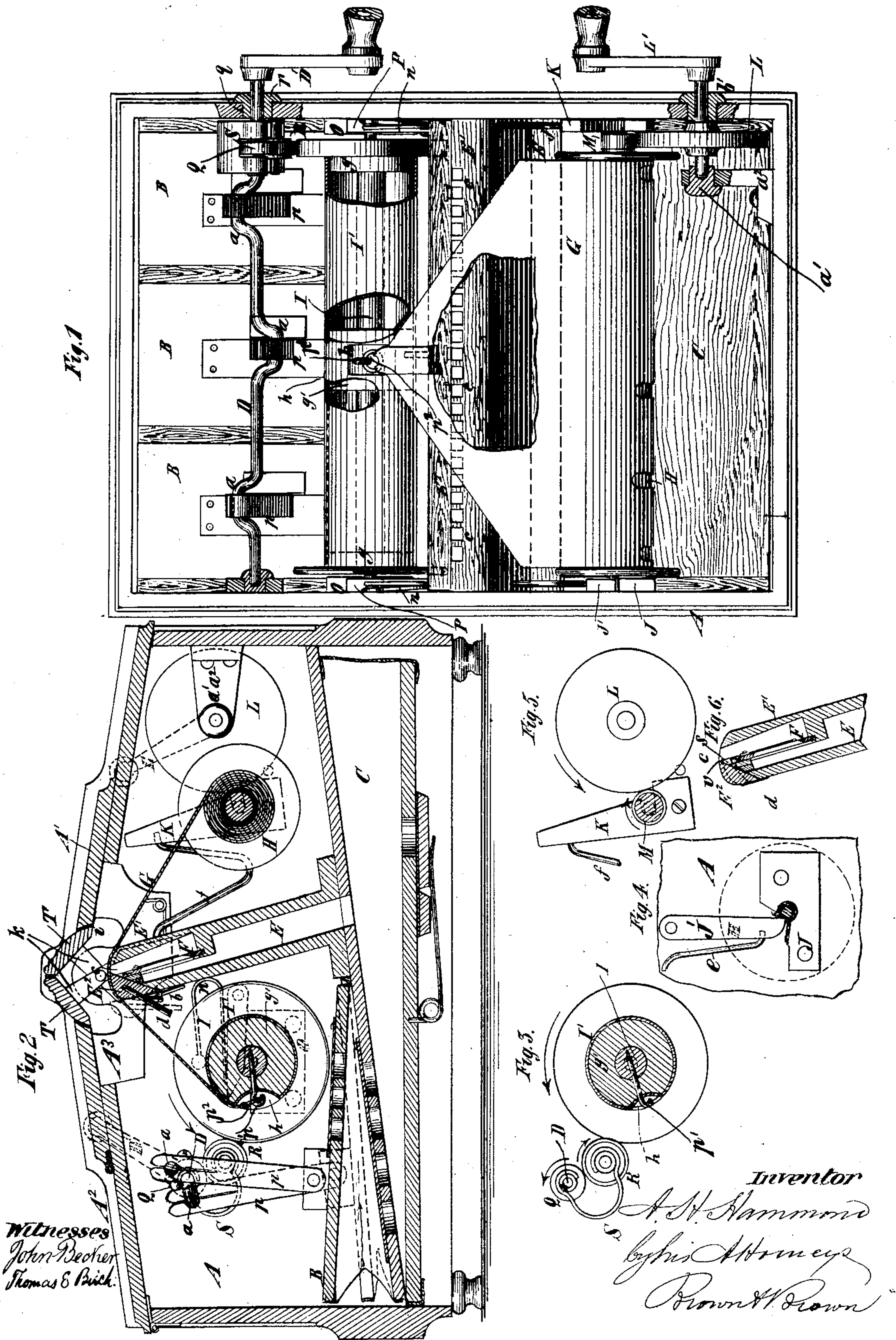


A. H. HAMMOND.
MECHANICAL MUSICAL INSTRUMENT.
No. 254,644. Patented Mar. 7, 1882.



(No Model.)

