P. J. MEAHL.

MACHINE FOR MAKING PERFORATED MUSIC.

APPLICATION FILED NOV. 2, 1903.

980,316. Patented Jan. 3, 1911.

5 SHEETS—SHEET 1.

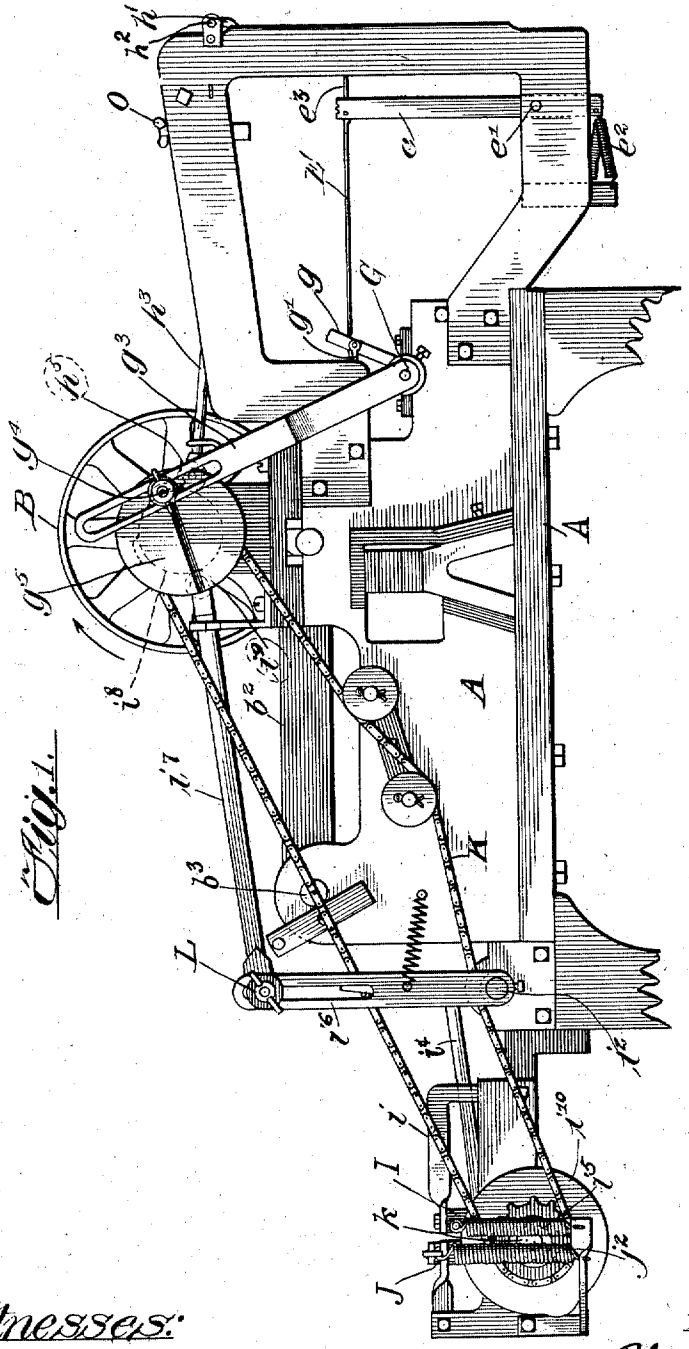


Fig. 1.

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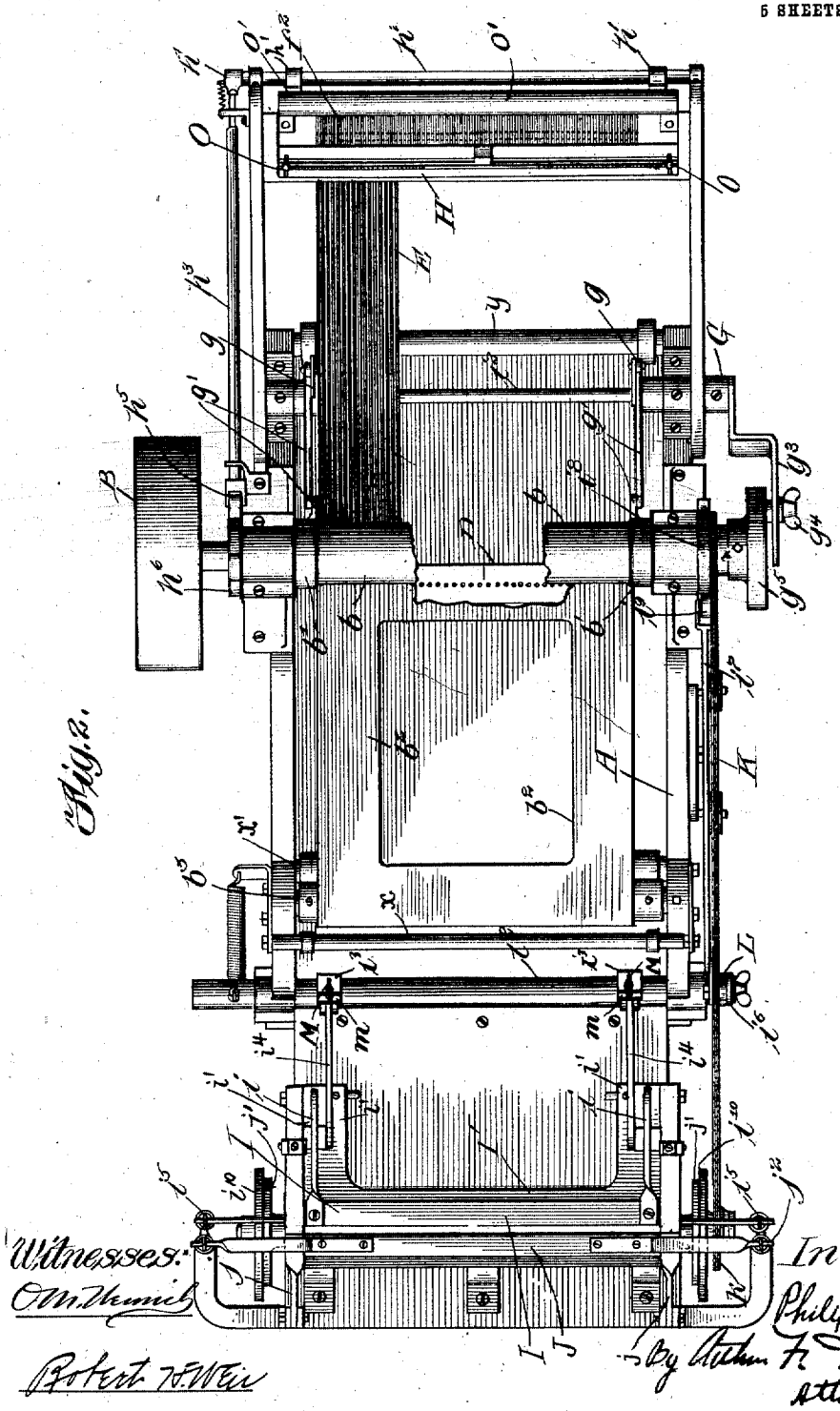


