W. R. CRIPPEN.

NOTE SHEET CUTTING APPARATUS.

APPLICATION FILED JUNE 5, 1907.

920,921.

Patented May 11, 1909.

7 SHEETS—SHEET 1.

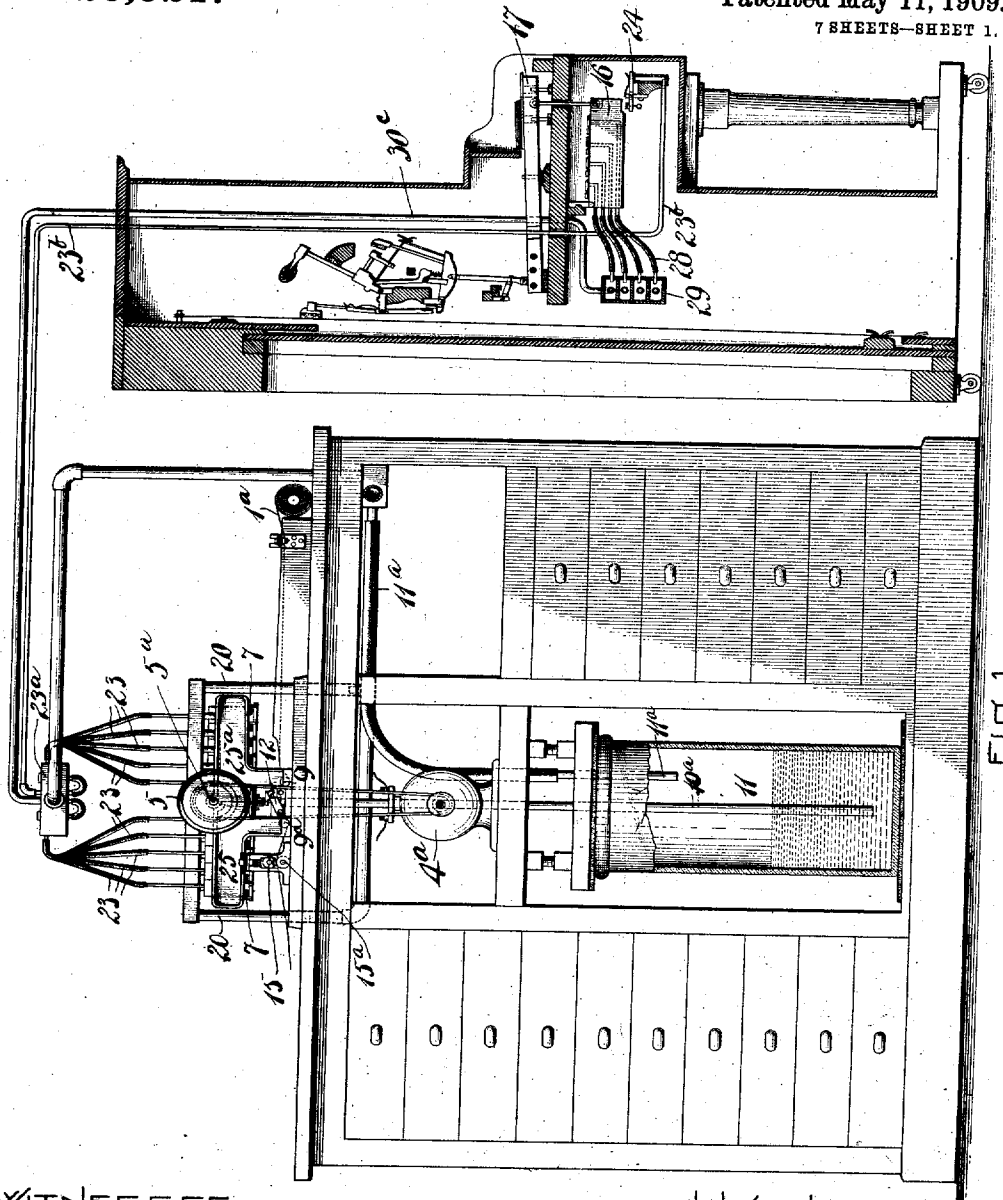

FIG. 1.

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7 SHEETS—SHEET 2.