2 Sheets—Sheet 2.

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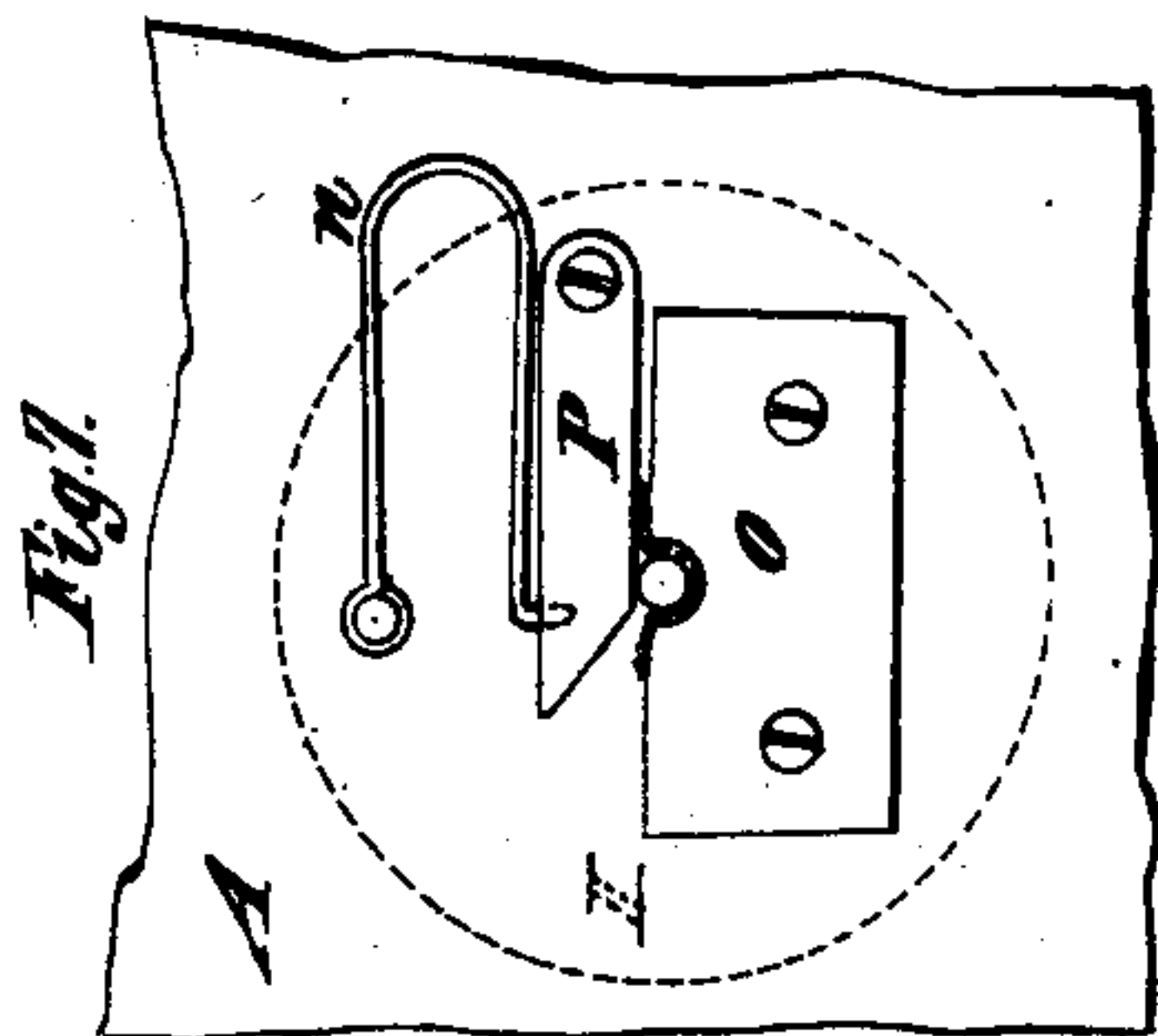


Fig. 11.

