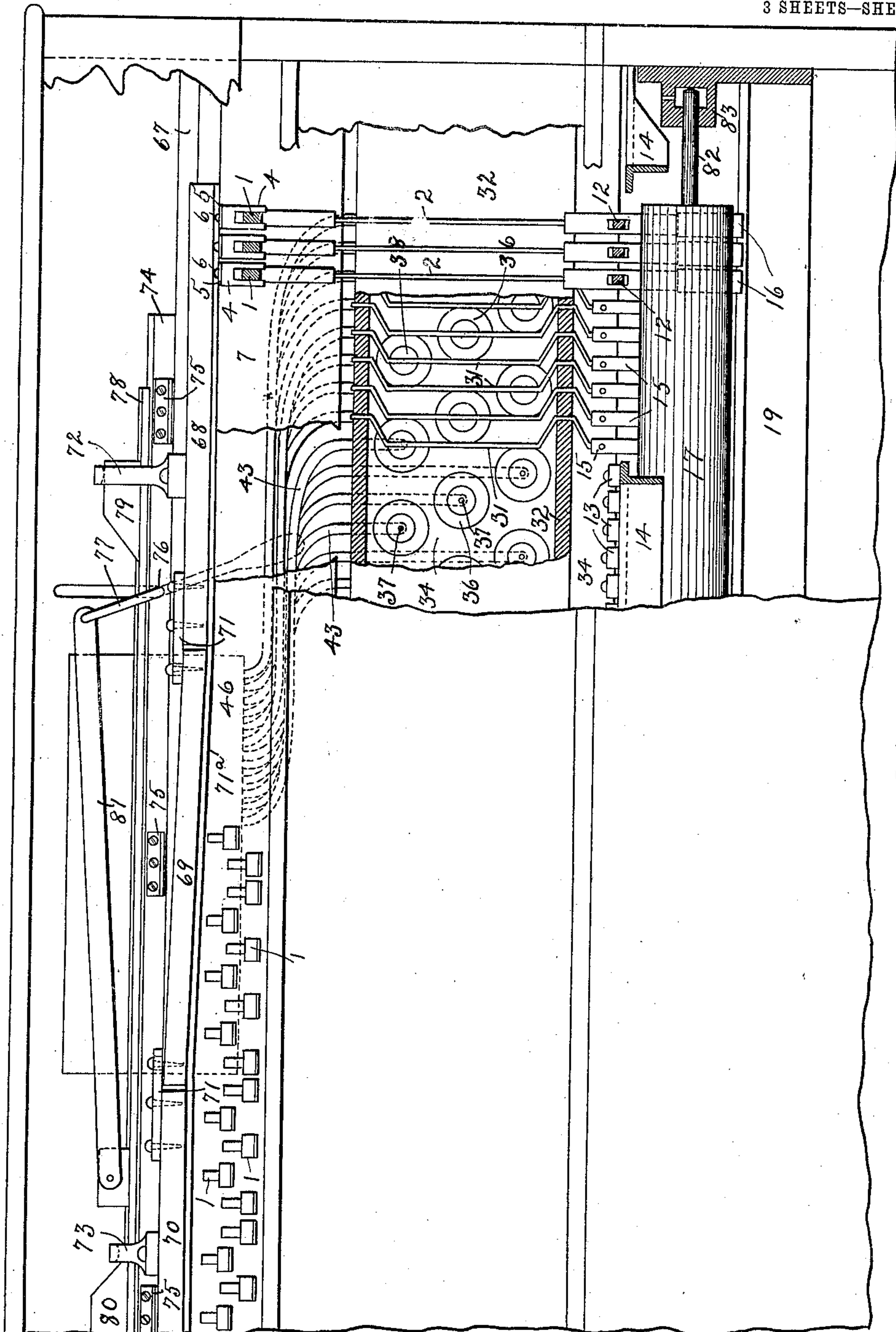
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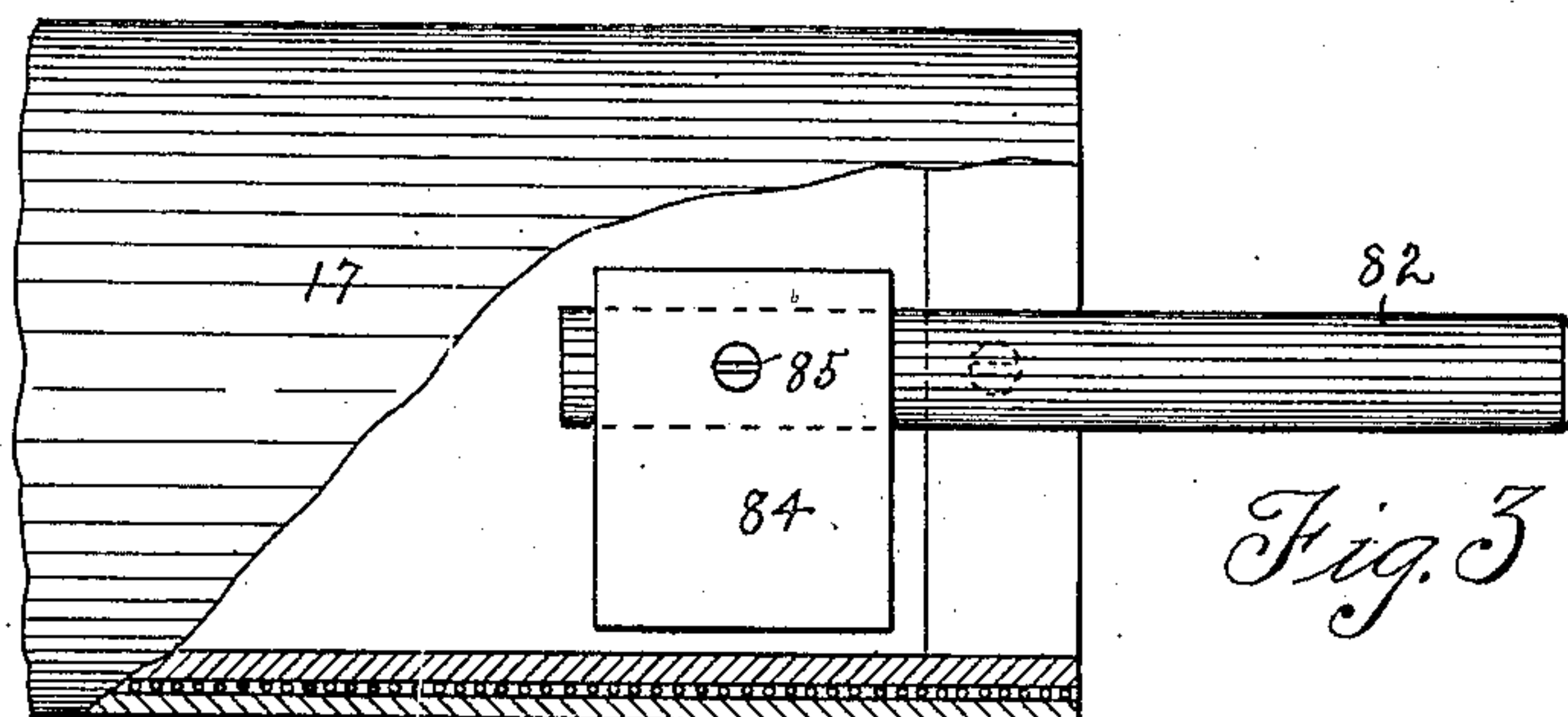
