

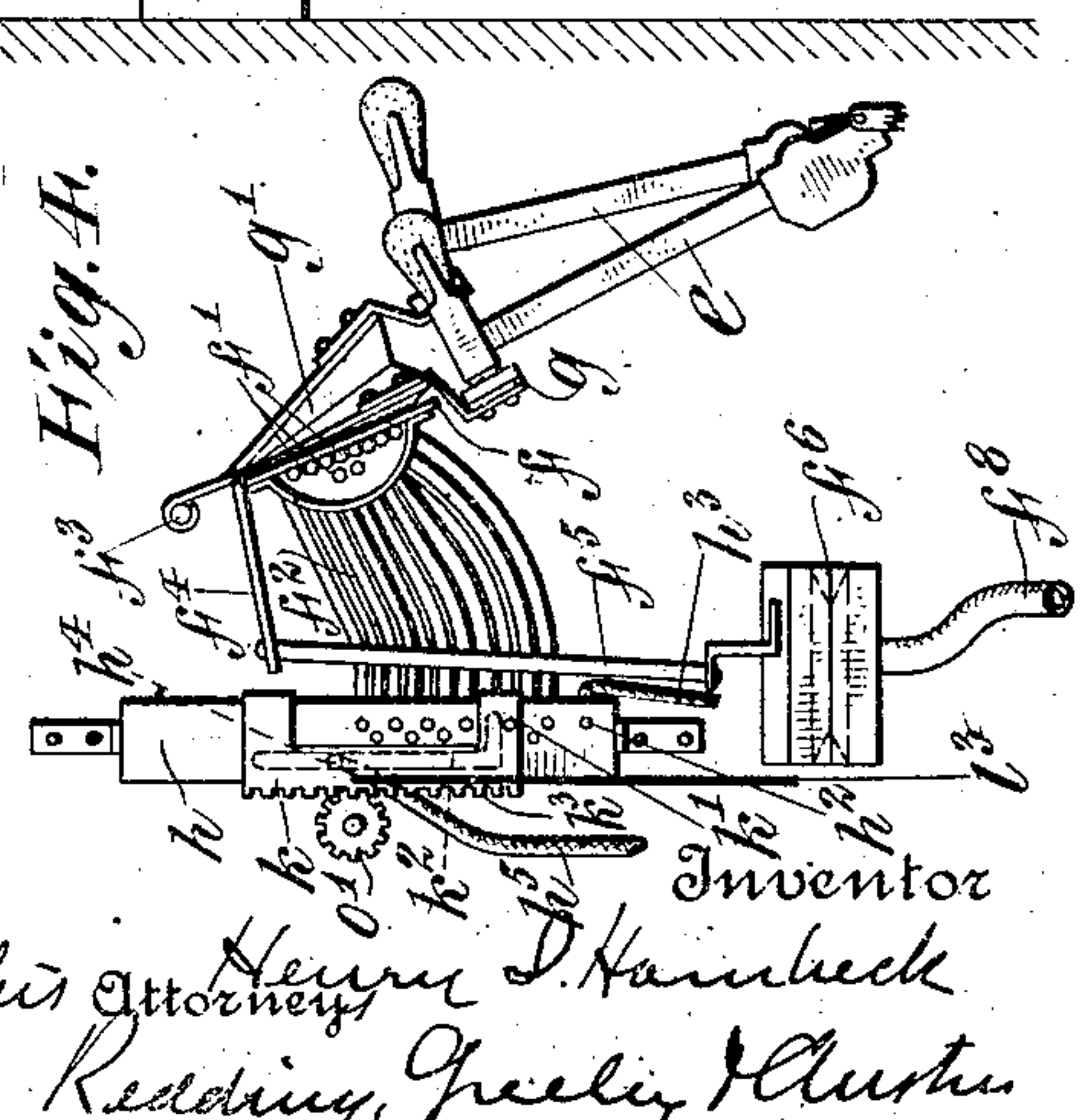
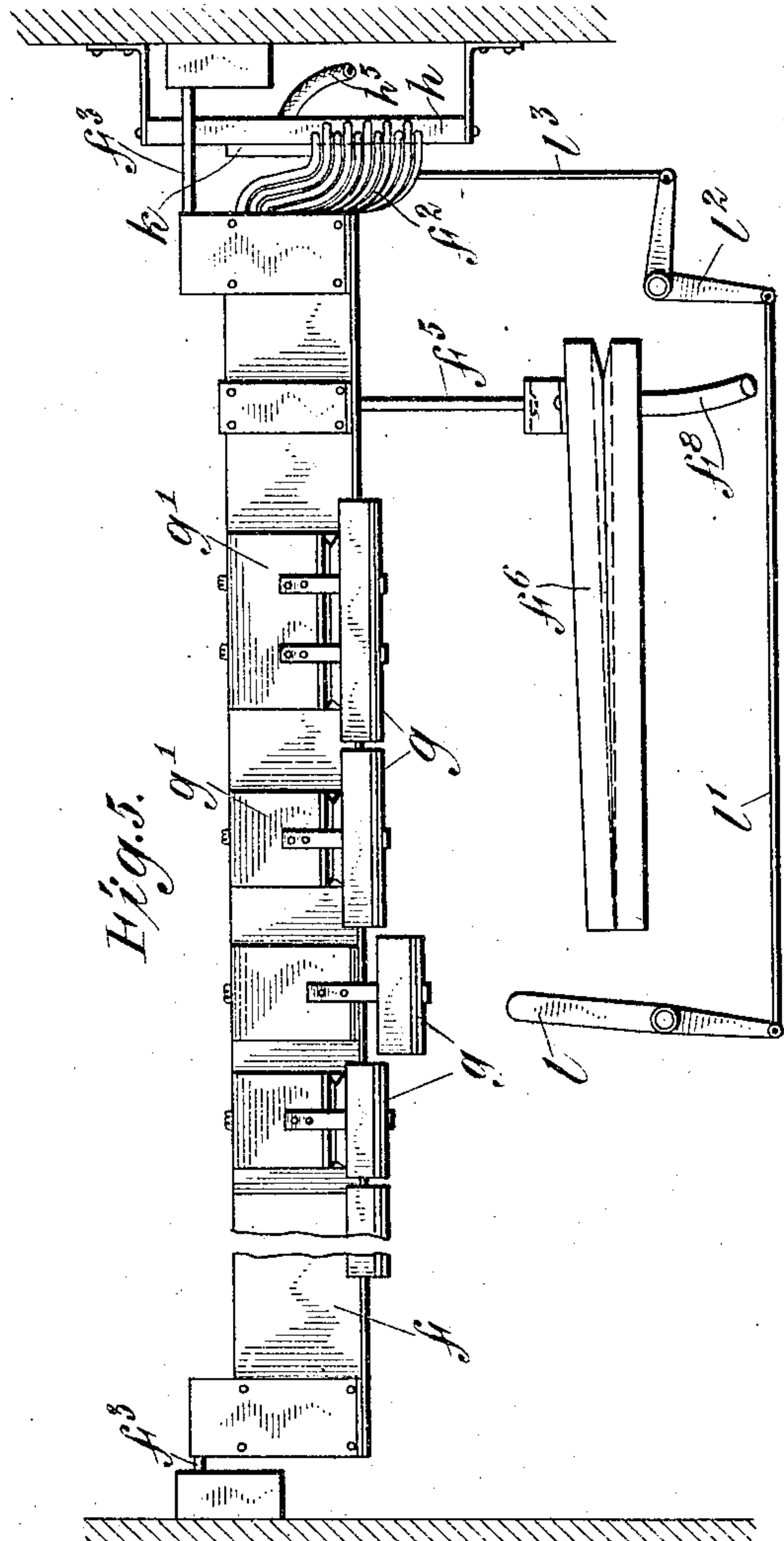
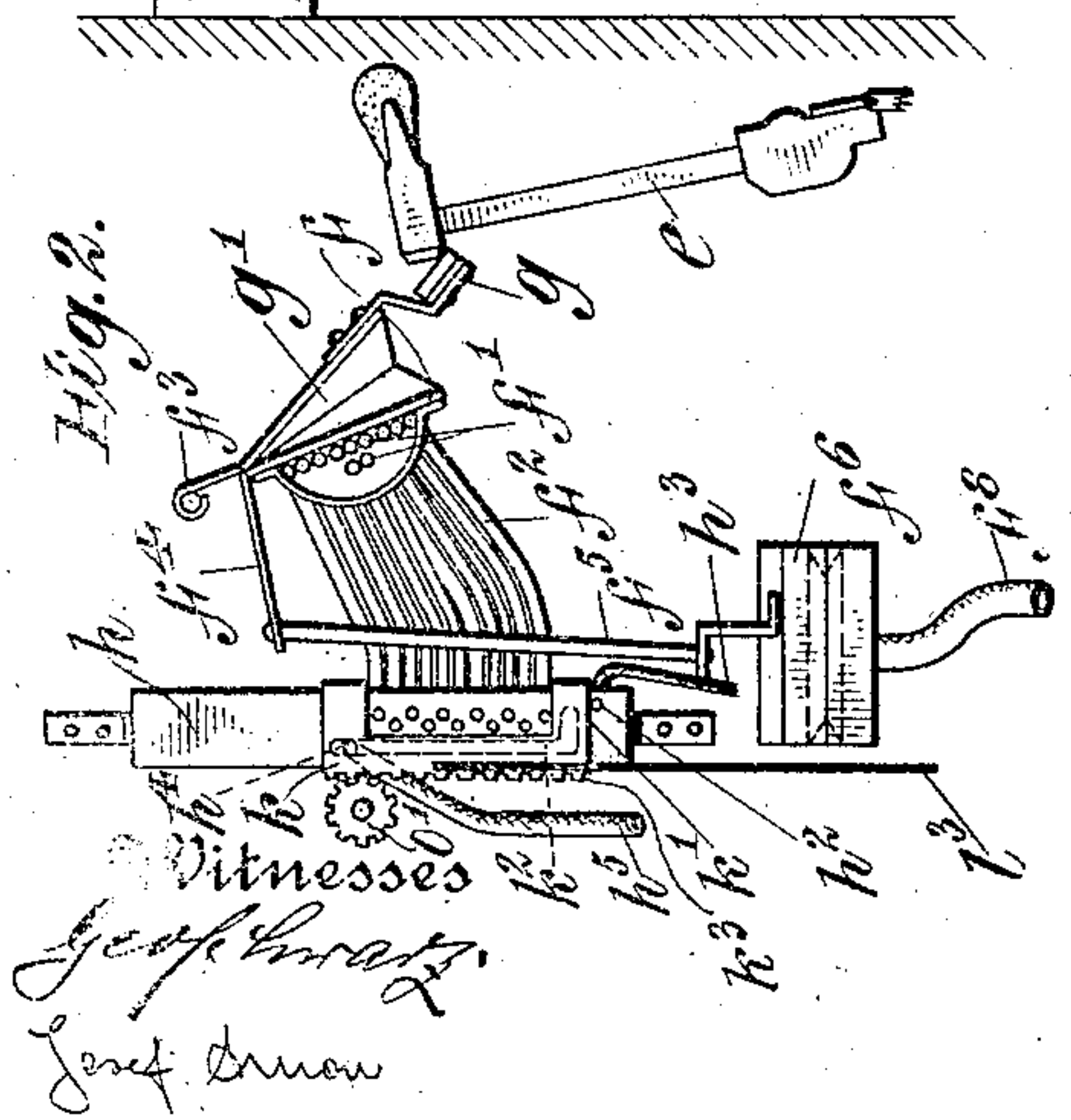