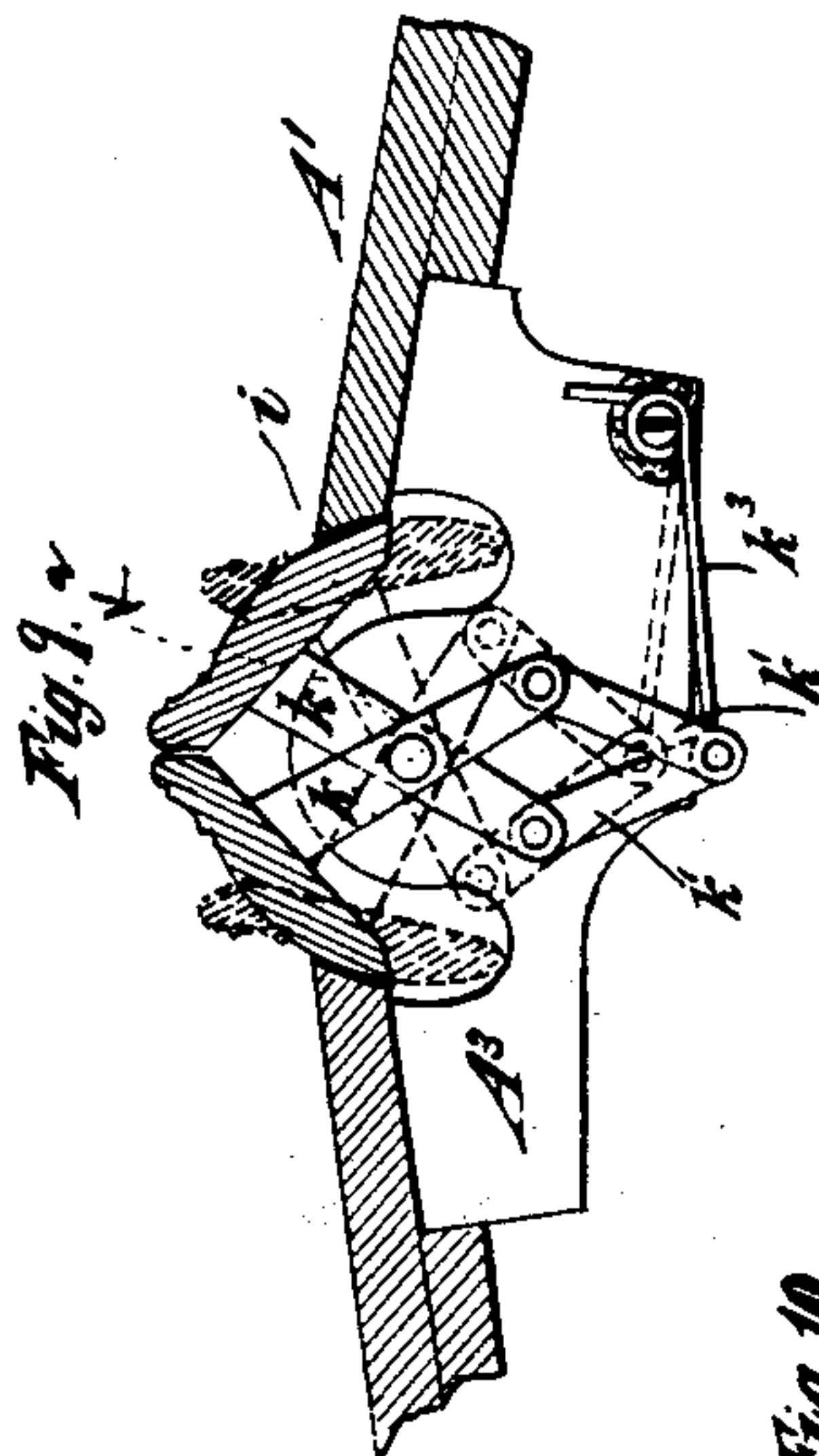
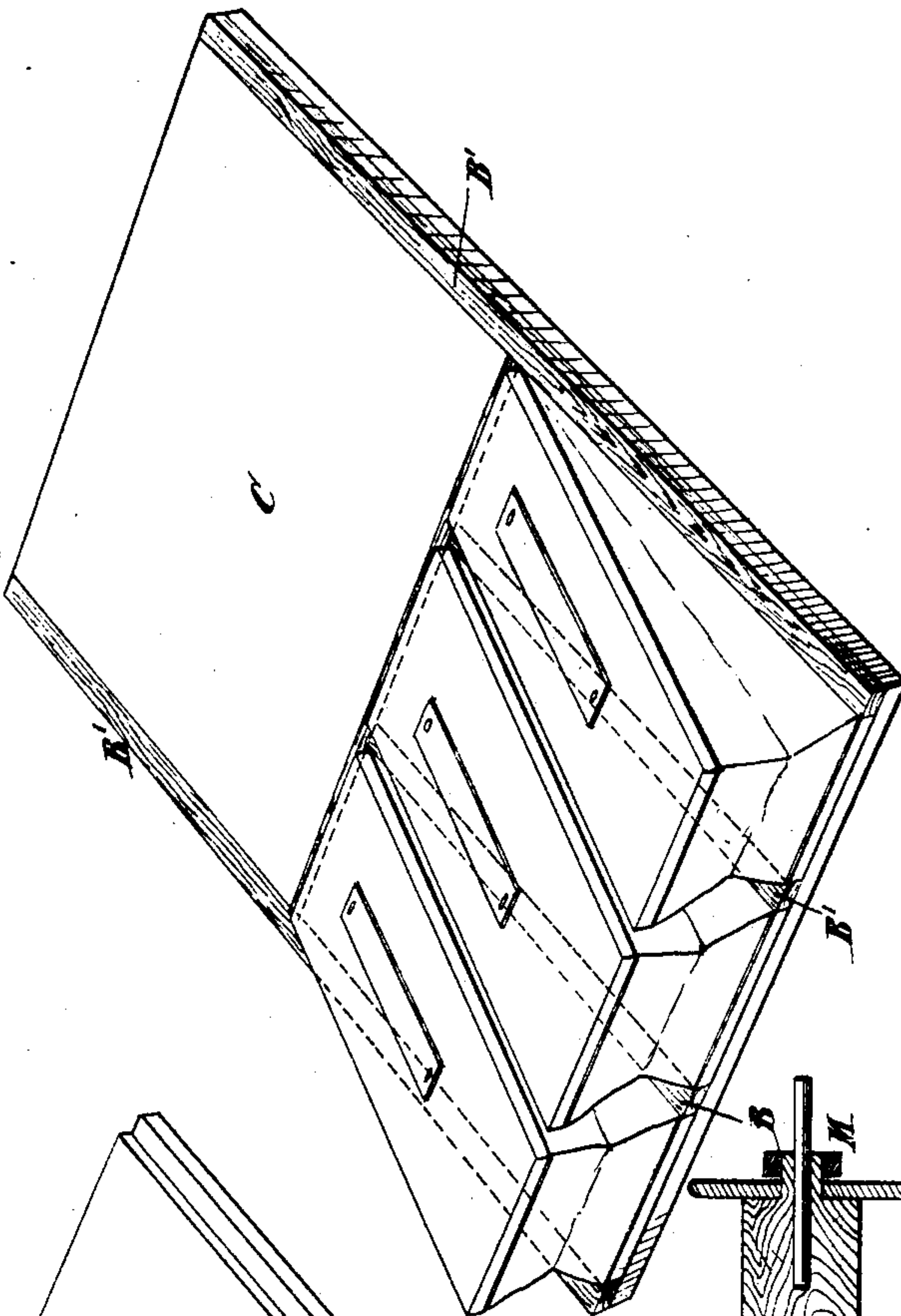


Fig. 10.