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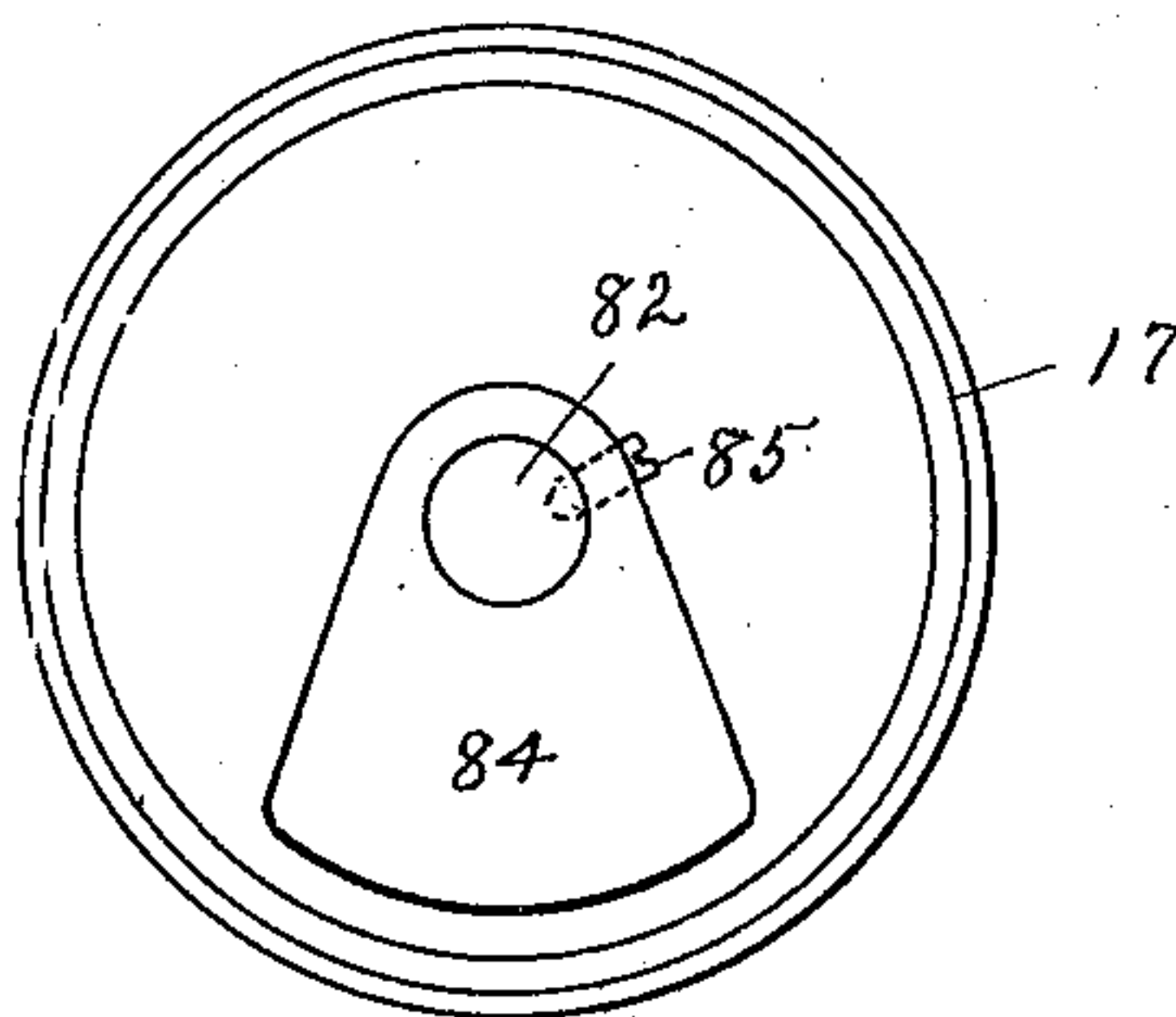
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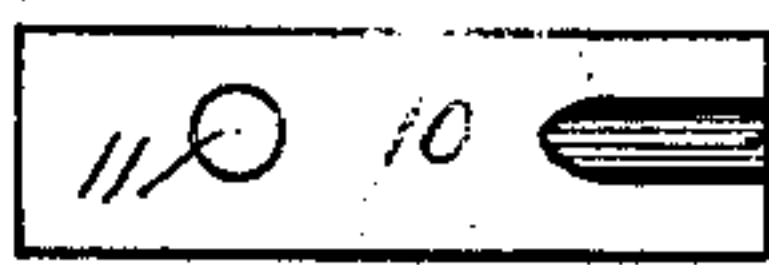
3 SHEETS—SHEET 3.