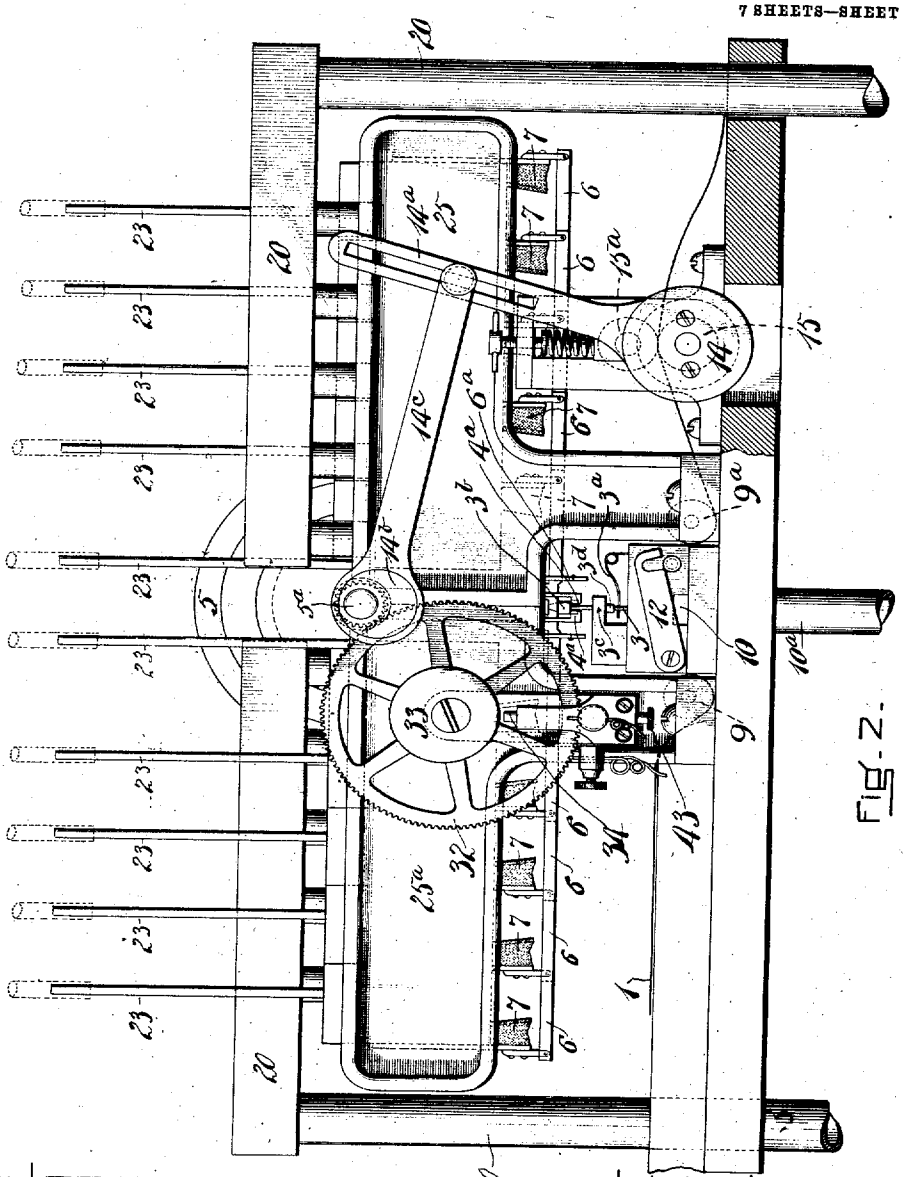

Fig. 2.

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7 SHEETS—SHEET 3.

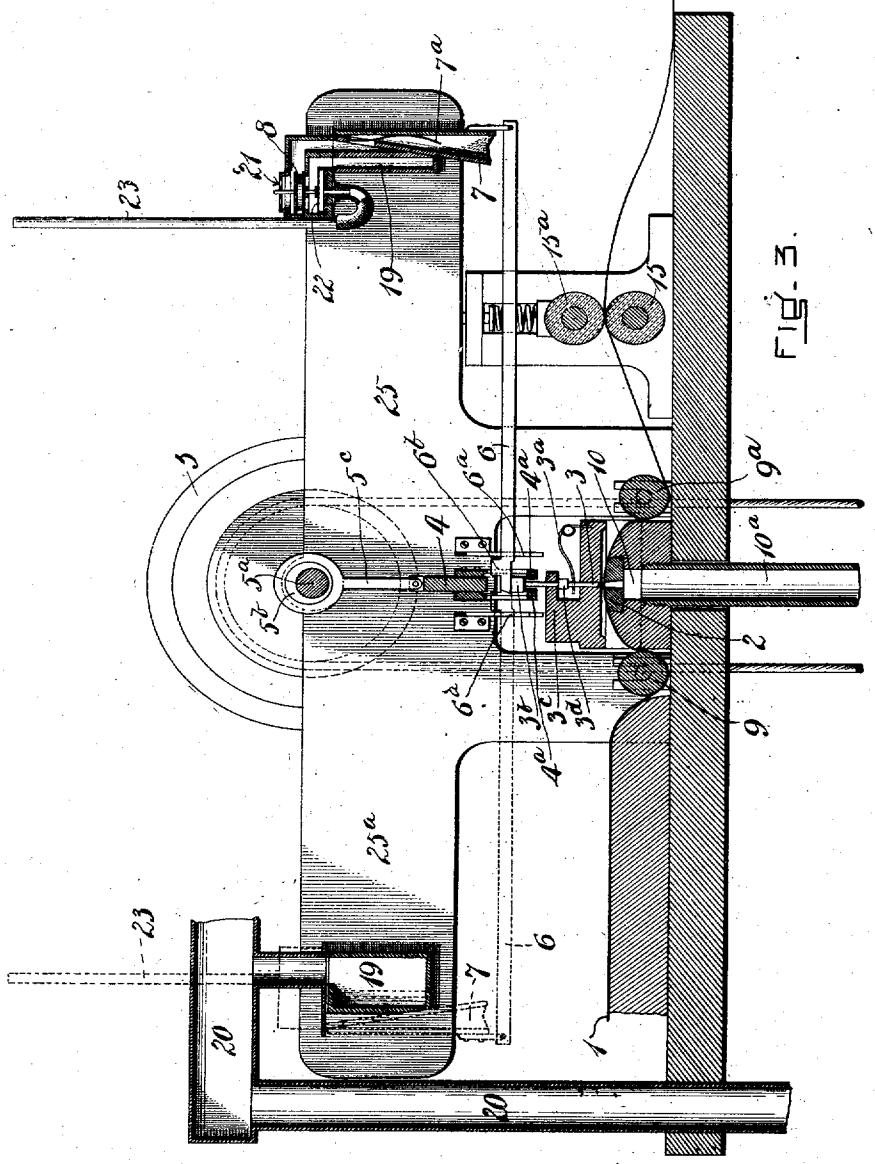

FIG. 3.

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7 SHEETS—SHEET 4.