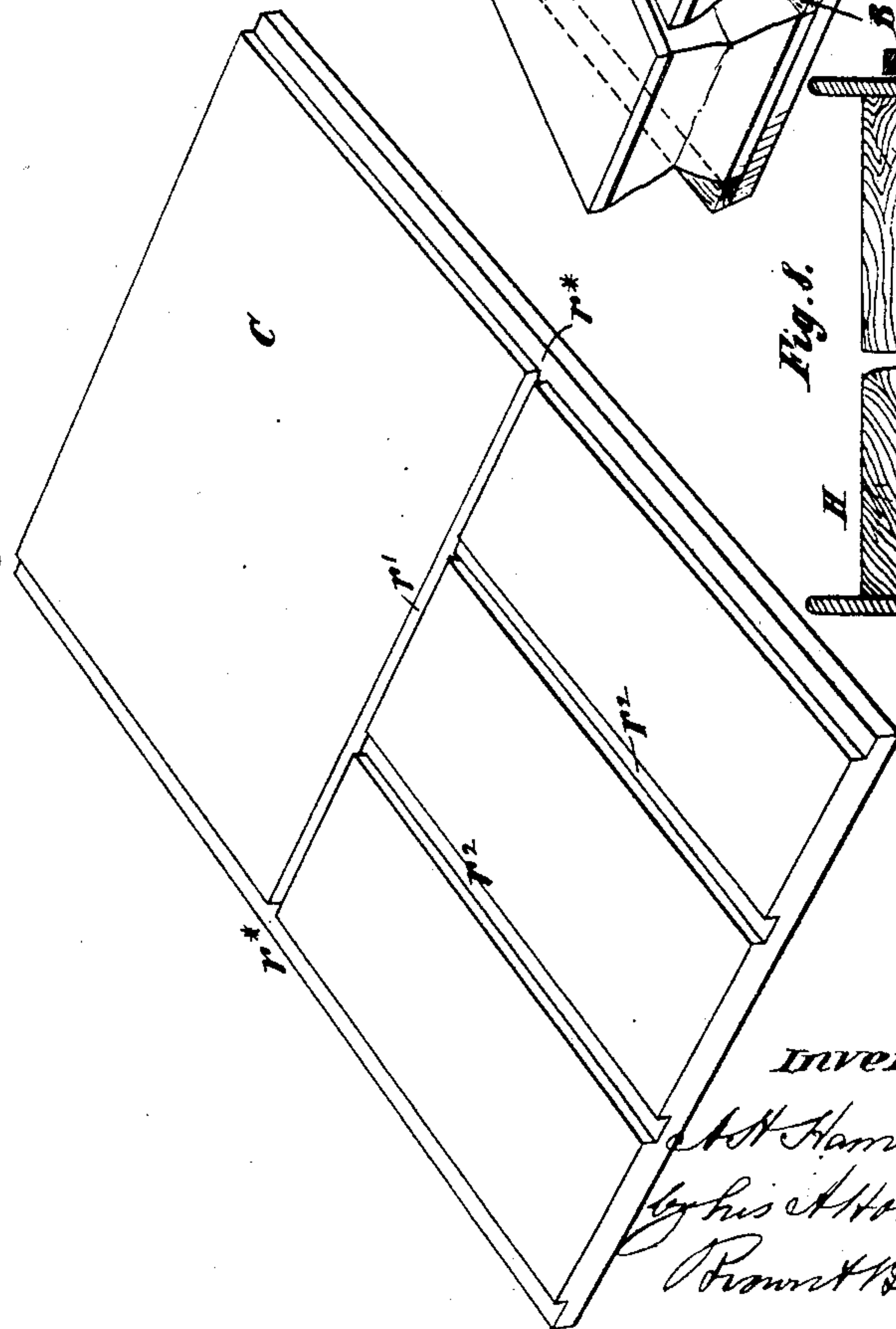


Fig. 8.



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UNITED STATES PATENT OFFICE.

ANDREW H. HAMMOND, OF WORCESTER, MASSACHUSETTS.

MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 254,644, dated March 7, 1882.

Application filed January 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, ANDREW H. HAMMOND, of Worcester, in the county of Worcester and State of Massachusetts, have invented certain
5 Improvements in Mechanical Musical Instruments, applicable also to other purposes, of which the following is a specification.

My improvements are designed for use principally, although not exclusively, in connection
10 with musical instruments wherein a perforated music-sheet traveling over reed-cells controls the sounding of the reeds, and thereby produces the desired tunes.