Fig. 2.

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6 SHEETS—SHEET 3.

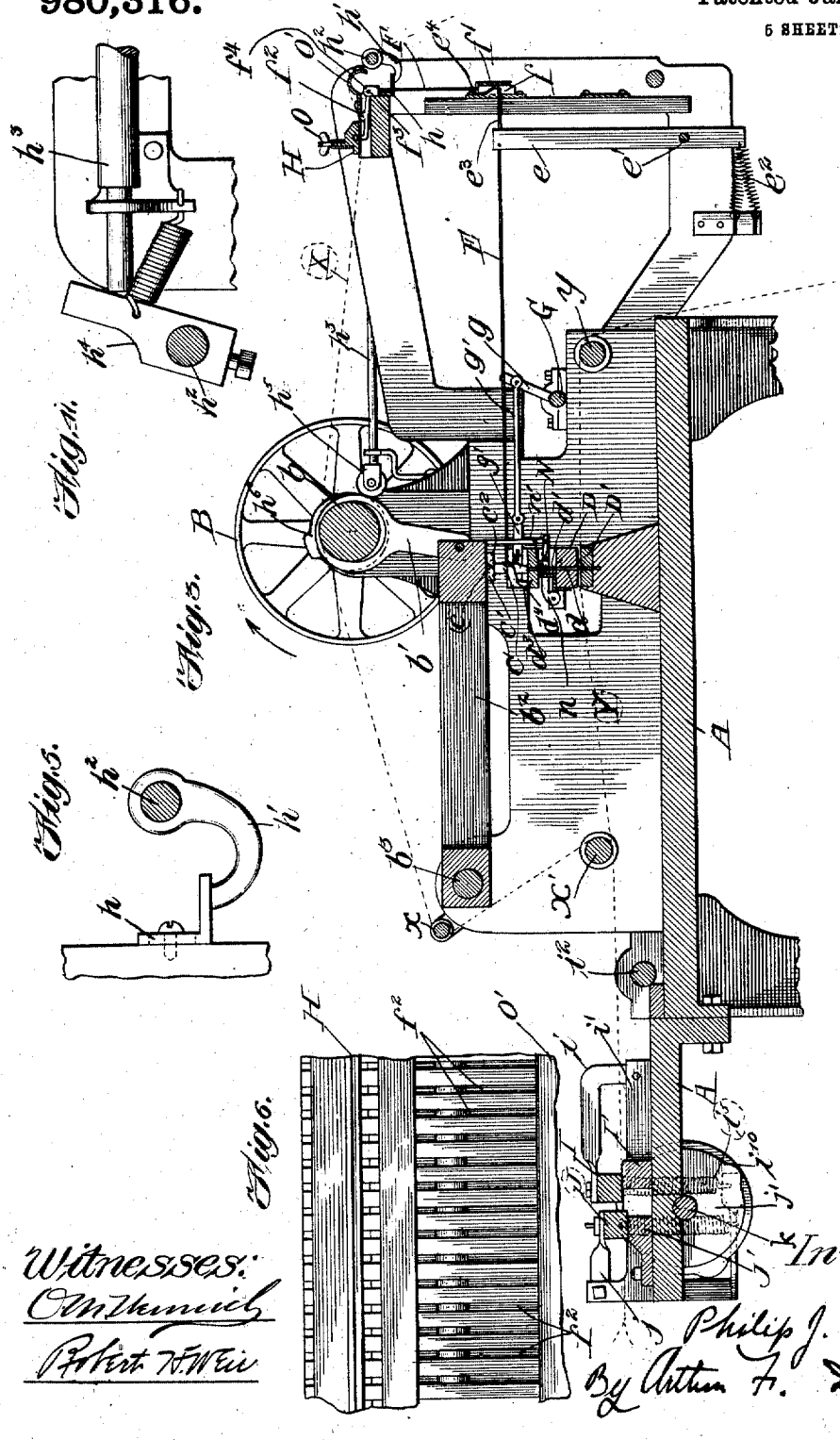


Fig. 4.