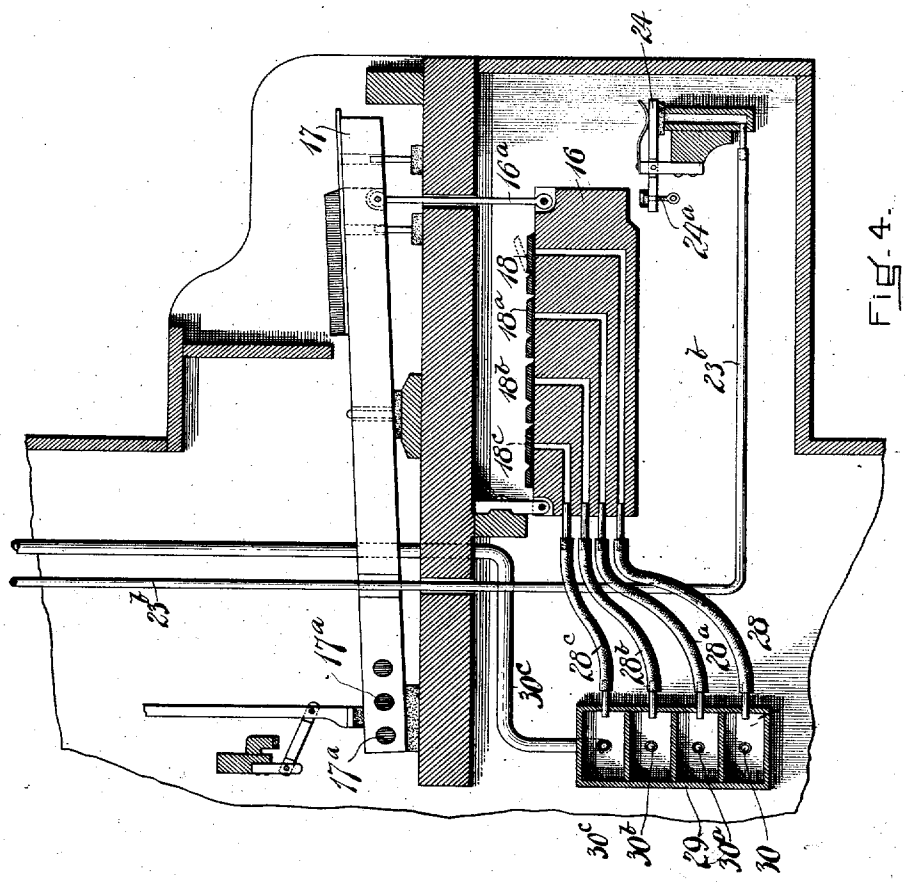

Fig. 4.

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7 SHEETS—SHEET 5.

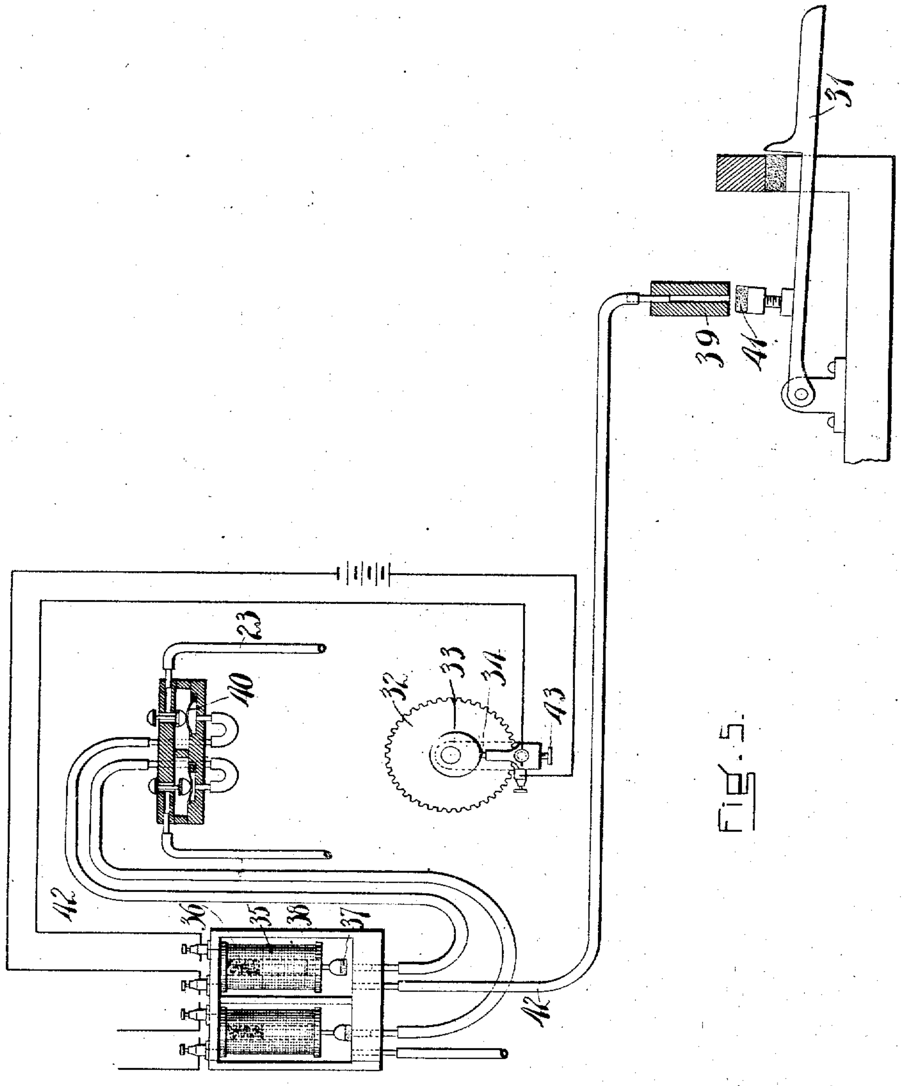

FIG. 5.