The improvements consist in a novel combination, with the case of a musical instrument
15 of the kind referred to, of a reed-board inclining toward and extending nearly to the top of the central portion of the cover of the case.

They also consist in the combination, in such
20 an instrument, of a cover composed of two portions connected by a bridge-piece or bridge-pieces, as hereinafter particularly described, whereby a transverse opening is produced in said cover.

They also consist in a novel combination of
25 a swell-opening and slats, hereinafter particularly described and claimed.

They also consist in the combination, in a musical instrument, of a receiver arranged at
30 the bottom thereof, bellows mounted on the top board of said receiver near one end, and a wind-chest and reed-board mounted on the top board of the receiver opposite said bellows, and extending nearly to the top of the central portion of the case of the instrument.

They also consist in the combination of a receiver having an inclined top board and a
35 wind-chest and reed-board mounted thereon, and also inclined.

They also consist in the combination, in a musical instrument, with a top board for a receiver grooved or recessed to form shoulders
40 or shoulder-like portions, of bellows-leather, india-rubber, or like flexible material having its edges fitting over said shoulders or shoulder-like portions, and cleats or strips fitted to the grooved or recessed portions and against the bellows-leather, india-rubber, or like material,
45 and serving to aid in securing the latter in place, as also to brace and stay said top board.

They also consist in the combination, with a roller provided with a peripheral recess and a hook or analogous device arranged therein, of a music-sheet provided at one end with a
55 ring or loop secured to it by a tape or strip and extending beyond the music-sheet, and adapted to be engaged with the said hook or device for securing the music-sheet to the said roller, whereby the liability of tearing the music-sheet in securing it to or detaching it from the roller
60 is greatly lessened.

In the accompanying drawings, Figure 1 is a plan of a mechanical musical instrument embodying my improvements. Fig. 2 is a central longitudinal section of the same. Fig. 3 is a
65 transverse section of the take-up roller and certain mechanism for imparting motion to the same. Fig. 4 is a transverse section illustrative of the manner in which the music-roller is supported at one end. Fig. 5 is a transverse
70 section illustrative of the manner in which it is supported at the other end. Fig. 6 is a central vertical section of a reed-cell. Fig. 7 is a transverse section illustrative of the method of supporting the take-up roller. Fig. 8 is a
75 longitudinal section of one of the rollers for the traveling sheet. Fig. 9 is a transverse section of the cover of the instrument. Fig. 10 is a perspective view of the top board of the receiver, and Fig. 11 is a perspective view of the
80 top board of the receiver with the bellows attached thereto.

As shown, the cover is composed of two portions, which are connected by a bridge-piece or bridge-pieces, A³, leaving a transverse opening
85 between the two portions.

Similar letters of reference designate corresponding parts in all the figures.

A designates the case of the instrument, which may be of any desirable shape and make.
90 Preferably it has a cover, A², hinged at one end, so that access may be readily had to the inclosed parts of the instrument. If this cover is made of two sections, A' and A², which are hinged together, one section may be thrown
95 back to expose the reed-board, or both sections may be thrown back to expose the whole interior of the case.

B designates a number of bellows (here shown
as three) arranged side by side lengthwise of
100

the case A, and near one end thereof. They may be of the usual or any other suitable construction, and are in this example of my invention mounted on the top board of a receiver, C, extending, as here shown, obliquely or in an inclined position across the case from end to end thereof. Preferably the top board of this receiver and the wind-chest E, mounted on and secured to it, are made of wood united together and having the grain extending in the same direction, so that if either warps, shrinks, or changes otherwise through atmospheric influences, it will not become disrupted from the other, and thereby entail leakage. As shown, the top board of this receiver has grooves or recesses r^* along its longitudinal edges, a transverse groove or recess, r' , and intermediate longitudinal grooves or recesses, r^2 , leading from the transverse groove or grooves r' to one end of the board, shouldered portions being thus formed of a size approximately equal to the top boards of the bellows B. The leather, india-rubber, or like flexible material forming the sides of the bellows is secured, by paste, glue, cement, or other suitable material, to the sides and ends of this shouldered portion; and cleats or strips B', which may be of wood, are fitted in the grooved or recessed portion of the receiver-board and secured thereto by glue, nails, or other means, and aid in securing the bellows-leather, india-rubber, or like flexible material in place. The cleats or strips in the side grooves or recesses, r^* , extend preferably the whole length thereof, so as to form braces or stays thereto. This mode of forming the top board of the receiver is advantageous as compared with the old method of attaching separate pieces of wood to form similar shouldered portions, as it leaves more available space within the bellows and obviates the liability to disruption between the shouldered portions and the receiver-board and consequent leakages resulting from changes effected by atmospheric variations. The top boards of the bellows B are actuated through the agency of pitman-rods p by cranks a on the driving-shaft D of the instrument, and these cranks are set approximately equidistant radially, so as to cause the bellows to operate in succession and maintain together a continuous action on the receiver. The driving-shaft may be actuated by a hand-crank, D', outside the case of the instrument.