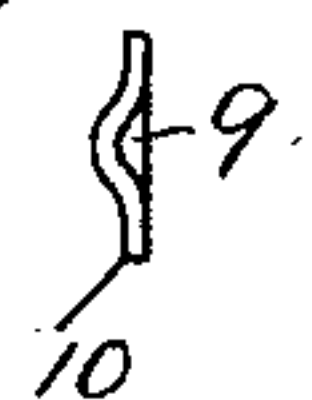
*Fig. 4*



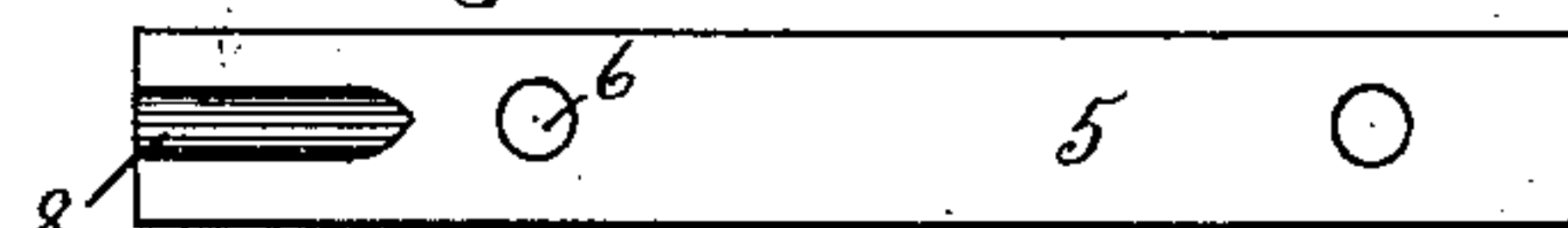
*Fig. 5*



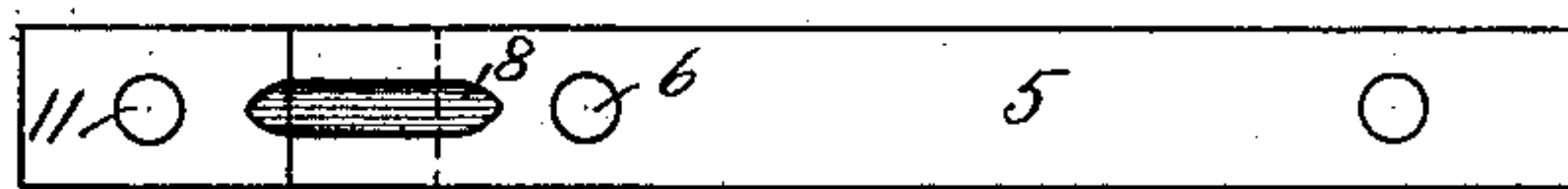
*Fig. 6*



*Fig. 7*



*Fig. 8*



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# UNITED STATES PATENT OFFICE.

FRANK P. SMITH, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF  
TO SMITH LYRAPHONE COMPANY, A CORPORATION OF WEST VIRGINIA.

## AUTOMATIC ATTACHMENT FOR PIANOS.

No. 828,293.

Specification of Letters Patent.

Patented Aug. 7, 1906.

Application filed December 23, 1902. Serial No. 136,308.

*To all whom it may concern:*

Be it known that I, FRANK P. SMITH, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Automatic Attachments for Pianos, of which the following is a specification.

This invention relates to improvements in automatic attachments for pianos; and the object of the invention is to provide a simple and efficient mechanism for operating the key-striking levers and also to provide means for controlling the touch of the said levers.

The invention consists of the new and novel parts and combination of parts hereinafter shown, described, and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view. Fig. 2 is a rear elevation of the upper portion of the machine, partly in section. Fig. 3 is a side view of one end of the cylinder, partly broken away and showing the balance-weight. Fig. 4 is an end view of the cylinder. Figs. 5, 6, and 7 are detailed views of the spring which carries the key-striking levers and its locking-strip, and Fig. 8 is a plan view of the said spring held in the locked position.

Similar reference-numerals designate like parts throughout the several views of the drawings.