Fig. 5.

Fig. 6.

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5 SHEETS—SHEET 4.

Fig. 7.

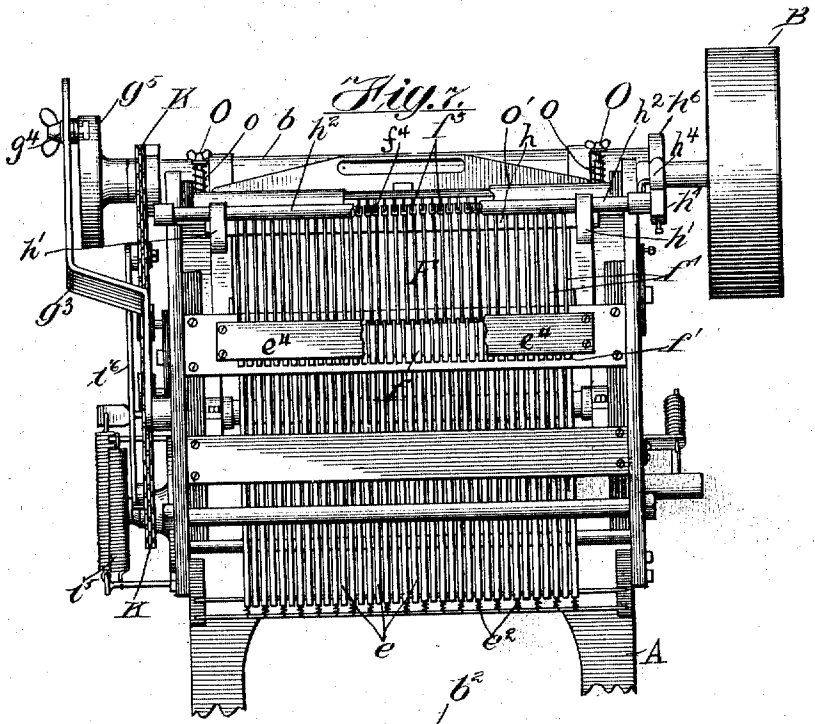
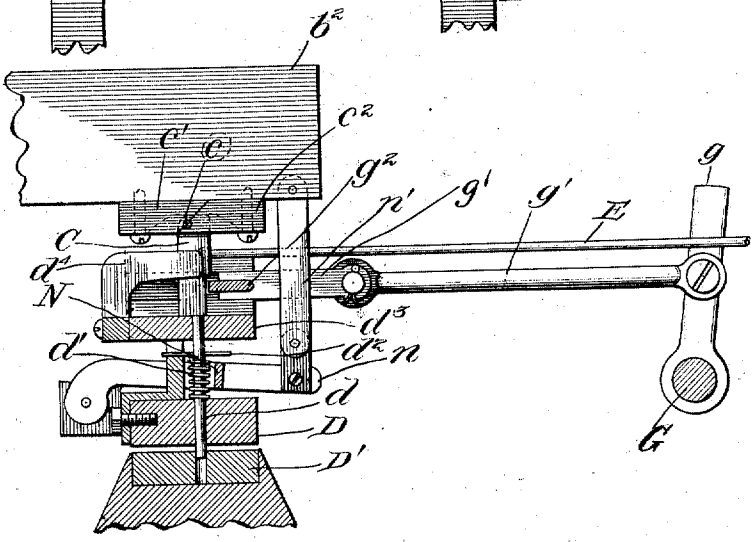


Fig. 8.



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5 SHEETS—SHEET 5.

Fig. 9.

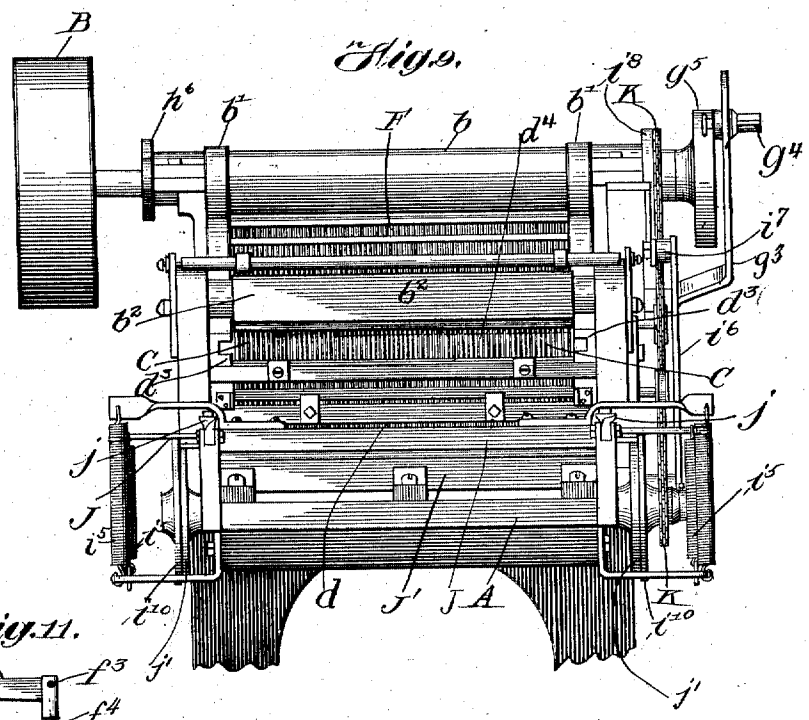


Fig. 11.