Mounted upon the wind-chest E is a reed-board, E', communicating through the wind-chest with the interior of the said receiver. The reed-board and wind-chest preferably extend obliquely up nearly to the top of the central portion of the case A, and the inlet-openings to the reed-cells c are at the apex. Preferably the inlets to such cells decrease in area retrogressively from the bass to the treble, so as to admit a volume of air suitable for each note.

In order to present a smooth surface to the perforated music-sheet G, whereby the ingress

of air to these cells is controlled and a uniform inlet for the air to the cells is obtained, I provide the apex of the reed-board with a hinged slat, E², which may be termed a "reed-cover," for lapping over the upper ends of the reeds F, and yet affording ready access to them, and which forms a part or one side of the inlet-apertures of the reed-cells. This cover E² is shown as hinged at the lower edge and as held closed by a spring or springs, b . This cover serves also to define and locate the inlets or mouths of the reed-cells at any desired distance forward of the faces of the reeds, and by varying the angle or inclination of the under side thereof, or of that portion only which overhangs the reeds and reed-cells, the inlet-apertures may be brought down close to the ends of the reeds, as shown at s in dotted lines in Fig. 6, or carried at a distance above them, as shown at v in bold outline in the same figure, and thus by shortening or lengthening the cells the volume and quality of tone may be varied as desired. The inlet-apertures of the reed-cells are beyond the ends of the reeds, and the walls of the cells opposite the faces of the reeds may be inclined away from the backs of the reeds gradually downward, as shown in bold outline in Fig. 2, causing a gradual enlargement of the reed-cells from their inlet-apertures inward.

A projecting rod, d , serves as a handle whereby the cover may be opened.

The perforated music-sheet G may be of paper or other suitable material, and, passing over the apex of the reed-board, it controls the admission to and exclusion from the reed-cells of air as may be necessary for the playing of the tune. The slat or cover E² forms part of the rest for the music-sheet G. It may be permanently secured to a removable roller, H, termed a "music-roller," and be detachably secured to a roller, I, termed a "take-up" roller, which, if desirable, may also be removable. I preferably arrange the music-roller and take-up roller close to the reed-board and considerably below its apex. This relative arrangement of parts reduces the length of perforated music-sheet between the music-roller and take-up roller to the greatest possible extent, and hence it will be guided and kept more perfectly in its proper place by the heads or flanges of the music and take-up rollers, while by the same construction the music-sheet is drawn down closely upon the top of reed-board, so that no passage of air occurs, except through the perforations for producing the music, the notes being thus rendered more distinct and caused to speak more promptly and with greater strength and rapidity than can be the case when the paper is drawn more nearly in a horizontal plane.

One of the journals of the music-roller (see Fig. 4) rests in a semicircular bearing formed in a block, J, affixed to the side of the case A, and is held therein by a lever, J', hung at the upper end from the side of the case and held against the said journal by a spring, e . The

other journal of said roller (see Fig. 5) rests in a semicircular bearing in a lever, K, pivoted at the lower end to the opposite side of the case A, and impelled by a spring, *f*, toward a wheel, L, supported on the same side of the case. This wheel L is preferably faced with india-rubber or india-rubber-coated fabric or analogous material, and it bears against a small wheel, M, carried by the music-roller adjacent to said journal, and prevents said journal from moving in that direction out of the bearing. The lever K hence serves not only as a bearing-piece, but also as a means for holding the wheel M in contact with the wheel L.

The construction of the bearings for the music-roller may form the subject of another application for Letters Patent.

The wheel L is driven by a hand-crank, L', outside the case of the instrument, and serves to rapidly reroll the music-sheet after use. It also serves, as above explained, as a bearing-piece to the music-roller, and may act like a brake for the said roller to prevent it from rotating with such undesirable rapidity as to deliver the music-sheet too fast. Its journals may be supported in bearings lined with felt, cloth, or leather to avoid noise and wear. As shown, one of the journals of this shaft is supported in a bearing in a bushing, *a'*, inserted in a bracket, *a''*, extending from the case A, and the other journal is supported in a bushing, *b'*, which may be inserted in the case A after the shaft is in place. The shaft is held against longitudinal displacement by the end of one of the journals fitting against the inner end of the bearing therefor in the bushing *a'*, and by the outer end of the hub of the wheel L bearing against the adjacent part of the case A or the bushing *b'*.

It is obvious that by pushing back the lever K with the hand and by moving the music-roller in the opposite direction, and then upward, it may be readily removed, and that by pushing it down along the edges of the levers J' and K until its journals arrive at their bearings it may be readily inserted again for use.

The shaft of the wheel L may be arranged between the music-roller and the reed-board, and the lever K reversed at the opposite side of the said roller, and in this case the reed-board may be recessed or cut away at one end to accommodate the wheel L between it and the adjacent side of the case, and the shaft of said wheel may be supported at one end in the reed-board and at the other in said side of the case. When this is done the said side of the case may be provided with a large opening, into which the shaft may be readily inserted, and the bushing *b'*, of hard wood or other suitable material, may be inserted after said shaft is in place between said shaft and the opening in the case, to secure said shaft in position and serve as a bearing therefor.