In carrying out my invention I provide a series of keyboard-operating devices, comprising a series of levers 1, rods 2, and levers 3. The levers 1 are adapted at one end to engage the keys of the piano and are pivoted in blocks 4, which latter are suspended from the flat metal springs 5, pivoted at 6 to a cross-bar 7, extending the entire length of the casing. The front ends of the springs 5 are provided with concavities 8 in their lower surfaces, which fit over the convexities 9 on the upper surfaces of the metal strips 10, which latter are also pivoted to the bar 7 at 11. It will be seen that by this method of suspending the levers 1 the latter may be adjusted to the desired alinement with relation to the keys of the piano and also should the said levers receive a side thrust when the instrument is being attached to a piano the springs 5 would turn on their pivots 6, thereby preventing any damage to the said levers 1. Adjustably connected to the other ends

of the levers 1 are the rods 2, which latter are pivoted to the links 12. These links 12 are pivoted to the blocks 13, secured to the angle-iron 14, which latter extends the entire length of the casing and is secured to the ends thereof.

The levers 3 are pivoted at one end to the rock-arms 15 and are provided at the other end with the shoes 16, which latter are adapted to be brought into contact with the revolving cylinder 17. These levers 3 normally rest upon a felt-covered bar 18, secured to the angle-iron 19, and are provided with curved surfaces 20, against which the lower ends of the rods 2 impinge. When the levers 3 are raised by the contact of the shoes 16 with the revolving cylinder 17, the rods 2, riding up the curved surfaces 20, have a tendency to force the levers 3 toward the revolving cylinder and keep the shoes 16 in close contact therewith.

The rock-arms 15 are pivoted to the blocks 21, which latter are secured to the angle-iron 19, extending the entire length of the casing and secured to the ends thereof. These arms 15 are held to their normal position by the springs 23, secured to the cross-bar 24, which latter extends the entire length of the casing and is carried upon the bar 25. The bar 25 is secured to the angle-iron 19 by the screws 26 and the nuts 27 and 28. The rocking motion of the arms 15 is adjusted by the stops 29 and 30, secured to the bar 25 and angle-iron 19, respectively.

The arms 15 are operated by the rock-shafts 31, which have their bearings in the sides of the wind-chest 32. The lower ends of the said rock-shafts 31 project through the wind-chest and normally rest against the buttons 33 in the upper ends of the said arms 15. The wind-chest 32 is secured to the rear of the pneumatic-board 34. The said pneumatic-board is secured to the ends of the casing and is provided with three rows of round air-wells 34<sup>a</sup>, each having a by-pass 35. The air-wells and by-passes of each row are out of line with those of the other two rows and are covered with diaphragm-pneumatics consisting of a thin leather disk 36, having a central aperture 37, through which the air passes to the wind-chest 32. Secured to the rear of the leather disks 36 are wood disks 38, having central apertures communicating



with the apertures 37 in the leather disks. To the rear of the wood disks 38 are secured small felt pads 39, which rest against the rock-shafts 31. As the air is drawn through the air-wells 34<sup>a</sup> and by-passes 35 the pneumatics 36 will be forced outwardly, carrying the wood disks 38 and pads 39 with them and causing the shafts 31 to rock in their bearings. The duct-board 40 is secured to the front of the pneumatic-board and has a series of air-ducts 41 communicating with the air-wells 34 in the pneumatic-board. Metal tubes 42 are secured in the upper ends of the air-ducts 41. To the upper ends of these tubes 42 are connected flexible tubes 43, which latter have their upper ends connected to other metal tubes 44, projecting into the apertures 45 in the tracker 46. The pneumatic-board is also provided with an aperture 47, which communicates with the pipe 48, the lower end of which latter is secured in a block 49, having an aperture 50 communicating with the air-reservoir 51.

The air-reservoir 51 consists of a stationary board 52 and a hinged board 53, held to its normal position by the spring 54. The board 52 is provided with valves 55 leading to the pumper 56, said valves being provided with a flexible covering 57 to prevent air from passing back from the pumper to the reservoir. The pumper consists of a hinged board 58, held to its normal position by the spring 59. This board 58 is also provided with valves 60 and a flexible covering 61 to prevent the backflow of air, the said boards 53 and 58 being connected to the stationary board 52 by the flexible pieces 62 and 63. The pumper is operated by the treadle 64, rod 65, and spring 66, which latter rests upon the upper surface of the said pumper. When the pumper is forced down by the treadle, the air in said pumper will be forced out through the valves 60, and when the said pumper is returned to its normal position by the spring 59 it draws the air from the reservoir through the valves 55.