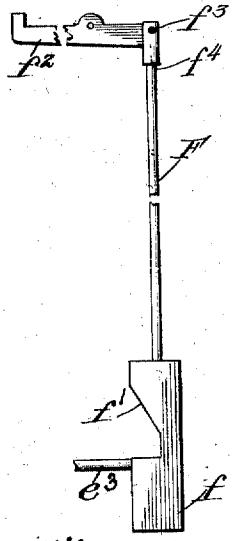
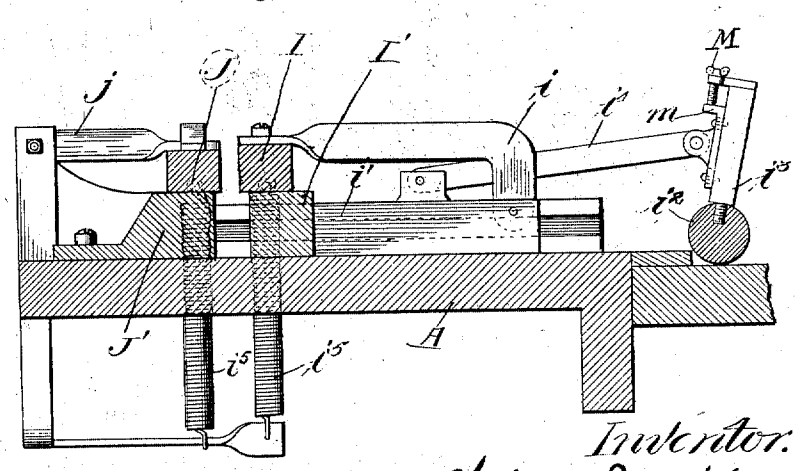


Fig. 10.



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UNITED STATES PATENT OFFICE.

PHILIP J. MEAHL, OF CHICAGO, ILLINOIS.

MACHINE FOR MAKING PERFORATED MUSIC.

980,316. Specification of Letters Patent. Patented Jan. 3, 1911.

Application filed November 2, 1903. Serial No. 179,452.

To all whom it may concern:

Be it known that I, PHILIP J. MEAHL, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Machines for Making Perforated Music, of which the following is a specification.

My invention relates more particularly to machines which are capable of duplicating or reproducing in a sheet of paper the openings or perforations of a completed sheet of perforated music, the latter being ordinarily termed a pattern or master-sheet.

In a machine characterized by my invention, the punching devices for making the openings or perforations in the paper are selectively controlled by a number of primary selectors, the said primary selectors consisting, preferably, of pivoted or rocking fingers adapted to engage the under side of the pattern or master-sheet, and the connection between these primary selectors and the punching devices including a similar number of intermediate selectors, the primary selectors being actuated or moved by gravity only, whereby the pattern or master-sheet is not liable to be torn or injured when engaged by the pivoted or rocking fingers. For this reason, it is possible to employ an ordinary piece of perforated music as the pattern or master-sheet, it being evident that the provision of primary selectors and intermediate selectors, permits of the use of a very thin or ordinary sheet of paper as the pattern or master-sheet, and consequently is of great advantage, as it makes it unnecessary to employ the usual and specially prepared sheet of thick paper from which to reproduce or duplicate the perforations.

Another feature of my invention consists in an improved construction and arrangement whereby the normally inert punches are positively retracted or raised to their normal positions after having been actuated or forced through the paper, and whereby the constantly vibrating hammers for operating the punches are effectively separated and prevented from contacting with each other, by means of suitably disposed metallic partitions.

A further feature of my invention consists of an improved feeding arrangement for feeding the paper, said arrangement being constructed and operated in an improved and highly efficient manner, and comprising a vibratory feeding clamp adapted to open and close automatically, and arranged to work in conjunction with a stationary holding clamp, said holding clamp gripping and holding the sheet material against movement while the feeding clamp is returned or moved back to a position to take a fresh grip or hold on the material, but operating to release the material at the instant the feeding clamp closes and starts to move the material forward in the direction of feed, and the general arrangement involving, of course, suitable means for selectively controlling the punches, whereby efficient feeding means are combined with efficient punching means in a machine for making perforated music.

The nature and advantages of my invention will, however, hereinafter more fully appear.