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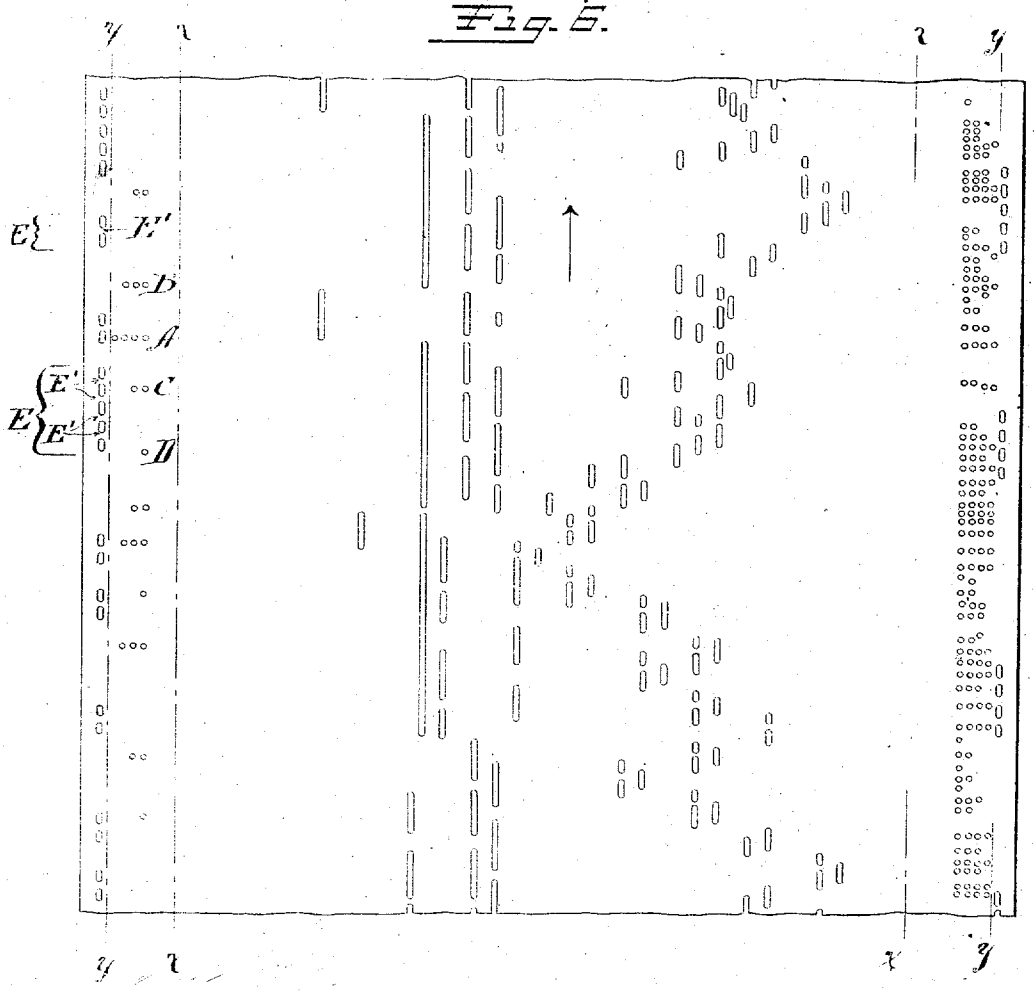
7 SHEETS—SHEET 6.

Fig. 6.



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APPLICATION FILED JUNE 5, 1907.

920,921. Patented May 11, 1909.

7 SHEETS—SHEET 7.

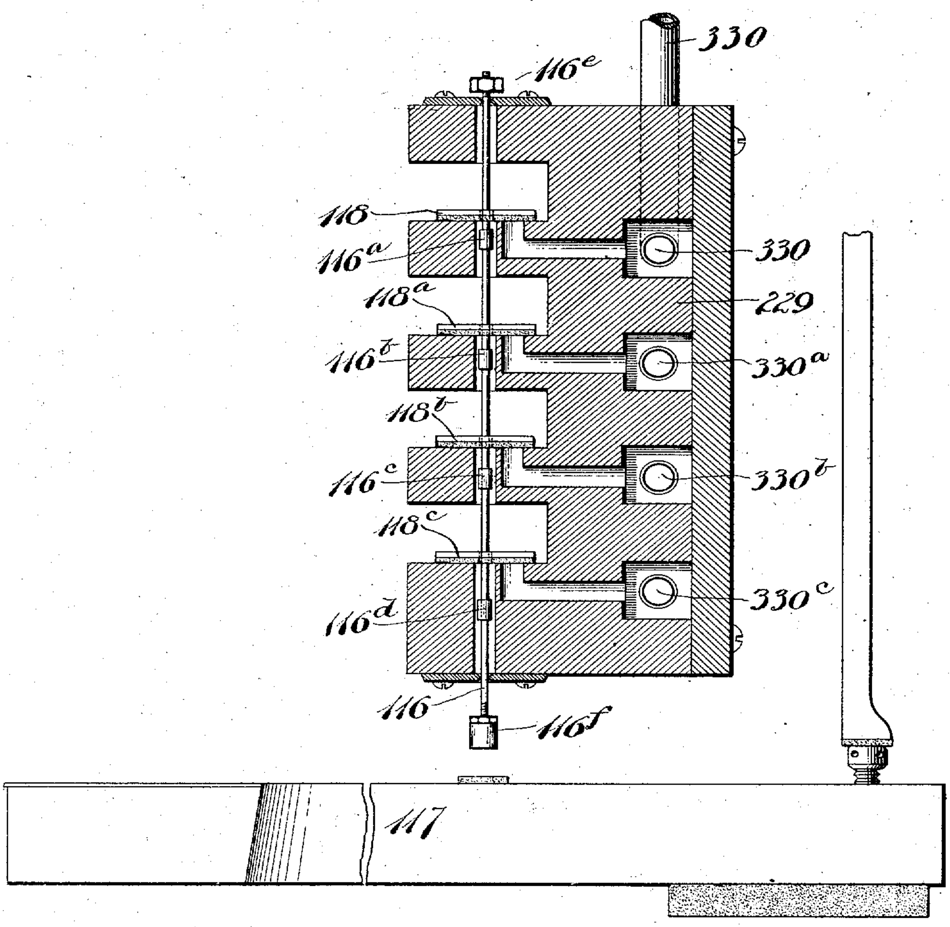

Fig-7-

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UNITED STATES PATENT OFFICE.

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NOTE-SHEET-CUTTING APPARATUS.

No. 920,921. Specification of Letters Patent. Patented May 11, 1909.

Application filed June 5, 1907. Serial No. 377,314.

To all whom it may concern:

Be it known that I, WALTER R. CRIPPEN, a citizen of the United States, residing at Cambridge, Massachusetts, have invented certain new and useful Improvements in Note-Sheet-Cutting Apparatus, of which the following is a full, clear, and exact description.

This invention relates to note sheet cutting apparatus for cutting note sheets for use with music playing instruments.

The invention comprises many features of improvement in construction, and possesses many advantages unique in apparatus of this character.