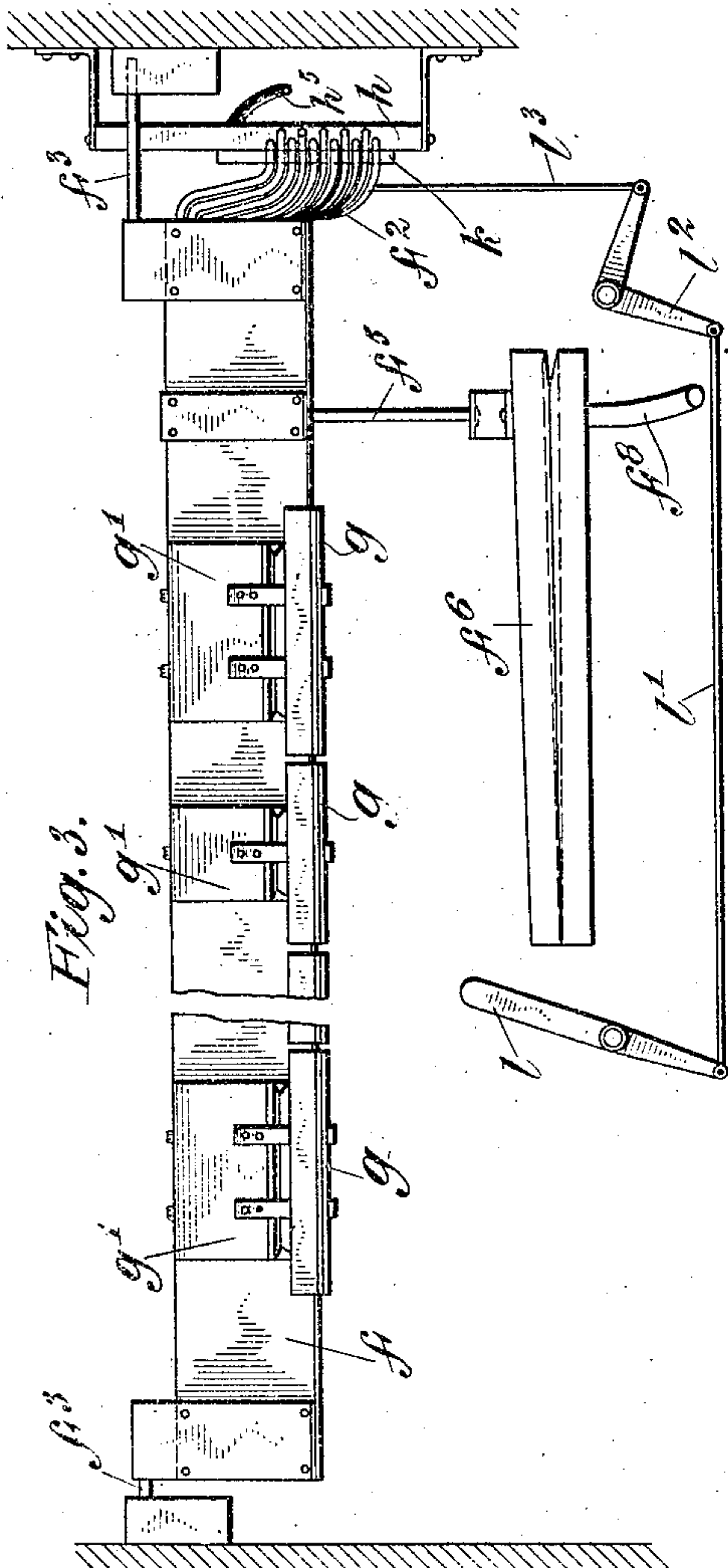
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APPLICATION FILED DEC. 24, 1908. RENEWED JAN. 27, 1910.