Back of the tracker 46 is a board 67, extending the entire length of the casing and secured to the ends thereof. To the rear edge of the said board 67 is hinged the expression-bar, which consists of three sections 68, 69, and 70, flexibly connected at 71 and extending above all the springs 5. The lower edges of the said sections are covered with a single piece of felt 71<sup>a</sup>. To the upper surfaces of the sections 68 and 70 are secured the arms 72 and 73, which project toward the front of the casing. A bar 74 is hinged at 75 to the board 67 and is provided with an aperture 76, through which the expression-lever 77 projects. A shifter 78 is arranged upon the upper surface of the bar 74 and is adapted to be moved longitudinally thereon. This shifter 78 carries two inclined blocks 79 and 80, which are adapted to be forced under the

arms 72 and 73 to raise one or both arms. The shifter 78 is connected to the expression-lever 77 by a rod 81.

When the lever 77 is turned to the left, the shifter 78 will be moved to the right, which causes the block 79 under the arm 72 to raise the latter, which in turn forces the section 68 down slightly upon the springs 5, (see Fig. 2,) whereby a more direct action of the key-striking levers 1 under the said section 68 to the keys of the piano is produced, and thereby a louder tone obtained. It will be seen that when the section 68 is forced down, as just described, the section 69 will be drawn down at one end on an incline, which prevents a decided change between the stroke of the levers 1 under the said section 68 and those above said section. When the lever 77 is turned to the right, the block 80 will be forced under the arm 73, causing the latter to rise, which will have the same effect upon the levers under section 70 of the expression-bar as that just described for the levers 1 under section 68.

When it is desired to impart a direct action to all the keys of the piano, the lever 77 is moved to a vertical position, which brings the blocks 79 and 80 under the arms 72 and 73, respectively. The said lever 77 is then raised in a vertical position, which lifts the bar 74 on its hinges 75, forcing the front ends of the arms 72 and 73 upwardly, which causes all the sections 68, 69, and 70 to be forced down tightly upon the blocks 4, thus relieving the levers 1 of the elastic effect of the springs 5 and causing the said levers 1 to impart a direct action to the keys of the piano.

The hollow cylinder 17 is provided with two short shafts 82, mounted in the bearings 83, which latter are secured to the ends of the casing. The ends of the shafts 82 project into the cylinder 17 and are provided with balance-weights 84, held thereto by set-screws 85. These weights 84 are provided to balance the cylinder 17.

The operation of my apparatus may be briefly described as follows: Power being applied to rotate the cylinder 17 and to start the wind apparatus, as the sheet-music passes over the tracker air will be drawn through the apertures 45, the tubes 43, air-ducts 41, and the air-wells 34 and by-passes 35 in the pneumatic-board, where it acts to depress the pneumatics and cause the shafts 31 to rock. The rocking of the shafts 31 also rocks the arms 15 and forces the shoes 16 of the levers 3 into contact with the revolving cylinder 17. When the levers 3 are forced into contact with the revolving cylinder 17, they will be carried upwardly, which raises the rods 2, causing the levers 1 to rock on their pivots and forcing their rear ends down upon the keys of the piano. The levers 1 being suspended from the springs 5 will normally impart an elastic touch to the keys of



the piano. When it is desired to impart a more rigid touch to the keys of the piano, the expression-bar is operated upon the springs 5 by the expression-lever 77, as heretofore described. When the levers 3 are released from contact with the revolving cylinder, they will be returned to their normal position by the springs 23, acting on the arms 15.

Having thus described my invention, what I claim is—

1. In an automatic attachment for pianos, the combination with the cylinder, 17, and means for operating the same, of the levers, 3, adapted to contact with the said cylinder, the rods, 2, having their lower ends impinging against the levers, 3, the key-striking levers, 1, at the upper ends of the rods, 2, and springs, 5, from which said levers, 1, are suspended.