The take-up roller I has its journals supported in bearings formed in blocks O, permanently secured against the inner surfaces of

the sides of the case A, and secured in place by levers or arms P, pivoted to the sides of the case so that their lower sides impinge on the said journals, springs *n* being employed to force them against the journals and cause them to exert a friction thereon to prevent the roller I from running too freely in rewinding. To remove or secure this roller it is only necessary to lift it against the pressure of the levers P, so as to withdraw it from the bearings, and then move it backward beyond said levers. It is desirable that this take-up roller shall be light, so as to lessen its aptitude for acquiring a momentum that will carry it forward against the will of the person using the instrument when rewinding or rerolling the music-sheet, and for this reason I preferably construct it of two heads connected by a shaft of wood or other strong material, and of a cylindric body or drum of paper, I', or other light material, connected to hubs *g* extending from the inner sides of said heads. The body I' is shown as provided at about the middle of its length with a flange or truck, *g'*, of the same diameter as the hubs *g*, and in the face of which is a recess, *h*, provided near the bottom with a hook, *p'*, for detachably securing the music-sheet thereto. The end of the music-sheet is preferably provided with a ring, *p''*, capable of engagement with the hook *p'*, which may be secured to the music-sheet by a tape or strip of any strong thin material passing through the ring and lapped over each side of and secured by paste, glue, or otherwise, to the music-sheet.

I prefer to make the heads of the music and take-up rollers of paper, leather-board, or like material, as shown in Fig. 8, for in that way I can easily and cheaply make them strong and durable. These heads are necessarily so thin that when made of wood they are easily split and broken; but by making them of paper, leather-board, or like material this difficulty is obviated. They are pressed onto extensions of the shaft or body of the roller of smaller diameter than the said shaft or body and glued against the shoulder thus formed.

Motion is transmitted to the take-up roller by a wheel, Q, mounted on the driving-shaft D, and a wheel, R, deriving motion therefrom, and imparting it to said roller by contact with one of its heads, which is preferably faced with india-rubber, india-rubber-coated fabric, or analogous material. The roller R is mounted on a U-shaped hanger, one arm of which embraces and is thereby secured to journal-boxes, preferably of wood, fitting on the driving-shaft D upon either side of the wheel Q, and the other arm of which embraces and is thereby secured to similar journal-boxes receiving and supporting the shaft of the intermediate wheel, R. This U-shaped hanger is made of spring-tempered sheet metal, and so adjusted that when put in position upon the driving-shaft D, with the intermediate wheel, R, also in its position, it exerts a spring force which impinges the peripheries of the two wheels upon each

other, creating a frictional contact, so that when the shaft D is rotated in the proper direction the face of the intermediate wheel, R, is thereby brought against the head of the take-up roller, and is caused to revolve on its axis, and its own rotary motion is transmitted to the take-up roller, which in turn rotates in the same direction as the driving-shaft D.

It is obvious that in this construction and arrangement of parts and forces the power that is exerted in rotating the crank-shaft D and intermediate wheel, R, when the latter is in contact with the head of the take-up roller, is equally exerted thereupon; and it is also true that any frictional contact of the wheels Q R and the said head of the take-up roller necessary to overcome any resistance to the rotation of the take-up roller is created by that resistance, so that the greater the resistance the greater the frictional contact of the wheels and the head of the roller. To disengage the intermediate wheel, R, from the head of the take-up roller it is only necessary to reverse the rotation of the driving-shaft D sufficiently to break the contact of their peripheries; and a stop may be placed upon the walls of the case to prevent the intermediate wheel, R, and its hanger from swinging away from the head of the take-up roller farther than may be desired.

The method which I have hereinabove described of supporting the intermediate wheel, R, and holding it forcibly in contact with the wheel Q upon the driving-shaft D, so as to create the necessary frictional contact, is the one preferred by me; but other methods of creating this frictional contact between the driving-shaft D and the intermediate wheel, R, may be employed.

My improvement last described consists primarily in connecting the intermediate wheel, R, and its hanger or bearing-piece with the crank-shaft, substantially as described, with such frictional contact between these two wheels as may be requisite, however such frictional contact may be produced, so that whenever the driving-shaft D is rotated it will carry with it the intermediate wheel, R, and its hanger, without rotating the intermediate wheel upon its axis, until some object is interposed sufficient to prevent the swinging motion of the intermediate wheel and its hanger.

The subsidiary improvement of making the intermediate wheel-hanger of sheet-steel or other material having a contractile force in itself sufficient to create the frictional contact desired between the two wheels by it connected with the crank-shaft D, I deem a valuable one from its compactness, simplicity, and durability; but a solid non-resilient hanger may be used and the required frictional contact of the two wheels obtained by means of a resilient surface upon one or both of these wheels, or in some cases gearing may be substituted for the wheels used in this device. By means of this combination of parts not

only do I prevent the rotation of the take-up roller in the wrong direction, but I also provide for readily releasing the take-up roller when it is desirable to reroll the music-sheet.