951,276.

Patented Mar. 8, 1910.

5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

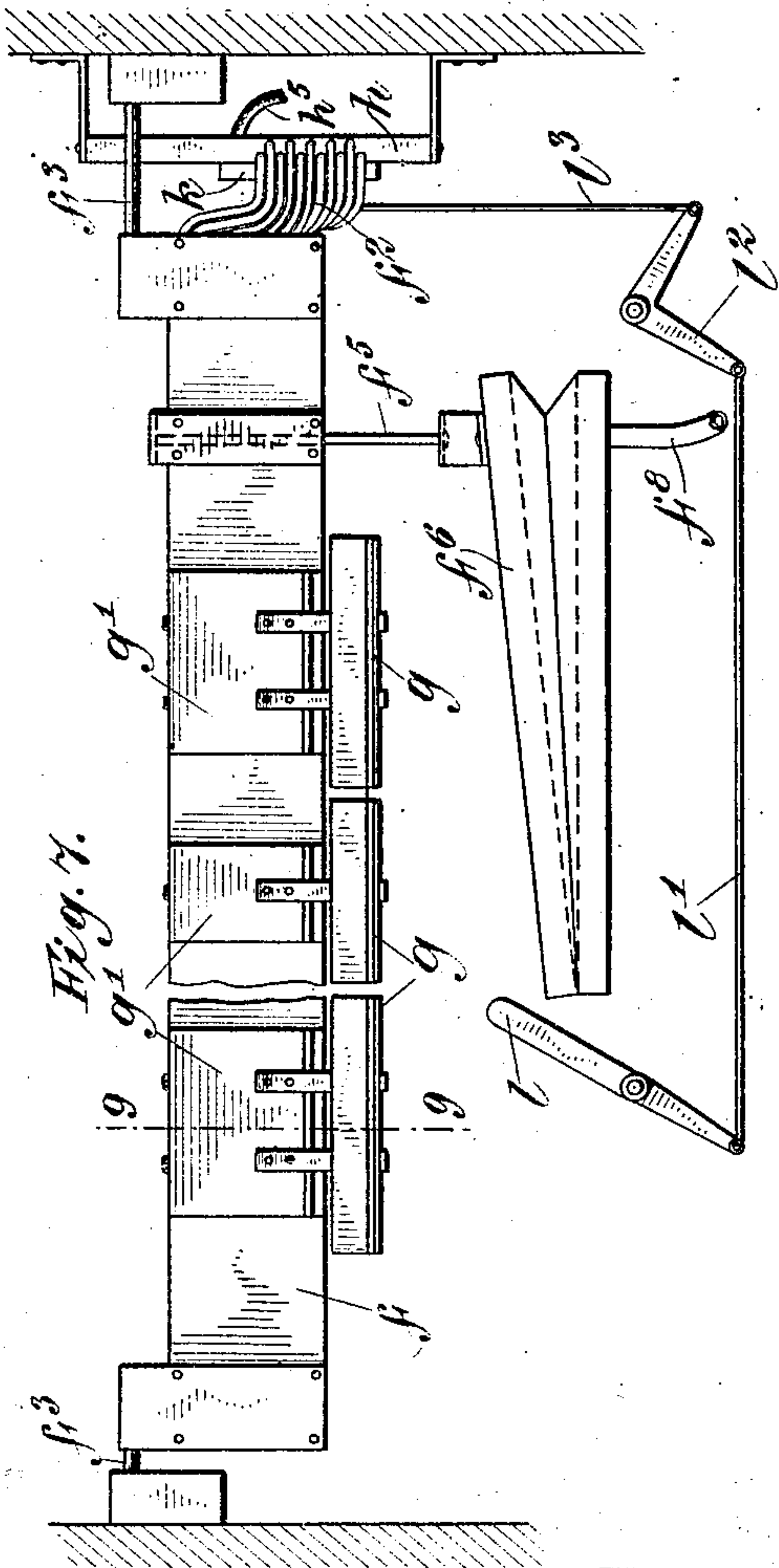


Fig. 7.