By this improved apparatus a note sheet may be automatically cut in such a manner that when said note sheet is used with a music playing instrument of proper construction, the composition may be automatically reproduced precisely as rendered by the artist who made the original or master record.

Among other advantages are simplicity of construction, compactness, accessibility of parts, and smoothness and reliability of action.

In the drawings—Figure 1 is a side elevation of my improved cutting apparatus as mounted on a suitable stand and connected with the keyboard of a piano, said piano being shown in section. Fig. 2 is a relatively enlarged view of the cutting apparatus proper, said view being on the opposite side to that shown in Fig. 1. Fig. 3 is a section of the apparatus shown in Fig. 2 and drawn on the same scale. Fig. 4 is a relatively enlarged sectional view of that part of my improved apparatus which is connected to the keyboard of the piano. Fig. 5 is a diagrammatic view of certain details of construction, showing certain parts in section and in elevation. Fig. 6 is a view of a portion of a note sheet, illustrating perforations therein, such as may be cut with my improved apparatus. Fig. 7 is a sectional view of a modification of a certain detail.

While it may be understood that various modifications may be made in my invention, I will proceed to describe more particularly that form shown in the drawings, which is, I believe, of preferable construction.

1 represents a blank sheet of paper leading from the roll 1^a to the cutting apparatus, the same passing over a cutting die 2 and under cutters 3—3.

15—15^a are paper feed rolls located beyond the die and cutters, by which the sheet is drawn across the die by an intermittent movement and at the proper speed. The cutters 3—3 are normally stationary and are supported in their elevated positions by light springs 3^a—3^a.

3^b—3^b are the cutter-heads.

3^c is a guide for the cutters, the same being mounted at its ends on the die 2, yet spaced therefrom properly to permit the passage of the note sheet, at the same time acting as a stripper-plate when the cutters are retracted or withdrawn from the paper, after perforating the same (see Fig. 3).

3^d—3^e are stops to limit the upward excursion of the cutters. The cutting end of each cutter is preferably beveled, as shown, having the incline formed toward the approaching uncut portion of the note sheet.

Above the series of cutters (any desired number of which may be provided to form as many rows of perforations as are needed) is a striker bar or cutter actuator 4, driven from any suitable source of power, for example, an electric motor 4^a, which may be belted to fly-wheel 5 on shaft 5^a.

5^b is an eccentric and 5^c a link, connecting the same with the striker-bar, so that as shaft 5^a is rapidly rotated, the striker-bar will be rapidly vibrated. The range of vibration of the striker-bar is insufficient to engage the cutter-heads directly, but when it is desired to actuate any particular cutter, the same is coupled with the striker-bar in the following unique manner: When a certain key is struck, it operated pneumatically, (or in any equivalent manner) means for introducing between the cutter-head and the vibrating striker-bar a suitable coupling device 6. When these couplers 6—6 are in their retracted positions, the bar 4 will have no effect upon the cutters, but when advanced, these couplers will, so to speak, fill in the space between the vibrating striker-bar and the cutters, so that the latter will partake of the rapid, vibrating movement of the striker-bar. By operating certain couplers at the proper time, the desired cutters can be selected to operate upon the sheet 1, and perforate the same at the proper time and to the proper extent. To guaran-

tee the certain withdrawal of each cutter from the paper after each punch, and to relieve the spring 3^a of this burden, I provide retractor bars 4^a—4^a, which are carried by the vibrating striker-bar and extend under the head of each cutter, so that on the upward movement of the striker-bar any cutter which is then being operated is bound to be withdrawn from the die and paper. The couplers 6—6 are preferably light bars placed edgewise and guided at their forward ends in suitably slotted plates 6^a—6^a. These coupler bars are suitably connected, as by pivots, at their rear ends, to small power pneumatics 7—7, or equivalent devices. These pneumatics are normally distended as by springs, such as 7^a, and when distended the couplers are held in their retracted or idle position.

8—8 are valves to control the operation of the pneumatics. These valves put said pneumatics respectively in communication with an exhaust on the one hand, and the atmosphere on the other hand. Normally these pneumatics 7 are open to the atmosphere, as shown in Fig. 3, but when the valves 8 are shifted they are put in communication with the exhaust, as later referred to, whereby collapse is effected to move the couplers.

The upper part of the die 2 is rounded or arched after the manner of an ordinary tracker-board of piano-player type, thus preventing injury to the paper. In front of and to the rear of this die 2 are rolls 9—9^a, located at a lower elevation than the die, so that the sheet will be given a serpentine course (as best seen in Fig. 3) thus preventing the formation of wrinkles in the paper as it traverses the die. Directly under the die is a vacuum or suction chamber 10 (Fig. 3) connected through pipe 10^a with a tank 11 (Fig. 1), partially filled with water. The suction or vacuum is maintained through pipe 11^a (connected with a suitable exhauster) the free end of which extends into the tank 11. At each end of the chamber 10 is an admission-port, preferably controlled by valves 12—12. When in operation, the air entering past valves 12—12 moves toward the outlet pipe 10^a, carrying with it any chips or cuttings punched from the paper. These chips or cuttings traverse down the pipe 10^a and collect in the water in the tank 11. By thus removing the chips, clogging is avoided. The speed of the air entering the valved passages at the ends of the chamber 10 may be controlled by regulating the valves 12—12. Furthermore, by having these valves at this point no wasteful volume of air need be admitted.

In the drawings I have shown the pneumatics 7—7 arranged in rows or banks (there being several pneumatics in each bank). These banks are arranged in two groups or sets which stand on opposite sides of the cutter die. By this means great compactness and accessibility of parts is afforded, for to remove any particular pneumatic, it merely requires the removal of one row, instead of the entire set. The length of any particular note perforation to be cut is unlimited; in other words, the movement of the cutter may be so rapid as to produce in effect a continuous cut.