By facing the periphery of the head of the roller I, against which the wheel R bears, with india-rubber, india-rubber-coated fabric, or like material, a frictional contact is obtained sufficient to effect the rotation of the take-up roller with very little frictional contact between the intermediate wheel, R, and the wheel Q on the driving-shaft.

I will here remark that I may in practice provide the side of the case which is the nearer to the hand-crank of the driving-shaft with a large opening, *q*, through which the said shaft may be easily introduced into its place, and that in such case I may insert between the said opening and the shaft a bushing, *r*, of hard wood or other suitable material, for securing the shaft in place and forming a durable bearing therefor. I preferably provide the cover A' A² of the instrument with a swell consisting of a slat or slats, T, combined with the opening *i* in the center of the cover, so as to be capable of being opened and closed wholly or partially at pleasure. The slats T work edgewise through the opening *i*. As shown, two slats, T, are employed, and they are rigidly connected at each end to levers *k*, which are pivoted by a pin, *k*², to the bridge-pieces A³, so that said slats may be adjusted to protrude more or less through the cover A' A² and approach or recede from each other, thus wholly or partially closing the opening *i*, and thereby modifying the volume of tone emitted by the instrument. Slots or recesses in the bridge-pieces A³ afford provision for the inward movement of the said slats T. Preferably the levers *k* at one end (see Fig. 9) are extended beyond the pivot-pin *k*² and connected to links *k'*, which are at the opposite ends pivoted together by any suitable means, such as a rivet or pin. As shown, they are pivoted together by means of a spring, *k*³, fastened to the adjacent bridge-piece A³, and having its free end bent at right angles and inserted in the links to form a connecting pivot-pin therefor. This spring serves to exert a force on the levers and links sufficient to preclude them from rattling at their connections, and may also serve to retain the slats in any desirable position when not otherwise actuated. When the slats T are thus connected both may be adjusted by manipulating, or, in other words, taking hold of and shifting, either, as when one is moved its connection with the other entails the moving of that also. When they are opened they will form a conduit adjacent to the reed-cells, whereby the sound will be concentrated, directed, and emitted from the instrument into a compact volume, and when closed they will more or less preclude the emission of sound, thereby forming a sensitive and efficient swell.

Although an instrument containing all the above-described features is very desirable, I

do not wish to be understood as restricting myself to the use of all the features together. Neither do I wish to restrict myself to the use of all the features in mechanical musical instruments, for some are applicable to other musical instruments.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with the case of a musical instrument wherein the operation of reeds is controlled by a traveling perforated music-sheet, of a reed-board inclining toward and extending nearly to the center portion of the cover of the case, substantially as specified.

2. The combination, with a musical instrument, of a cover composed of two portions, A¹, A², and a bridge-piece or bridge-pieces, A³, connecting them.

3. The combination, in a musical instrument, of a swell-opening, two slats for controlling the same, and means whereby said slats are enabled to work outward and inward through the cover of the instrument to approach and recede from each other.

4. The combination, in a musical instrument, of a swell-opening, two slats for controlling the same, and means whereby said slats are enabled to work outward and inward through the cover of the instrument to approach and recede from each other, and to form, when moved inward, a conduit adjacent to the openings of the reed-cells for directing the sound from the instrument.

5. The combination, in a musical instrument, of a swell-opening and two slats for controlling the same, working outward and inward through the cover of the instrument to approach and recede from each other, and connected so that both may be moved or adjusted by manipulating one only.

6. The combination, in a musical instrument, of a swell-opening, two slats for controlling the same, working outward and inward through the cover of the instrument to approach and recede from each other, and levers whereby said slats are pivoted in place.

7. The combination, in a musical instrument, of a swell-opening, slats for controlling the same, pivoted by levers so as to work outward and inward through the cover of the instrument to approach and recede from each other, links for connecting said levers, and a spring applied to said links.

8. The combination, in a musical instrument, of a receiver arranged at the bottom thereof, bellows mounted on the top board of said receiver near one end, and a wind-chest and reed-board mounted on the top board of the receiver opposite said bellows, and extending nearly to the top of the central portion of the case of such instrument, substantially as specified.

9. The combination, in a musical instrument, of a receiver arranged at the bottom thereof and having an inclined top board, and a wind-chest and reed-board mounted on the top board of said receiver, and also being inclined, substantially as specified.

10. The combination, in a musical instrument, with a top board for a receiver grooved or recessed to form shoulders or shoulder-like portions, of bellows-leather, india-rubber, or like flexible material having its edges fitting over said shoulders or shoulder-like portions, and cleats or strips fitted to the grooved or recessed portions and against the bellows-leather, india-rubber, or like material, and serving to aid in securing the latter in place, as also to brace and stay said top board.

11. The combination, with a roller provided with a peripheral recess and a hook or analogous device arranged therein, of a music-sheet provided at one end with a ring or loop secured to it by a tape or strip, and extending beyond the music-sheet, and adapted to be engaged with the said hook or device for securing the music-sheet to said roller, substantially as specified.

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Witnesses:

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