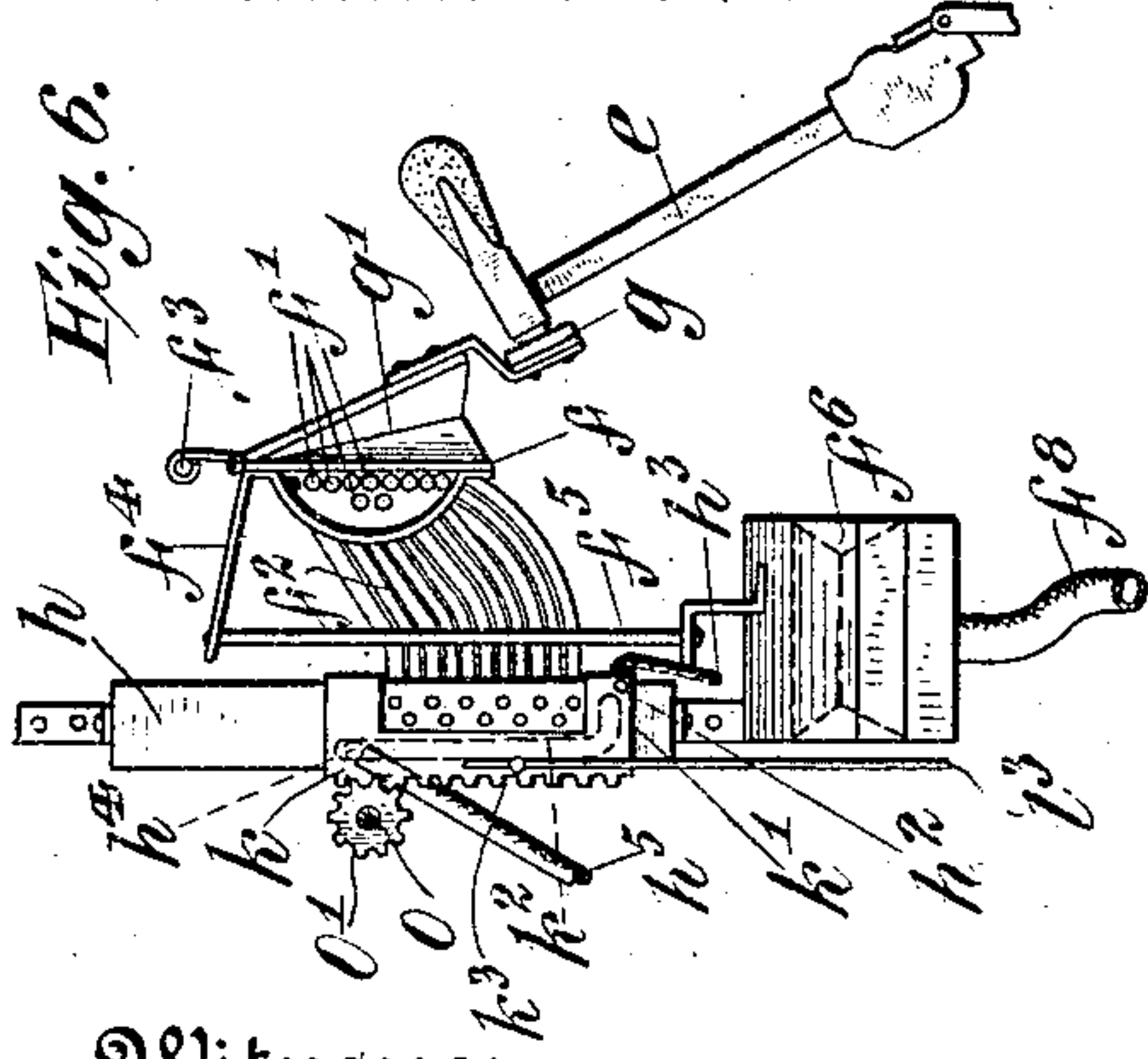


Fig. 6.

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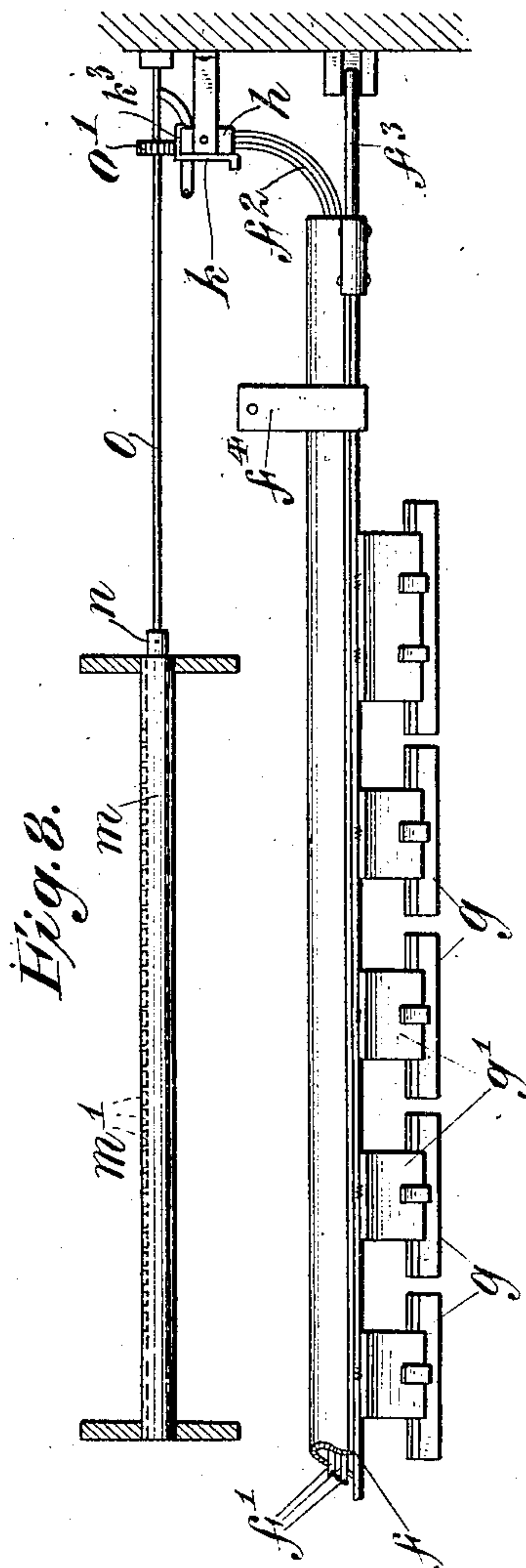


Fig. 8.