Since the paper moves in a direction at right angles to the movement of the cutter, I provide, as indicated above, an intermittent feed, so arranged that the paper will be given a forward movement only during that period when the cutter is lifted, no matter how short that period may be. This I accomplish by means of a clutch 14 of the ball type, carried by an oscillating arm 14^a, having a bearing at one end of the feed rolls 15. This arm 14^a is oscillated by means of an eccentric 14^b mounted on main shaft 5^a. The eccentric 5^b for the striker-bar and the eccentric 14^b for the paper feed rolls are so placed relatively to each other that the advance movement of the feed rolls will occur during that period when the cutter is lifted or disengaged from the note sheet. The link 14^c, between the paper feed eccentric 14^b and the clutch operating arm 14^a, makes an adjustable connection (see Fig. 2) with said arm 14^a, whereby by moving said connection, nearer to or farther away from the axis of the clutch 14, the length of each feeding impulse may be modified at will; thus the more remote the connection, the shorter will be the feed, and successive punching will intersect and form an uninterrupted slot or cut of any desired length. On the other hand, this connection may be so near the axis of clutch 14 that successive punches will be separated to a greater or less degree, as desired.

The die construction is such, and its position in the frame of the machine is such, that by removing a few ordinary holding-screws (not shown) the die and all the punches carried thereby may be removed laterally from the main frame (see Figs. 2 and 3). The die proper may be made up of one or more sections, as desired. After the die is removed the shaft 5^a may be loosened and lifted out, together with the striker-bar and the cutter retractors.

The frame of the machine is preferably made in two sections, 25 and 25^a, so that it can be divided on a median line under the main shaft 5^a (Fig. 2), the bearings for the latter being carried by either section, as desired, but as shown in the drawings by section 25^a (Fig. 1). The coupler guides 6^a—6^a may be carried by these frame sections, so that when the machine is assembled the couplers will always be properly alined and guided. Each coupler 6 is preferably supported at its free end at all times upon the

head of its respective cutter, while the space filling element, which is entered under the vibrating striker-bar 4 to couple the latter with a cutter, is a raised projection or shoulder 6^b, just to the rear of the forward end of the coupler (Fig. 3). The means for controlling each pneumatic is preferably operated upon directly by the keys of the instrument being played upon. Referring to Fig. 3, 19 is a vacuum chamber, the vacuum being maintained from any suitable source through pipe 20. Between this vacuum chamber and each pneumatic 7 (see right and left of Fig. 3) are passages leading to the pneumatics 7. In each of these passages is located one of the valves 8. Each valve 8 is operated by a small puff pneumatic 22, the chamber under which is connected by duct 23 to a primary action at 23^a (of conventional form) the latter being in turn connected by duct 23^b, to an inlet controlled by valve 24, the latter being opened by the key 17, when the record is being made. The depression of one of these keys will open directly or indirectly the valve 24, operating primary pneumatic 23^a and admitting air at atmospheric pressure through duct 23 to pneumatic or puff 22, thus raising the latter and shifting the valve 8 to open the passage between the vacuum chamber 19 and the coupler pneumatic 7, at the same time cutting the latter off from the atmosphere. This causes the collapse of the pneumatic 7 and the shifting of the coupler 6 into its coupling position, so that the rapidly vibrating striker will transmit its movement to the particular cutter or cutters thus selected.

By the means thus far described an ordinary note sheet may be cut provided with note perforations, but my invention is such that a note sheet may be cut, in which certain perforations may be provided to control the pedal, and also other devices for the faithful reproduction of tone values. Referring to Fig. 6, the perforations between the dotted lines $x—x$ represent the ordinary note perforations, the length of which determine tone values; the perforations between the dotted lines $x—y$, at each margin of the sheet, control dynamic force; while the perforations between the dotted lines $y—y$ and the extreme margin of the sheet, control the operation of the pedals. I will first describe the perforations which are designed to control dynamic force. As shown in Fig. 6, for example at A, four of these perforations may be made at once; at B three may be made at once; at C two may be made at once, at D one may be made at a time, while at other points none of these perforations may occur. Where none of these perforations occur, it is designed that any notes sounded at such time will be sounded with pianissimo effect. Where one perforation occurs, as at D, a note sounded at that time will be struck with piano effect. Where two perforations occur at once, as at C, a note struck at that time will be sounded with mezzo-forte effect. Where three perforations occur at once, as at B, forte effect; and where four perforations occur at once, as at A, double forte will be sounded. This, of course, contemplates the use of this note sheet with an instrument capable of reproducing automatically the definite tone value and dynamic force of a certain note or notes. In the cutting instrument these perforations may be formed at one or both margins of the paper and cutters similar to those already described, together with the associated parts, (also described) would be employed. One means for operating pneumatics for controlling these particular cutters is best shown in Figs. 1 and 4, wherein I provide, under each key, what I term a valve carrier 16, hinged at its inner end to the frame of the piano, and coupled as by a link 16^a at its other end to the piano key 17.

18—18^a—18^b—18^c are valves carried by the number 16, and located at different distances from the fulcrum thereof. These valves control respectively ducts 28—28^a—28^b—28^c, which lead respectively to separate chambers in a box 29, from each of which lead ducts 30—30^a—30^b—30^c, which in turn lead respectively to their coupler pneumatics 7.

From the foregoing it will be clear that when the key 17 is struck very lightly the carrier 16 will descend, will open valve 24, with the result that one of the cutters designed to form a note perforation will be coupled up and vibrated. If the key is struck very lightly, none of the valves mounted on the valve carrier 16 will be opened. If, however, the key 17 is struck with slightly more force, the valve 18, being most remote from the fulcrum of the carrier 16, will open, as indicated in dotted lines (Fig. 4), thus breaking the vacuum under one of the primary pneumatics, putting into action one of the coupler pneumatics, whereupon one marginal perforation (D), will be formed. If the key is struck with slightly more force, two of the valves, to wit, 18—18^a, will be opened, forming two punches (C); with still more force, three of the valves, to wit, 18—18^a—18^b will be opened; and if with still more force, four of the valves, to wit, 18—18^a—18^b—18^c will be opened, thereby forming at once four perforations. These valves 18 to 18^c are preferably supported on top of the carrier 16, because gravity will serve to keep them closed unless the carrier 16 descends with such speed as to open one or more. The particular position of the valves 18 to 18^c with respect to the carrier 16 is not essential, excepting in so far as they should be successively located at different distances from the fulcrum, or so that they will be opened according to the degree of

force applied to the key 17. The ducts 28 to 28^e might be directly connected to their respective primary pneumatics, instead of leading first to the box 29, but from the standpoint of mechanical construction, the arrangement shown and described is preferable. The usual weights 17^a may be employed to balance the key 17, and the weight of the valve carrier attachment 16, so that its presence will not be felt.