2. In an automatic attachment for pianos, the combination of the key-striking levers, 1; springs, 5, from which the levers, 1, are suspended; the rods, 2, adjustably connected to the levers, 1; and the levers, 3, having curved surfaces upon which the said rods, 2, rest, substantially as described.

3. In an automatic attachment for pianos, the combination of the key-striking levers, 1; springs, 5, from which the levers, 1, are suspended, each of said springs having a concavity in its lower surface; metal strips, 10, each having a convexity on its upper surface which fits into the concavity in the said springs; the rods, 2, adjustably connected to the levers, 1; and the levers, 3, substantially as described.

4. In an automatic attachment for pianos, the combination with the cross-bar 7, of the metal strips, 10, pivoted thereto and each having a convexity on its upper surface; springs, 5, pivoted to the said bar and each having a concavity in its lower surface which fits over the convex upper surface of the said strips, 10; key-striking levers, 1, suspended from the said springs, 5; rods, 2, adjustably connected to the levers, 1; and levers, 3, against which the rods, 2, impinge, substantially as described.

5. In an automatic attachment for pianos, the combination with the cylinder, 17, of the key-striking levers, 1; springs, 5, from which the levers, 1, are suspended; rods, 2, adjustably connected to the levers, 1; and the shoe-levers, 3, upon which the rods, 2, rest, and adapted to be brought into contact with the said cylinder; substantially as described.

6. In an automatic attachment for pianos, the combination of the cylinder, 17; the key-striking levers, 1, rods 2, and levers 3; springs, 5, from which the levers, 1, are suspended; shoes 16 secured to the levers, 3; and means for causing the shoes of the levers, 3, to contact with the said cylinder.

7. In an automatic attachment for pianos, the combination with the key-striking levers,

1, the rods, 2, having their upper ends connected to the levers, 1, levers, 3, upon which the lower ends of the rods, 2, rest, and the springs, 5, from which the levers, 1, are suspended, of an expression-bar arranged above and adapted to be forced down upon said springs, 5, either as a whole or in part, to regulate the action of the levers, 1.

8. In an automatic attachment for pianos, the combination of the cylinder; the key-striking levers, 1, rods 2, and levers 3; springs 5, from which the levers, 1, are suspended; shoes, 16, secured to the levers, 3; means for causing the shoes of the levers, 3, to contact with the said cylinder; and an expression-bar arranged above and adapted to be forced down upon said springs to control the touch of the levers, 1.

9. In an automatic attachment for pianos, the combination of the key-striking levers, 1, rods, 2, and levers, 3; springs, 5, from which the levers, 1, are suspended; an expression-bar arranged above said springs and consisting of the sections, 68, 69 and 70 flexibly connected; laterally-projecting arms, 72, and 73, connected to the sections, 68, and 70, respectively; the hinged bar, 74; the expression-lever, 77, projecting through the bar, 74; a shifter, 78, carrying the inclined blocks, 79, and 80; and a rod, 81, connecting the end of the expression-lever, 77, with the shifter, 78, substantially as described.

10. In an automatic attachment for pianos, the combination of the key-striking levers, 1, rods 2, and levers 3; springs, 5, from which the levers, 1, are suspended; and an expression-bar arranged above the said springs, comprising three sections flexibly connected, whereby the end sections may be forced down upon the said springs independently of each other, or the three sections forced down as a whole upon said springs, as and for the purpose described.

11. In an automatic attachment for pianos, the combination of the key-striking levers, 1; the springs, 5, from which the levers, 1, are suspended; rods, 2, adjustable connected to the levers, 1; levers, 3, having shoes, 16, on one end and provided with a curved surface upon which the rods, 2, rest; rock-arms, 15, to which the levers, 3, are pivoted; and means to rock said arms, as and for the purpose described.

12. In an automatic attachment for pianos, the combination with the cylinder, 17, of the key-striking levers, 1; the springs, 5, from which the said levers, 1, are suspended; rods, 2, adjustable connected to the levers, 1; levers, 3, having shoes, 16, on one end and provided with curved surfaces upon which the rods, 2, rest; rock-arms, 15, to which the levers, 3, are pivoted; and means to rock said arms to cause the shoes of the levers, 3, to contact with the cylinder, 17; as and for the purpose described.