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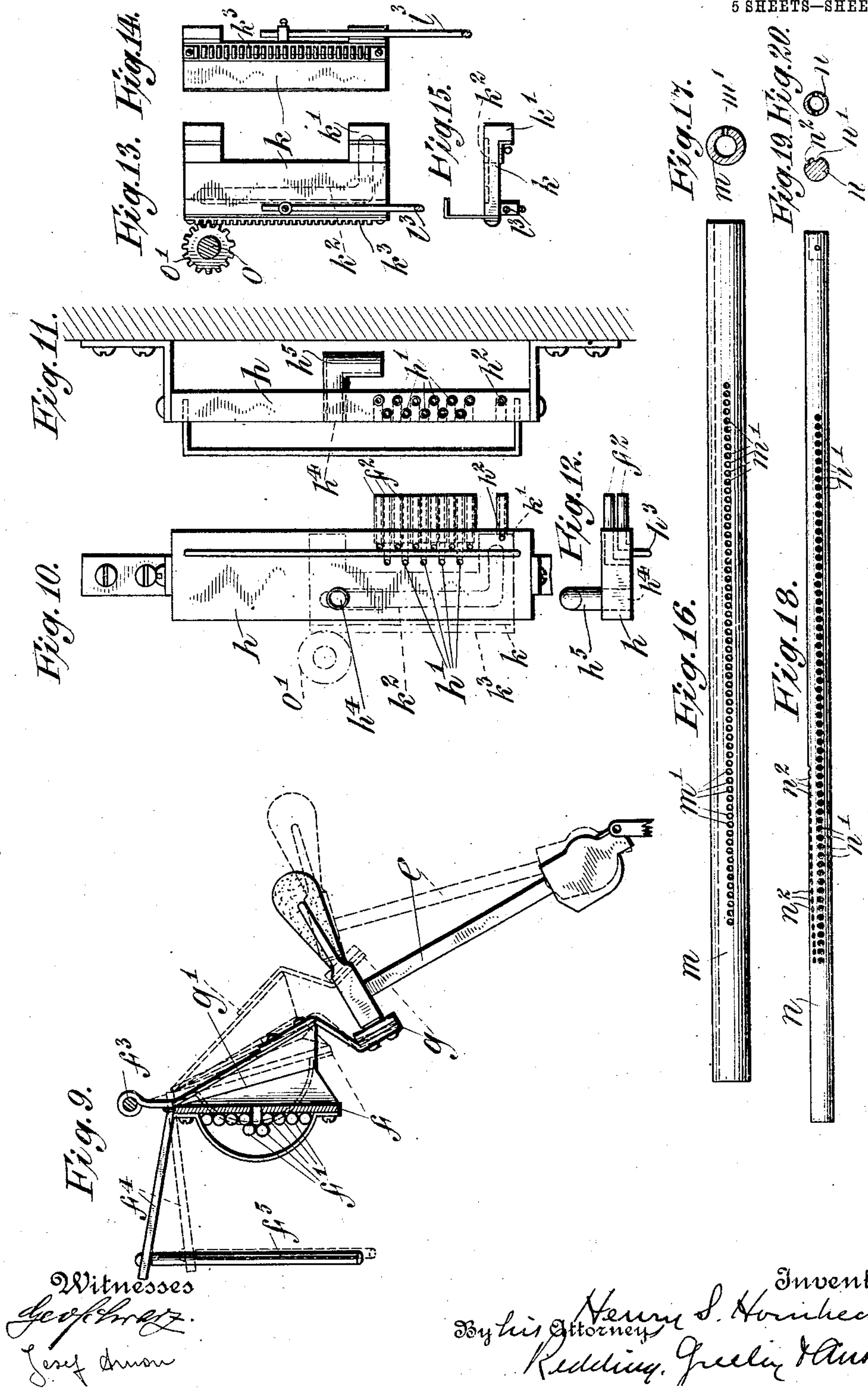
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5 SHEETS—SHEET 4.



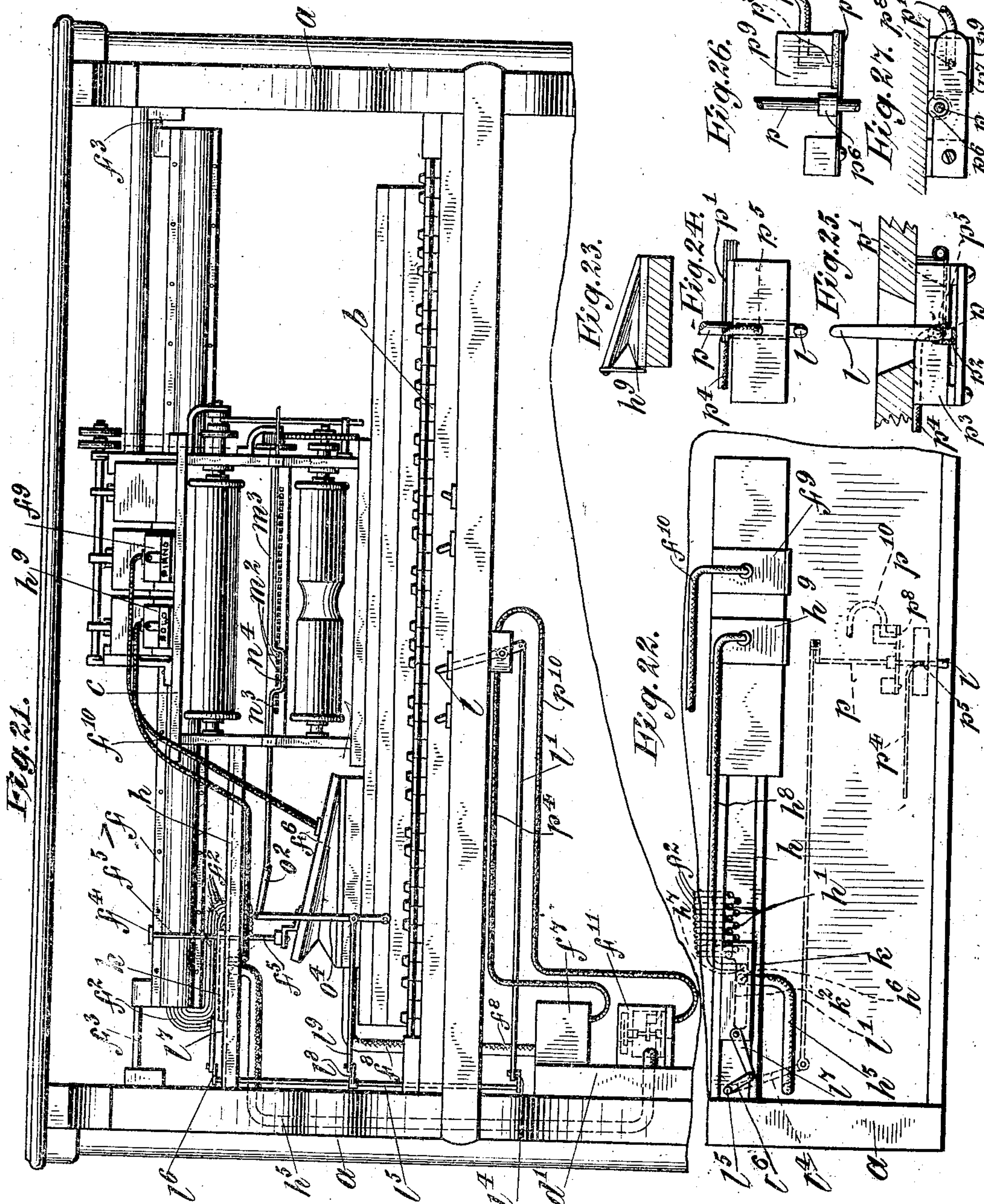
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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951,276.

Specification of Letters Patent.

Patented Mar. 8, 1910.

Application filed December 24, 1908, Serial No. 469,082. Renewed January 27, 1910. Serial No. 540,467.

To all whom it may concern:

Be it known that I, HENRY S. HORNBECK, a citizen of the United States, residing in the city of Elizabeth, in the State of New Jersey, have invented certain new and useful Improvements in Pianos, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

It is the object of this invention to provide means whereby, in the operation of automatic pianos, it shall be possible to give prominence to any note or succession of notes within the range of the instrument while other notes, sounded simultaneously, are modulated or softened in tone. Tones softer than the normal are usually produced by lessening the throw of the hammers, the hammer rest rail being moved bodily toward the strings of the instrument so that the throw of all of the hammers shall be diminished. It has also been proposed to provide supplemental rest rails, movable independently of each other and by independent operating means to diminish the throw of the hammers of the upper portion of the scale or of the lower portion of the scale. This permits the tone of notes in one portion of the scale to be modulated while all notes in the other portion of the scale are struck with normal force. This, however, is insufficient for the artistic rendition of many musical compositions in which the successive notes which carry the theme or air or melody should receive prominence over notes which though sounded simultaneously may be both higher and lower in the scale than the corresponding note or notes of the theme. It is, therefore, the special purpose in view in the present invention to enable such superior artistic results to be produced and any note or any succession of notes, anywhere in the scale, to receive prominence over notes sounded simultaneously in any other part of the scale. To this end the hammer rest rail is divided in short sections and the several sections are so controlled from a single operating device as to permit the performer to retire instantly any of such sections while all other sections are in position, to shorten the throw of the hammers, so that the strings corresponding to such section shall be struck by their hammers with normal force or with such force as to give the corresponding notes the desired prominence.