In the accompanying drawings,—Figure 1 is a side elevation of a machine for making perforated music, embodying the principles of my invention; Fig. 2 is a plan of the machine shown in Fig. 1; Fig. 3 is a vertical longitudinal section through the machine shown in Fig. 1; Fig. 4 is a detail side view on an enlarged scale of a part of the primary selecting mechanism. Fig. 5 is a detail side view on an enlarged scale of another portion of the primary selecting mechanism; Fig. 6 is also an enlarged detail plan view of a portion of the primary selecting mechanism; Fig. 7 is a view of the front end of the machine shown in Fig. 1; Fig. 8 is an enlarged detail longitudinal section of the machine showing a transverse section of the punching devices and adjacent parts; Fig. 9 is a view of the rear end of the machine shown in Fig. 1; Fig. 10 is an enlarged detail longitudinal sectional view of the feeding device; Fig. 11 is an enlarged detail side elevation of one of the primary selectors, showing the manner in which the same control the intermediate selectors.

As thus illustrated my improved machine for making perforated music comprises a suitable frame or body structure A, adapted to provide suitable bearings for the various shafts and operative parts, and adapted to support the pattern or master-sheet, paper, etc., in suitably elevated positions.

The machine is driven through the medium of a belt pulley B, mounted on an eccentric shaft *b*, which latter is arranged over, and transversely of, the frame or body struc-

ture. The pulley is driven in the direction indicated by the arrow adjacent thereto, while the pattern or master sheet and the paper sheet to be punched are drawn or pulled from the front end to the rear end of the machine. Pitmen b' are employed as the medium of power transmitting connection between the said eccentric shaft and the constantly vibrating member b^2. This constantly vibrating member b^2 is pivoted at its rear end b^3, so as to swing up and down at its forward end, and constitutes the means for operating the vibrating hammers C. These vibrating hammers are, it will be observed, pivoted at their upper ends to said vibrating member b^2, are arranged in a row across the machine, and are thus adapted, in addition to their constant up and down movement, to swing back and forward. The said vibrating hammers are preferably all mounted on a pivot-rod c, which is clamped between a couple of separable blocks c' and c^2, as shown more clearly in Fig. 8, it being observed that the relative formations of the two blocks are such that the rod is held tightly in place when the two blocks are secured to the bottom of the vibrating member b^2. In other words, the blocks have beveled faces which fit together, and the rod is held in a bore formed half in each beveled face. In this way, the vibrating hammers can all be readily removed for repair or substitution, and, if desired, a separate pin can be provided for each vibrating hammer.

The punching mechanism (see Fig. 8) involves upper and lower dies, D and D′, and a number of vertically arranged punches d, corresponding in number to the number of vibrating hammers. These punches are held in their normally elevated positions by the springs d', applied between the top of the upper die D and the cross pins d^2 extending through the punches. Each punch is positioned directly below one of the said vibrating hammers, and is thus adapted to be driven through whatever paper or other material may be drawn between the dies. As a feature of special improvement, the upper ends of the punches are adapted to work in an upper bar d^3, upon which are mounted the metallic overhanging partitions d^4, for separating and controlling the vibrating hammers. In this way, the vibrating hammers are adapted to act smoothly and evenly, and the punches are adapted to be driven through the paper with force and certainty of action. The means for normally maintaining the said vibrating hammers out of position so as not to engage the punches, consists of a number of longitudinal rods E, connected at their rear ends with the said vibrating hammers, and connected at their forward ends with the vertically disposed and pivoted levers e. These levers e are pivoted at e' to the frame or body structure, and are under the constant tension or influence of the springs e^2, which therefore tend constantly to draw the rods E forward in a direction to bring the vibrating hammers into position to act on the upper ends of the punches. The levers e are adapted to act as intermediate-selectors, being provided with horizontal fingers e^3 adapted to extend through a perforated plate e^4 and engage the lower ends of the primary selectors F. The lower ends of these primary selectors consist of blocks f provided with notches f', these blocks being adapted to slide up and down in bearings on the plate e^4. When a notch f' is brought into register with the end of a finger e^3, it is obvious that the intermediate selector e, upon which its finger is mounted, will immediately, under the influence of one of the springs, draw the corresponding vibrating hammer forward, thereby causing said vibrating hammer, when it descends, to act on the upper end of the corresponding punch. Normally, the blocks f are all up, thereby rendering the intermediate selectors e normally incapable of pulling or drawing the vibrating hammers into operative position. Thus the operation of any certain punch is dependent upon the downward adjustment of the corresponding block f of the primary selector.

The intermediate-selectors e are detached or disengaged from the notch near the lower ends of the primary selectors by means of a rock-shaft G, provided with arms g, connected by sectional rods g' with a horizontal and forwardly and rearwardly sliding bar g^2. This sliding bar, as will be observed, is mounted to extend transversely of the machine, and directly in front of the vibrating hammers and is moved beneath the overhanging partitions d^4. Therefore each time the vibrating hammers rise, they are simultaneously swung toward the rear of the machine, thereby drawing all of the intermediate-selectors out of engagement with the lower ends of the primary selectors. This rock-shaft G is given an oscillatory or rocking movement through the medium of a slotted arm g^3, and the crank-pin g^4 on the rotary crank-plate g^5, it being observed that this crank-plate is mounted on the main shaft b. Thus, as this shaft is rotated, the shaft G is given the rocking movement necessary for vibrating the restoring bar g^2— that is to say, the bar which effects the restoration of the intermediate-selectors to a position out of engagement with the primary selectors. The means for controlling the primary selectors F, and thereby selectively controlling the punches through the medium of the intermediate-selectors, comprises a pattern or master-sheet X, of any suitable or approved character, adapted to travel immediately above the pivoted or rocking fin-