24^a is an adjustment carried by the valve 24 for timing the moment when it shall be engaged and actuated by the depression of the key 17.

In Fig. 7, I have shown a modification of the valve arrangement for operating the pneumatics to control dynamic force, in which 229 is a box from which lead the ducts 330, 330^a, 330^b, 330^c to the primaries, arranged to control certain coupler pneumatics. 117 is a key. 118, 118^a, 118^b, 118^c are valves to control admission passages to the ducts 330 to 330^c, respectively. 116 is the valve carrier, in this instance being in the form of a lift-rod arranged over the key 117 and actuated thereby. This rod passes freely through the valves 118 to 118^c and is provided with stop-shoulders 116^a, 116^b, 116^c, 116^d arranged to engage valves 118 to 118^c, respectively. These stop-shoulders, as will be seen, are normally spaced away from their respective valves at gradually increasing distances, the stop-shoulder 116^a being nearest to its respective valve. This carrier 116 may be provided with an adjustable supporting shoulder 116^e at its upper end. The lower end is spaced away from the key 117 such a distance as may be found most desirable. 116^f is an adjustable extension at the lower end of carrier 116, whereby the spacing between the same and the key may be varied. As will now be seen, when the key 117 is struck lightly, none of the valves 118 to 118^c will be opened, and consequently, no perforation will be formed in the paper to give greater dynamic force to any particular note than pianissimo. If the key is struck with slightly more force, the carrier 116 will be kicked up sufficiently far to open one of the valves, to wit, 118; and so on, as the key is struck with greater force, these valves will be opened one or more, depending upon that degree of force with which the said key is struck and the carrier kicked.

Now in regard to the pedal control for forming the perforations on the note sheet between the lines y—y and the extreme margin of the sheet. These perforations are made by cutters controlled by the pneumatics, as previously described. Since these perforations are very near the margin of the sheet, and since the pedal perforations may be of considerable length, there is danger of weakening the sheet along the edge. Consequently, it is preferable to have, at certain intervals, bridging connecting pieces. Two of these pedal perforations are indicated at E—E in Fig. 6, the upper one being comparatively short, the lower one being the longer. Each of these pedal perforations E—E are shown to be made up of a plurality of cuts interrupted by bridging pieces E′—E′, which are formed, or rather left, in the paper by momentarily interrupting the action of the cutter. These bridges, however, are not of sufficient length to entirely cover the duct in the tracker-board with which the note sheet is used, and consequently the pedal will not be released but will remain depressed. By the presence of these bridges E′, a long slot or perforation near the margin of the sheet is avoided, and consequently the sheet is not materially weakened. The means for interrupting momentarily the action of the cutter forming the pedal perforations is best seen in Figs. 2 and 5, in which 32 is a gear wheel in mesh with a gear on the shaft 5^a and driven thereby.

33 is a cam driven by gear 32.

34 is a means for making and breaking a circuit, the same being shown conventionally, since it may be of any desired form. Leading from this circuit breaker is a circuit connected with a solenoid 35. The core of solenoid 35 is normally pressed outwardly by spring 36, and carries at its free end a valve 37. The solenoid is located in an air-tight box 38, the interior of which forms part of the wind-way 42, leading from the valved entrance 39 to the primary pneumatic 40.

41 is a valve for controlling the entrance 39, the valve 41 being carried by pedal 31.

23 represents one of the ducts, as before, leading from the primary 40 to the particular coupler pneumatic intended to couple the carrier with that cutter which is to form the pedal perforations, the same being similar to the cutter previously described. As shown in Fig. 5, the cam 33 is in the position in which the circuit is closed through solenoid 35, consequently the valve 37 is open. During the operation of the machine this valve 37 is being intermittently opened and held open for such a period as the cam 33 operates to close the circuit. When, however, the cam moves away from the circuit closer and allows it to momentarily break, the spring 36 will advance the core and close the valve 37, thus momentarily closing the wind-way 42, whether the same be itself open at 39. If the wind-way is open at 39 (as indicated in Fig. 5) by the depression of pedal 31, air will be admitted through the pneumatic 40 and its respective coupler pneumatic will be thrown into action. This, however, will be interrupted by the action of cam 33, as before described, and during said interrupted period the bridges E′ (indicated in Fig. 6) will be formed.

43 indicates conventionally an adjusting

device by which the closer 34 may be moved nearer to, or farther away from, the cam 33, whereby the period of interruption may be varied at will and the length of the bridge determined.

In the drawings the pedal-perforation at one side may be used for the soft pedal, while those at the other side will be for the loud pedal. Both perforations may be at the same side, if desirable.

What I claim is:

1. In a note sheet cutting apparatus, a die having a curved bearing face, a guide roller in front of said die and at a lower plane than said die, means for feeding a note sheet under said roller and over said die, a second guide-roll to the rear of and below the die and between it and the feeder, a cutter coacting with said die to perforate said sheet, a vibrating actuator arranged to coact with said cutter, and means for coupling and uncoupling the actuator and cutter.

2. In a note sheet cutting apparatus, a die, a guide roll in front of said die and at a lower plane, feeding mechanism at the opposite side of said die, a second guide roll between said feeding mechanism and said die and at a lower plane than the latter, cutting devices arranged to coöperate with said die, and means for advancing said cutters and feeding mechanism alternately.

3. In a note sheet cutting apparatus, a die, cutters coacting therewith, an actuator normally disconnected from said cutter, means for coupling and uncoupling said actuator and cutter, and means for positively moving said cutter in both directions when coupled with the actuator, said means being carried by the actuator but stationary relatively thereto when the cutter is idle.