The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated and in which—

Figure 1 is a view in front elevation of so much of an automatic or player piano equipped with the improved devices as is necessary to enable the invention to be understood, the front casing being removed. Figs. 2 and 3 are respectively a detail view in end elevation and a detail view in rear elevation of the devices with which the improvement is particularly concerned, the parts being represented in the position which they occupy when the throw of all of the hammers is diminished. Figs. 4 and 5 are views respectively similar to Figs. 2 and 3 but illustrating the positions of the parts when a single section of the hammer rest rail is retired while all other sections are thrown forward to diminish the throw of the hammers. Figs. 6 and 7 are also views similar respectively to Figs. 2 and 3 but showing the parts in the position which they occupy when all sections of the hammer rest rail are retired to permit all of the hammers to have their full normal throw. Fig. 8 is a detail view of some of the parts shown in Figs. 2 and 3 as seen from the top. Fig. 9 is a detail view in section on the plane indicated by the line 9-9 of Fig. 7, on a larger scale, the normal position of the hammer rest rail being shown by full lines and its abnormal position by dotted lines. Fig. 10 is a detail view in elevation, as seen from the right in Fig. 1, of a portion of the valve mechanism which controls the sections of the hammer rest rail. Fig. 11 is a view of the same in elevation as seen from the right in Fig. 10. Fig. 12 is an end view of the same with the guide and brackets removed. Figs. 13, 14 and 15 are detail views in side, front and end elevation respectively of the slide valve and the mechanism for actuating the indicator. Figs. 16 and 17 are detail views of the outer shell of the indicator. Figs. 18, 19 and 20 are detail views of the indicator. Fig. 21 is a partial view, similar to the corresponding portion of Fig. 1 and illustrating a slightly different embodiment of the invention. Fig. 22 is a partial view of some of the parts shown in Fig. 21, as seen from the top. Fig. 23 is a detail view of one of the indicating or signaling devices shown in position in Fig. 21. Figs. 24-27

are detail views showing the controlling lever and the devices operated therewith.

In the embodiment of the invention illustrated in the drawings the frame *a* of the piano supports in usual manner the key-board *b*, the tracker box *c*, bellows mechanism *d*, wind-box *d'* and hammers *e*, which are operated in the usual manner either from the finger keys or from the tracker box mechanism.

The hammer rest rail against which the hammers rest when they fall back from the strings comprises a main rail or support *f* and a series of independently movable sectional rails *g*, each of which is independently operated by means mounted on the main rail and is preferably carried by the movable member of a corresponding sectional bellows *g'* and is adapted to cooperate with a relatively small number of hammers *e*. The main rail *f* also supports the tubes *f'* which lead to the several bellows *g'* and the flexible connecting tubes *f''* by which the tubes *f'* are connected to the wind box as hereinafter described. The main rail *f* is movably supported so that all of the sectional rails *g* may be advanced toward or retired from the hammers *e* to vary the throw thereof, the main rail being shown as hung upon pivots *f''* and having an arm *f'''* connected by a rod *f''''* with the movable member of a bellows *f'''''*, which, in the construction shown, is the operating means for the main rail. The latter, being normally expanded, as shown in Figs. 6 and 7, to hold the rest rail in normal retired position away from the strings, is arranged to be collapsed, at the will of the performer, to throw the rest rail toward the strings, as shown in Figs. 2 and 4 and by dotted lines in Fig. 9, and for this purpose is connected with the usual double pneumatic or controlling pneumatic *f''''''*, the operation of which is in turn controlled, at the will of the operator, preferably through the valve mechanism hereinafter described.

The several flexible connections *f''* lead from the tubes *f'* to a valve chest *h* in the ports *h'* of which they terminate. Independent of the series of ports *h'* in the valve chest *h* is a port *h''* which is connected by a tube *h'''* with the controlling pneumatic *f''''*, which is constructed and operates in the usual manner for the purpose of establishing connection between the bellows *f'''''* and the wind box *d'* through the tube *f''''''*. Cooperating with the valve chest *h* is a slide valve *k* which is adapted to control, in the first place, the admission of atmospheric pressure to the controlling pneumatic *f''''* through the port *h''* and tube *h'''*, to collapse bellows *f'''''* and, in the second place, to control the connection of the several rest rail bellows *g* with the wind box *d'* so that one or another or more of such bellows may be

collapsed at the will of the performer. The slide valve has a projection *k'*, which, in the normal position of the parts, covers the port *h''* and therefore shuts off atmospheric pressure from the pneumatic *f''''* and permits the bellows *f'''''* to remain extended so as to hold the rest rail in normal, retired position away from the strings. The first movement of the slide valve *k* from its normal position uncovers the port *h''* and, through the pneumatic *f''''*, causes the bellows *f'''''* to be collapsed and all sections of the hammer rest rail to be thrown into the abnormal or pianissimo position. The slide valve *k* has in its working surface an L-shaped slot *k''*, the short arm of which is adapted to register with one or more (as shown clearly in Fig. 10) of the valve ports *h'* in the valve chest *h*, while the long arm thereof is always in registration with a port *h'''* which is connected by a pipe *h''''*, either directly or indirectly with the wind box *d'*, so that some one or more of the sectional rest rail bellows *g'* shall be collapsed and the corresponding section of the sectional rest rail *g* be drawn away from the strings according to the position which the slide valve *k* occupies with respect to the series of ports *h'*.

The movement of the slide valve *k* is controlled and effected by the performer through any suitable means. As shown in the drawings, there is suitably mounted in convenient position near the key-board a controlling lever *l* which, in the arrangement shown, is connected by a rod *l'* with one arm of a bell crank lever *l''* the other arm of which is connected by a rod *l'''* with the slide valve *k*. Shifting of the lever in one direction or the other effects the desired movement of the slide valve.