gers f^2 of the said primary selectors. The said pattern or master-sheet can be drawn forward simultaneously with the paper Y in any suitable manner. Preferably, this pattern or master-sheet travels beneath a perforated plate H, which is provided with a row of perforations adapted to receive the fingers f^2, it being observed at this juncture that these fingers are pivotally connected at f^3 with the upper ends f^4 of the rods F which support of blocks f. Thus the weight of the blocks f keeps the pivoted fingers f^2 pressed constantly against the under-side of the pattern or master-sheet. As the master-sheet moves forward, with the paper, the fingers f^2, by reason of gravity only, press upon its under surface and engage the perforations in the master-sheet as fast as they are brought into register with the ends of the fingers; and as soon as some of the fingers f^2 engage the perforations in the pattern, or master sheet, the block f connected with each finger engaging an opening drops down, thereby, as already explained, allowing the corresponding fingers e^3 to enter the notches f' in these blocks, and permitting the springs e^2 to draw the corresponding vibrating hammers into position to engage the corresponding punches.

The means for restoring the primary selectors to their positions out of engagement with the pattern or master-sheet, comprises a vertically reciprocating bar h, adapted to be intermittently raised and lowered by the arms h' on the rock-shaft h^2. This rock-shaft h^2 is adapted to be rocked or oscillated for the purpose of lifting the bar h, the means for so doing consisting preferably of a longitudinal rod h^3 adapted to engage a spring-held arm h^4 on said shaft, and provided at its other end with a roller h^5 adapted to engage a cam h^6 on the main shaft b. The cam arrangement and connection thus provided effect a raising of the bar h at the proper time, this bar being adapted to engage the joints between the fingers f^2 and the rod ends f^4, thereby throwing the engaging ends of the fingers f^2 down and away from the pattern or master-sheet. It will be understood that the restoration or disengaging of the intermediate selectors E must be first effected in the operation of the machine before the bar h is actuated for the purpose of disengaging the primary selectors away from the pattern or master-sheet. This is, of course, accomplished by properly timing or adjusting the various actuating devices.

The feeding device, which may be employed as the means for giving the paper Y an intermittent forward feeding movement toward the rear of the machine, and which may also be employed for simultaneously therewith drawing the pattern or master-sheet X forward also toward the rear of the machine, comprises a horizontally vibrating feeding clamp having upper and lower jaws I and I', connected through the medium of arms i, i', pivoted together at their forward ends. A rock-shaft i^2 is connected through the medium of crank arms i^3 and pitmen i^4 with the lower arms i' of the vibrating feeding clamp. This clamp is adapted to slide in suitable ways, and its upper jaw is adapted to be drawn down upon its lower jaw by means of a spring i^5 which connects this upper jaw with some suitable portion of the body frame. The rock-shaft i^2 is connected with the main driving shaft b through the medium of a slotted crank-arm i^6, a rod i^7, and a cam i^8, the latter being adapted to engage a roller i^9 on the end of said rod. Thus, with this arrangement, the rotation of the cam i^8 is accompanied at regular intervals by the oscillation of the shaft i^2, resulting in a vibratory movement of the feeding clamp. The jaws of said feeding clamp are automatically opened and closed at the proper times, by cams i^{10}, one at each side of the machine, engaging pins or projections on the opposite ends of the jaw I. When the feeding clamp reaches the limit of this rearward or feeding movement, the said cams operate to open or separate the jaws I and I', and are held open long enough to permit the feeding clamp to be retracted or drawn back to a position to take a fresh grip on the paper. At the moment the clamp is in position to grip and move the paper forward again, the cams then release the jaw I, allowing the two jaws to come together just as the clamp starts to move in the direction of feed. Thus, in this way, the jaws of the clamp are alternately opened and closed automatically at the proper times, and, in addition, the clamp is vibrated, so as to give the proper or desired intermittent feeding movement to the paper, it being understood that both the pattern or master-sheet and the sheets to be punched must remain stationary during the time that the punches are operated. The feeding clamp grips and feeds the paper forward as soon as the latter is free from or disengaged by the punches.

As a matter of further and special improvement, and as a means for insuring against back movement of the paper during the time that the feeding clamp is being drawn back into position to take a fresh grip upon the paper, I provide a gripping or holding clamp, comprising the upper and lower jaws J and J'. The upper jaw J is mounted on pivoted arms j, and is adapted to rise and fall, so as to coöperate with the lower jaw in alternately gripping and releasing the paper. The jaws J and J' are opened and closed by the cams j', one at each side of the machine, adapted to engage pins or projections on the opposite ends of the jaw J. As in the case of the feeding

clamp, the springs j^2 are employed as a means for pulling the jaw down upon the lower jaw J'. A sprocket chain K, suitable sprockets mounted on the main shaft b, and a shaft k upon which the said cams i^{10} and j' are mounted, may be employed as the means for driving these cams—that is to say, for rotating them in the proper direction to automatically open and close the jaws of the two clamping devices. With this arrangement, the holding clamp securely holds the paper against back movement, while the feeding clamp is being drawn back to a position to take a fresh grip on the paper, and then open promptly to release the paper as soon as the time arrives for the feeding clamp to give the paper the desired extent of feed.