13. In an automatic attachment for pianos, the combination of the cylinder, 17; the key-striking levers, 1; the springs, 5, from which the levers, 1, are suspended; rods, 2, adjustably connected to the levers, 1; levers, 3, having shoes, 16, on one end; rock-arms, 15, to which the levers, 3, are pivoted; the wind-chest, 32; and rock-shafts, 31, having their lower ends projecting through the wind-chest for rocking the arms, 15, and causing the shoes on the levers, 3, to contact with the cylinder, 17, as and for the purpose described.

14. The combination with the key-striking levers, of a flexible expression-bar extending across the levers and adapted to be operated in part, or as a whole, to control the touch of the said levers, substantially as described.

15. The combination with the key-striking levers, and the springs from which the said levers are suspended, of a flexible expression-bar extending across the springs and adapted to be operated in part, or as a whole, to control the touch of the said levers, substantially as described.

16. The combination of the key-striking levers; the springs from which the said levers are suspended; a flexible expression-bar extending across the springs and adapted to be operated in part, or as a whole, to control the touch of the said levers; and means for operating said levers, substantially as described.

17. The combination with the key-striking levers, of an expression-bar extending across the levers and consisting of a plurality of sections, said sections being adapted to be operated, one at a time, or in unison, to govern the touch of the said levers, substantially as described.

18. The combination of the key-striking levers; means for operating said levers; springs from which the said levers are suspended; and an expression-bar extending across the springs and consisting of a plurality of sections flexibly connected and adapted to be operated one at a time, or as a whole, to control the touch of said levers, substantially as described.

19. The combination of the key-striking levers; means for operating said levers; springs from which said levers are suspended; and flat metal strips adapted to lock the springs in position, substantially as described.

20. The combination of the key-striking levers; means for operating said levers; springs from which the said levers are suspended, and having concavities in their rear ends; and flat metal strips having convexities which fit into the concavities of the said springs and lock the latter in position.

21. In an automatic attachment for pianos, the combination of the key-striking levers 1, springs 5 from which the levers 1 are suspended, means for operating said levers, and

an expression-bar adapted to limit the motion of the levers 1.

22. The combination of the pneumatic-board having a series of air-wells arranged in three rows, the wells of each row being out of line with those of the other two rows; a series of pneumatics covering said wells; a wind-chest secured to the pneumatic-board; and a series of rock-shafts having their bearings in the wind-chest and lying adjacent the said pneumatics, said shafts having one end projecting through the said wind-chest, substantially as described.

23. The combination of the key-striking levers; the springs from which the said levers are suspended; a flexible expression-bar extending across the springs and adapted to be operated in part, or as a whole, upon said springs to control the action of the key-levers; and a lever for operating said expression-bar, substantially as described.

24. The combination of the pneumatic-board having a series of primary pneumatics arranged in three rows, the pneumatics of each row being out of line with those of the other two rows; a wind-chest secured to the pneumatic-board; and a series of rock-shafts having their bearings in the wind-chest and lying adjacent the said pneumatics, said shafts having one end projecting through the said wind-chest, substantially as described.

25. In an automatic attachment for pianos, the combination with the cylinder 17, and means for operating same, of the levers 3 adapted to contact with the said cylinder, each of said levers 3 having a curved friction-surface 20, and means impinging against the said curved friction-surface 20 of the levers 3 and adapted to operate the keys of the piano.

26. In an automatic attachment for pianos, the combination with the cylinder 17, and means for operating same, of the levers 3 adapted to contact with the said cylinder, each of said levers 3 having a shoe on one end and a curved friction-surface 20, and means impinging against the curved friction-surface 20 and adapted to operate the keys of the piano.

27. In an automatic attachment for pianos, the combination with the cylinder 17, and means for operating same, of the key-striking levers 1, rods 2 adjustably connected to the levers 1, the levers 3 adapted to contact with the said cylinder, said levers 3 each having a curved friction-surface 20 against which the levers 2 impinge.

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

FRANK P. SMITH.

Witnesses:

CHAPIN A. FERGUSON,  
CHARLES H. MILLIKIN.