In order that the performer may be guided by the evidence of his eyes in the movement of the slide valve and consequently in the collapsing of the bellows *g'*, it is desirable that an indicator of some sort should be provided. A suitable indicator is shown in Figs. 1 and 16-20 of the drawings, a portion of the controlling mechanism being also shown in Figs. 2, 4, 6, 13 and 14. This indicator comprises a sleeve *m*, suitably mounted for observation by the performer, preferably in the front of the tracker box. It is provided with a longitudinal series of apertures *m'*. Within the sleeve is mounted a rotatable rod or shaft *n* which has a longitudinal series of black dots *n'* or, it might be, a black line, corresponding to the series of openings *m'* in the sleeve *m*. The rod *n* has also a spirally stepped series of black dots *n''*. Therefore, when the rod *n* is in its normal position within the sleeve *m* all of the holes *m'* will show black, while if the rod be turned from its normal position one or a few of the

holes m' will show black, the location of such holes as show black depending upon the extent to which the rod n is rotated. In order that the rotation of the rod may be made to indicate which of the sectional bellows g' are collapsed, it is connected with the devices for controlling the collapsing of such bellows. Such connection may be accomplished in any convenient manner. As shown in the figures of the drawings referred to, the rod n is secured to a shaft o which carries a pinion o' in mesh with a rack k^3 on the slide valve k . The extent of rotation of the rod n will, therefore, depend upon the extent of movement of the slide valve k and therefore upon the location of the sectional bellows g' which is collapsed.

In the embodiment of the invention illustrated in Figs. 21-27 provision is made not only for indicating the position of the sectional bellows which may be collapsed, but for indicating whether the devices are in operative condition for solo playing, or for piano or for pianissimo playing throughout the scale, and also for permitting the solo playing to be instantly discontinued at any time without requiring the controlling lever to be moved all the way back to its initial or normal position.

The general features of construction of the piano itself and of the solo devices, including the sectional hammer rest rail and the operating bellows, are arranged substantially as already described with respect to Fig. 1. The slide valve k is in this instance shown as arranged in a horizontal position, together with the valve chest h which is connected, as before, with the sectional bellows. The short arm of the controlling lever l is connected by a rod l' with an arm l^4 on a vertical shaft l^5 . Another arm l^6 on the shaft is connected by a rod l^7 with the slide valve k and still another arm l^8 is connected by a rod l^9 with a lever o^4 , the free end of which is connected by a link o^2 with a sliding indicator rod n^3 . The latter is bent or stepped, as at n^4 , to show upon a series of spots m^2 on a bar m^3 the position of the slide valve and therefore the location of the sectional bellows which may be collapsed. The pneumatic f^7 controls the connection of the main rest rail bellows f^6 , through the tube f^8 , with the wind box d' as before. The main rest rail bellows f^6 , if placed so that it may be seen by the performer, may be utilized, as in the construction shown in Fig. 1, to show that the parts are in the position for playing piano, that is, with the rest rail thrown toward the strings to reduce the throw of the hammers. In Fig. 21, however, there is shown a separate small signaling bellows f^9 , the connection of which with the wind box is controlled by the pneumatic f^7 . As shown the small bellows f^9 is directly connected by a pipe

f^{10} with the main rest rail bellows f^6 so that the bellows f^9 is collapsed whenever the bellows f^6 is collapsed. The bellows f^9 carries an indicator marked "piano" which is normally concealed but is exhibited when the bellows is collapsed.

In the construction shown in Fig. 1 the valve chest h is always under suction, being permanently connected with the wind box d' through the pneumatic f^7 and pipe h^5 , so that, whenever the slide valve k therein is moved from its normal position, some one at least of the sectional bellows is also connected with the wind box and is collapsed. In the construction shown in Fig. 21, however, the tube h^5 is so connected to the wind box d' , through an independent pneumatic f^{11} , as to establish or not to establish communication between the channel h^2 of the slide valve k and the wind box, according to the operation of the pneumatic f^{11} at the will of the performer, who is therefore enabled to cut the solo devices out of operation or throw them into operation regardless of the position of the slide valve and without requiring the controlling lever l to be moved back to its normal position. The two pneumatics f^7 and f^{11} might be controlled by the usual separate controlling devices, but in order to avoid a multiplicity of controlling devices to receive the attention of the performer, provision is made whereby both of the pneumatics f^7 and f^{11} are controlled by movement of the controlling lever l which, as already described, controls the position of the slide valve and determines which of the sectional rest rail bellows g' shall be collapsed. Such means are shown in detail in Figs. 22-27, wherein it will be seen that the shaft p upon which the controlling lever l is mounted, is not only capable of a movement of rotation upon its own axis but is also capable of a movement downward (or it might be in any other direction transverse to its axis) and of movement in a longitudinal direction, either toward or from the performer.

As will be seen by reference to Figs. 24 and 25, the shaft p is capable of movement downwardly, against the upward pressure of a supporting spring p' , in an open bearing p^2 formed in a block p^3 . A tube p^4 establishes connection between the pneumatic f^7 and a port p^5 in the block p^3 , which port is closed by the shaft p when it is in its upper or normal position. Pressure downward upon the lever l moves the shaft p away from the port and permits atmospheric pressure to reach the pneumatic f^7 through the tube p^4 and, through the connection of the pneumatic, establishes connection of the bellows f^6 with the wind box d' and causes the collapsing of the bellows to throw the entire hammer rest rail toward the strings. The shaft p , being also movable longitudinally

in its bearing, has a collar p^6 , as shown in Figs. 26 and 27, which bears against a flat spring valve p^7 . The latter normally closes a port p^8 in a block p^9 , which port is connected through a tube p^{10} with the pneumatic f^{11} , so that when the lever l is pulled toward the performer the port p^8 is opened, atmospheric pressure is admitted to the pneumatic f^{11} and communication from the tube h^5 to the wind box d' is at once established. Whenever the lever l is permitted to move back to its normal position, away from the performer, the port p^8 is at once closed and the pneumatic f^{11} operates in the usual manner to cut off communication between the tube h^5 and the wind box d' . This connection may, therefore, be established or cut off at will regardless of the position of oscillation of the controlling lever l about its axis and therefore regardless of the position of the slide valve k .

The slide valve k is provided in its working face as before with a long L-shaped channel k^2 , the long arm of which always overlies the port h^6 with which the tube h^5 is connected. The short arm of the channel k^2 is adapted to establish communication with at least some one or another of the ports h' of the valve chest h , so as to establish connection between the sectional rest rail bellows and the wind box. For the purpose of signaling to the performer that the parts are in operative condition for solo playing there is also formed in the valve chest and adapted to be covered always by the long arm of the channel k^2 of the slide valve k a port h^7 which is connected through a tube h^8 with a signaling or indicating bellows h^9 located in convenient position for observation by the performer, as shown in Fig. 21. The bellows h^9 carries an indicator marked "piano" which is normally concealed but is exhibited when the bellows is collapsed.

The operation of the solo device will now be readily understood, both as to the embodiment of the invention shown in Fig. 1 and as to the embodiment of the invention shown in Fig. 21. Referring first to the embodiment shown in Fig. 1, it will be understood that the lever l is grasped by the performer and is moved slightly to the right, thereby causing the slide valve k to uncover the port h^2 . This, through the pneumatic f^7 , causes the bellows f^6 to collapse and the entire hammer rest rail to be moved toward the strings into position to limit the backward throw of the hammers. In this position of the parts the playing of the instrument will be piano throughout the range of the instrument. Should it then be desired to produce the effect of a solo and accompaniment the lever l is moved further to the right to effect connection between the wind box and that one of the sectional bellows g'

which comes within the range of the hammers which should have their full throw, the movement of the lever and therefore of the slide valve being continued in one direction or the other with the shifting of the solo notes up or down the scale. In this embodiment of the invention the hammer rest rail can be restored to its normal position only by moving the lever back to its left hand position so as to cover up again the port h^2 and permit the bellows f^6 to expand.