The extent of feed can be varied by adjusting the connection L along the slot in the arm i^6. The accuracy of the feed can be insured by adjusting the thumb-screw M on the arm i^3, it being observed that these screws are adapted to vary the distance between the axis of the shaft i^2 and the point where the rods i^4 connect with the arms i^3. The arrangement for accomplishing this adjustment comprises the said thumb-screw and the adjustable blocks m mounted on the said arm i^3, and adapted to be raised and lowered by the said thumb-screw. Other arrangements for accomplishing the variation of the feed, and for insuring the accuracy of adjustment of the feeding devices, can be employed. If desired, the master-sheet X and paper Y can both pass through the feeding and holding clamps, as indicated in Fig. 3. In such case, the master-sheet can pass over the machine, then over the rod x, under the rod x', and forward to the clamps. The paper can pass over the rod y, through the punching mechanism, and thence below and with the paper through the clamps.

With further reference to the punching devices, it will be seen that, in addition to the springs d', the means for retracting or lifting the punches includes a horizontally disposed bar N, arranged transversely of the machine, and immediately below the pins d^2. This bar is mounted on swinging arms n, and is thus adapted to rise and fall; and arms n are connected with the vibratory member b^2 through the medium of links n'. In this way, the vibration of the member b^2 is accompanied by a bodily up-and-down or vibratory movement of the bar N. This movement is sufficient to cause the bar N to engage the pins d^2, and thereby positively lift the punches into position to disengage the paper. The spring d' may be employed as the sole means for retracting the punches, but the provision of the bar N renders the retraction of the punches more certain, it being understood that it is absolutely essential that the punches be promptly disengaged from the paper in order that the latter may have the aforedescribed intermittent feeding movement.

With further respect to the selecting mechanism, the plate H can be yieldingly and adjustably caused to bear upon the upper surface of the pattern or master-sheet by means of thumb-nuts O and springs o, applied in the manner illustrated. The guard o', or rounded supporting piece, can be employed as a means for preventing the pattern or master-sheet from dragging on the jointed portions of the primary selectors F, or selectors proper.

It will be seen that the primary selectors are subject to no strain whatever, being subject only to the force of gravity; and consequently a very thin sheet of paper may be employed as the pattern or master-sheet, it being possible, in fact, to employ for this purpose a sheet of ordinary perforated music. In other words, the fingers or selectors which engage the pattern or master-sheet, are employed for controlling the intermediate selectors, which latter are the ones subject to more or less pressure and strain, and which are connected directly with the hammers for actuating the punches. This is of great advantage, inasmuch as it makes it unnecessary to employ a specially constructed pattern or master-sheet, which, as is well known, usually consists of a comparatively thick sheet of paper provided with the necessary perforations and openings, and the making of which is an expensive item in the manufacture of perforated music. It will be understood, however, that a master-sheet of thick paper can be employed whenever it may be found necessary or desirable to do so. Furthermore, it wil be seen that I provide improved means for actuating the punches, and for retracting the punches, these features being also of advantage, as they render the machine more serviceable and certain in use.

The improved feeding arrangement, as shown and described, is also an important feature of my invention, as it insures a proper and accurate feeding of the paper and master-sheet, a condition which is obviously very essential to the manufacture of perforated music in this manner.

In operation, it is obvious that the punches—that is to say, those which have been selected for operation, are driven through the paper while the selecting and feeding devices are at rest. As soon as the vibrating hammers which operate the punches start to rise, the intermediate selectors are restored and disengaged from the primary selectors in the manner described. After this, the primary selectors are then restored and disengaged from the pattern or master-sheet. At this point, everything being in readiness, the feeding clamps feed the

pattern or master-sheet and paper forward the desired or necessary distance, the primary selectors that engage openings in the master-sheet allowing some of the intermediate selectors to pull some of the vibrating hammers into position to engage the corresponding punches. The selection of punches having thus been made, the selected punches are then driven through the paper in the manner described. Thus the different steps in the operation are repeated at a rapid rate, in such manner as to give the master-sheet and paper a steady, progressive, movement.

It will be readily understood that the various cams, cranks, and other power transmitting devices can be so timed or relatively adjusted as to cause said different steps in the operation of the machine to occur at the proper times.

It will be seen that the feeding clamp, composed of the jaws I and I^1, is adapted to feed the paper forward, and also the master-sheet, if such is desired; and it is preferable, in any event, that said feeding clamp be adapted and timed to feed the paper while the punches are out of engagement with the paper; also if the device is used to fit the pattern sheet while the primary selectors and also the intermediate selectors are out of engagement with the master-sheet. Furthermore, said feeding clamp is preferably actuated through the medium of a pitman having adjustable connection with the slotted arm, these two elements constituting medium of power transmitting connection between the clamp and the shaft which actuates the hammers for operating the punches. Preferably, as illustrated, both the primary selectors and the intermediate selectors are pivotally mounted; the primary selectors being provided with pendent notched blocks which act as weights to keep the primary selectors pressed normally against the under side of the master-sheet; and the intermediate selectors being subject to spring tension tending to keep them pressed against the said blocks or weights by which the primary selectors are actuated. And these pivoted primary selectors and intermediate selectors are, as described and illustrated, preferably and advantageously employed in combination with the normally stationary punches.