4. In a note sheet cutting apparatus, a die, a reciprocating cutter coöperating therewith, a vibrating actuator normally disconnected from said cutter, normally stationary means for coupling said actuator and cutter, and means carried by the actuator to retract said cutter when the latter is coupled, and means to yieldingly support said cutter when uncoupled.

5. In a note sheet cutting apparatus, a die, a plurality of cutters, means for operating the cutters, said means being normally disconnected from the cutters, means for connecting the same including a plurality of valves, an actuator in common to all of said valves, and a key for moving said actuator to open one or more of the valves controlled thereby.

6. In a note sheet cutting apparatus, a die, a plurality of cutters, means for operating the cutters, said means being normally disconnected from the cutters, means for connecting the same including a plurality of valves, a hinged actuator carrying all of said valves, the latter being located successively at different distances from the hinge thereof, and a key for oscillating said actuator to open one or more of the valves carried thereby.

7. In a note sheet cutting apparatus, a die, a cutter arranged to coöperate therewith, means for reciprocating said cutter but normally disconnected therefrom, means for coupling said parts for indeterminate periods, and means for positively interrupting the operation and stopping the movement of the cutter at definite times.

8. In a note sheet cutting apparatus, a die, a cutter arranged to coöperate therewith, means for reciprocating said cutter but normally disconnected therefrom, means for coupling said parts for indeterminate periods, and means for positively interrupting the operation and stopping the movement of the cutter at definite times including a pneumatic under control of both of the first mentioned operating means.

9. In a note sheet cutting apparatus, a frame, a shaft carried thereby, means for rotating said shaft, a reciprocating cutter actuator driven from said shaft, a die, a normally stationary cutter between said die and said actuator, normally stationary coupling devices arranged at one side of said actuator, guides for the forward ends of said couplers, coupler actuating devices supporting the outer ends of said couplers, said actuating devices being carried by said frame at one side of said shaft, and means for selectively causing said coupler actuators to operate to couple desired cutters with said actuator.

10. In a note sheet cutting apparatus, a frame, a shaft carried thereby, means for rotating said shaft, a reciprocating cutter actuator driven from said shaft, a die, a normally stationary cutter between said die and said actuator, normally stationary coupling devices arranged on opposite sides of said actuator guides for the forward ends of said couplers, coupler actuating devices supporting the outer ends of said couplers, said actuating devices being carried by said frame on opposite sides of said shaft, and means for selectively causing said coupler actuators to operate to couple desired cutters with said actuator.

11. In a note sheet cutting apparatus, a die, a series of normally stationary cutters arranged to coact therewith, a vibrating actuator for said cutters but normally disconnected therefrom, a normally stationary coupler for each cutter and arranged to operatively connect the same with the actuator, the crown of the die being rounded, means for guiding a sheet of paper in a reverse curve toward, over and away from the die, and means for feeding said sheet intermittently.

12. In a note sheet cutting apparatus, a die, a series of normally stationary cutters arranged to coact therewith, a vibrating ac-

tuator for said cutters but normally disconnected therefrom, a normally stationary coupler for each cutter and arranged to operatively connect the same with the actuator, the crown of the die being rounded, means for guiding a sheet of paper in a reverse curve toward, over and away from the die, and means for feeding said sheet intermittently.

13. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, and including a series of inertia operated valves.

14. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, said means including a plurality of normally closed inertia opened valves.

15. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, said means comprising a series of valves, a carrier therefor hinged at one end, the valves of said series being arranged at different distances relatively to the hinge of said carrier and controlled by inertia.

16. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, said means comprising a series of gravity closed valves, and means for opening one or more of the same by inertia.

17. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, said means comprising a series of gravity closed valves, and means for opening one or more of the same dependent upon the degree of force applied to the key coöperating therewith.

18. In a note sheet cutting apparatus, a die, a plurality of cutters, cutter actuators, couplers, means for operating the couplers, a key, and inertia controlled means for throwing into action one or more of said coupler operators from a single key.

19. In a note sheet cutting apparatus, a die, a plurality of cutters, cutter actuators, couplers, means for operating said coupler, a key, and means controlled by the degree of force applied to the key to throw into action one or more of said coupler operators.

20. In an automatic note sheet cutting apparatus, a die, a key, a cutter for a note perforation controlled by said key, and a cutter for a marginal perforation controlled by the same key, the operation of the cutter for the marginal perforation being dependent upon the degree of force applied to said key.

WALTER R. CRIPPEN.

Witnesses:
R. C. MITCHELL,
LANGDON MOORE.

Corrections in Letters Patent No. 920,921.

It is hereby certified that in Letters Patent No. 920,921, granted May 11, 1909, upon the application of Walter R. Crippen, of Cambridge, Massachusetts, for an improvement in "Note-Sheet Cutting Apparatus," errors appear in the printed specification requiring correction, as follows: In line 93, page 1, the word "operated" should read *operates;* lines 17–18, page 2, the word "dis- ended" should read *dis- tended;* line 85, same page, after the word "of" the words *one of* should be inserted, and in line 89, page 3, the word "number" should read *member;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of May, A. D., 1909.

[SEAL.]

C. C. BILLINGS,
Acting Commissioner of Patents.

tuator for said cutters but normally disconnected therefrom, a normally stationary coupler for each cutter and arranged to operatively connect the same with the actuator, the crown of the die being rounded, means for guiding a sheet of paper in a reverse curve toward, over and away from the die, and means for feeding said sheet intermittently.

13. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, and including a series of inertia operated valves.

14. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, said means including a plurality of normally closed inertia opened valves.

15. In a note sheet cutting apparatus, a die, a series of cutters arranged side by side, a cutter actuator normally disconnected therefrom, means for feeding a note sheet across the space in front of said cutters and in a direction transverse to the arrangement thereof, and means controllable by a single key for coupling one or more of said cutters with the cutter actuator, said means comprising a series of valves, a carrier therefor hinged at one end, the valves of said series being arranged at different distances relatively to the hinge of said carrier and controlled by inertia.

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