In the operation of the embodiment of the invention shown in Fig. 21 the mere oscillation of the controlling lever l upon its axis produces no effect upon the playing of the instrument. A pressure downward upon the lever, however, causes, through the pneumatic f^7 , the collapsing of the bellows f^6 and the throwing of the hammer rest rail into position for playing piano, at the same time operating the piano signal f^9 . A pulling of the lever toward the performer then, through the pneumatic f^{11} , establishes connection between the wind box and the channel in the slide valve, at the same time operating the solo signal h^9 , and therefore a movement of oscillation of the lever l upon its axis establishes connection between such channel and some one or another of the sectional rest rail bellows so that such bellows is collapsed and the corresponding section of the rest rail thrown away from the strings gives the corresponding hammer or hammers full throw.

It will be understood that various other changes in details of construction and arrangement may be made without departing from the spirit of the invention which is not limited to the construction shown and described herein.

I claim as my invention:

1. In a piano, the combination with the hammers, of a main rest rail, a sectional rest rail, means for moving the main rest rail toward or from the hammers to limit the throw thereof and independent means mounted upon the main rest rail and moving therewith for moving one or another of the several sections toward or from the hammers.

2. In a piano, the combination with the hammers, of a main rest rail, means for moving the same toward or from the hammers, a series of bellows carried by the main rest rail, a sectional rest rail carried as to its several sections by the several bellows and means to control the expanding and collapsing of said bellows severally.

3. In a piano, the combination with the hammers, of a main rest rail, a sectional rest rail, means for moving the main rest rail toward or from the hammers to limit the throw thereof, independent means mounted upon the main rest rail and moving therewith for moving one or another of the sev-

eral sections toward or from the hammers and an indicator operatively connected with the last named means to show which of the several sections are moved toward or from the hammers.

4. In a piano, the combination with the hammers, of a main rest rail, means for moving the same toward or from the hammers, a series of bellows carried by the rest rail, a sectional rest rail carried as to its several sections by the several bellows, means to control the expanding and collapsing of said bellows severally and an indicator operatively connected with such means to show which sections of the sectional rest rail are moved toward or from the hammers.

5. In a piano, the combination with the hammers, of a series of bellows, a sectional rest rail carried as to its several sections by the several bellows, a valve chest having separate connections to the several bellows, a wind box connected with the valve chest, a valve to control connection from the valve chest to the several bellows and means to operate the valve.

6. In a piano, the combination with the hammers, of a series of bellows, a sectional rest rail carried as to its several sections by the several bellows, a valve chest having separate connections to the several bellows, a wind box connected with the valve chest, a slide valve and means to operate the same to control the connection from the valve chest to the several bellows, and an indicator operatively connected with the slide valve to be moved in accordance with the movement thereof.

7. In a piano, the combination with the hammers, of a main rest rail, a bellows and connections for moving the main rest rail toward or from the hammers, a series of bellows carried by the main rest rail, a sectional rest rail carried as to its several sections by the several bellows, and means to control the expanding and collapsing of all of said bellows severally.

8. In a piano, the combination with the hammers, of a main rest rail, a bellows and connections for moving the main rest rail toward or from the hammers, a series of bellows carried by the main rest rail, a sectional rest rail carried as to its several sections by the several bellows, a pneumatic for controlling the first named bellows, a valve chest having separate connections to the several sectional rest rail bellows and having a connection to said pneumatic and a slide valve and means to operate the same to control said pneumatic and to control the connections from the valve chest to the sectional rest rail bellows severally.

9. In a piano, the combination with the hammers, of a main rest rail, means for moving the same toward or from the hammers, a series of bellows carried by the main

rest rail, a sectional rest rail carried as to its several sections by the several bellows, a valve chest having separate connections to said bellows severally, a valve to control said connections, a wind box and connections to the valve chest and means to control said connections from the wind box to the valve chest.

10. In a piano, the combination with the hammers, of a series of bellows, a sectional rest rail carried as to its several sections by the several bellows, a wind box, a valve chest connected with the wind box and with which the several bellows communicate, a controlling device, means operated by the controlling device which control communication from the wind box to the valve chest and independent means also operated by the controlling device to control the connections from the valve chest to the several bellows.

11. In a piano, the combination with the hammers, of a series of bellows, a sectional rest rail carried as to its several sections by the several bellows, a wind box, a valve chest connected with the wind box and with which the several bellows communicate, a signaling device connected to the wind box, a controlling device, means operated by the controlling device for controlling the connections from the valve chest to the several bellows, independent means operated by the controlling device for controlling the connection from the wind box to the valve chest, and independent means operated by the controlling device for controlling the connection from the wind box to the signaling device.

12. In a piano, the combination with the hammers, of a series of bellows, a sectional rest rail carried as to its several sections by the several bellows, a wind box, a valve chest connected to the wind box and having separate connections to the several bellows, a valve to control said separate connections, a pneumatic to control the connection from the wind box to the valve chest, an oscillating lever operatively connected with the valve, a shaft upon which said lever is mounted, said shaft being movable longitudinally in its bearing, a connection having a port adjacent to said shaft and a valve normally closing said port when the shaft is in its normal position and moved by the longitudinal movement of the shaft to open the port.

13. In a piano, the combination with the hammers, of a series of bellows, a sectional rest rail carried as to its several sections by the several bellows, a wind box, a valve chest connected to the wind box and having separate connections to the several bellows, a valve to control said separate connections, a signaling device connected to the wind box, a pneumatic to control the connection of the signaling device to the wind

box, an oscillating lever operatively connected with the valve, a shaft upon which said lever is mounted, said shaft being movable longitudinally in its bearing, a valve
5 controlled by the longitudinal movement of said shaft and an air connection from said pneumatic to said valve.

14. A controlling device for pneumatic piano players, comprising an oscillating lever having a mechanical connection, a shaft
10 upon which said lever is mounted, a bearing block having a slotted bearing in which said shaft is laterally movable and having an air port normally closed by the shaft and a
15 spring holding said shaft yieldingly in its normal position.

15. A controlling device for pneumatic

piano players, comprising an oscillating lever having a mechanical connection, a shaft upon which said lever is mounted, a bearing
20 block in which said shaft is movable longitudinally, an air connection having a port adjacent to said shaft, a projection carried by said shaft, and a spring valve normally
25 closing said air port and moved to open the same by engagement with the projection on the shaft in the longitudinal movement of the shaft.

This specification signed and witnessed this 21st day of December, A. D., 1908.

HENRY S. HORNBECK.

Signed in the presence of—

W. B. GREELEY,

AMBROSE L. O'SHEA.