By locating the feeding clamp between the punches and the holding clamp, it is obvious that the holding clamp will prevent the feeding clamp from, for any reason whatever, pulling the paper back in the wrong direction. In other words, with this relative arrangement of the elements, there is no danger of a reverse motion of the paper, nor of a buckling of the paper during the return stroke of the feeding clamp; and consequently, a very accurate feeding of the paper is insured.

It will be seen that the hammers are pulled into operative positions by springs through the medium of horizontally disposed rods. The punches are normally stationary, both when the machine is running and while the machine is at rest, and are only brought into action when engaged by the hammers. In other words, the punches of my improved machine remain normally at rest during the operation of the machine, and are not constantly vibrated during the running of the machine, as is the case with certain machines prior to my invention. Consequently, each punch, even while the machine is running, remains stationary until actuated by the hammer. Furthermore, the die which coöperates with the punches is always stationary, whether the machine is running or not.

What I claim as my invention is—

1. A machine for making perforated music, comprising punching mechanism, means for carrying a pattern sheet, vertically arranged primary selectors provided with horizontally arranged pivoted fingers pivotally connected thereto and arranged to engage said pattern sheet, and horizontally arranged intermediate selectors connected with said punching mechanism and controlled by said primary selectors, the said punching mechanism having a stationary support over which the paper travels.

2. A machine for making perforated music, comprising punching mechanism, means for carrying a pattern sheet, a plurality of sets of vertically arranged selectors constituting the means through which the said pattern sheet selectively controls the said punching mechanism, one set of selectors being primary and provided with horizontally arranged pivoted fingers pivotally connected thereto for engaging the under side of the pattern sheet, and the other set of selectors being intermediate of said primary selectors and said punching mechanism and provided with horizontally arranged reciprocating rods connected with the punching mechanism, the said punching mechanism having a stationary support over which the paper travels.

3. A machine for making perforated music, comprising punching mechanism, means for carrying a pattern sheet, primary selectors provided with pivoted fingers pivotally connected thereto and mounted to engage the under side of said pattern sheet by force of gravity alone, and intermediate selectors connected with said punching mechanism and controlled by said primary selectors.

4. A machine for making perforated music, comprising a plurality of normally stationary punches, a corresponding number of normally vibrating hammers for actuating said punches, means for carrying a pattern sheet, primary selectors for engaging the

under side of said pattern sheet by force of gravity alone, and intermediate selectors connected with said hammers and controlled by said primary selectors.

5. A machine for making perforated music, comprising normally stationary punches, a constantly vibrating member, hammers mounted on said member, said hammers being adapted to swing into and out of engagement with said punches, means for carrying a pattern sheet, primary selectors for engaging the under side of said pattern sheet by force of gravity alone, and intermediate selectors connected with said hammers, said primary selectors having portions provided with notches adapted to be engaged by said intermediate selectors, whereby the primary selectors are controlled by the pattern sheet, and the intermediate selectors in turn controlled by said primary selectors.

6. A machine for making perforated music, comprising normally stationary punches, means including a plurality of selectors and means for carrying a pattern sheet for selectively controlling the operation of said punches, a vibratory bar for retracting said punches, and pivotally mounted swinging, supporting and actuating means for said bar.

7. A machine for making perforated music, comprising normally stationary punches, vibrating hammers for actuating said punches, stationary partitions separating said hammers, a pivotally mounted swinging support for said hammers and means including means for carrying a pattern sheet and a plurality of selectors for selectively controlling the operation of said punches through the medium of said hammers.

8. A machine for making perforated music, comprising punching mechanism, means for carrying a pattern sheet, vertically arranged primary selectors having horizontally arranged pivoted fingers for engaging the under side of said pattern sheet, vertically arranged intermediate selectors controlled by said primary selectors and connected to said punching mechanism, means including a horizontally arranged vibratory bar for retracting said intermediate selectors, and means including a vertically movable vibratory bar for retracting the said primary selectors.

9. A machine for making perforated music, comprising punching mechanism, means for carrying a pattern sheet, vertically arranged primary selectors having horizontally arranged pivoted fingers adapted to engage said pattern sheet, vertically arranged intermediate selectors controlled by said primary selectors and connected with said punching mechanism, means including a horizontally arranged vibratory bar for retracting said intermediate selectors, and means including a vertically movable vibratory bar adapted to retract the primary selectors subsequent to the retraction of the intermediate selectors.

10. A machine for making perforated music, comprising a constantly vibrating member, a plurality of pendent hammers pivotally secured to said member through the medium of a pivot rod clamped between the correspondingly beveled faces of separable blocks, a corresponding number of normally stationary punches adapted to be actuated by said hammers, and means including means for carrying a pattern sheet for selectively controlling the said punches through the medium of said hammers.

11. A machine for making perforated music, comprising punching mechanism, means for carrying a pattern sheet, means for selectively controlling said punching mechanism, a vibratory feeding clamp timed to feed the paper while the said selectively controlling means is dormant, a cam for automatically opening said clamp, and a spring for insuring the closing of said clamp, said clamp being also operative to actuate a portion of the said selectively controlling means simultaneously with the feeding of the paper, the said punching mechanism having a stationary support over which the paper travels.

12. In a machine for making perforated music, the combination of punching mechanism, means for carrying a master-sheet, means whereby the master-sheet selectively controls the operation of the punching mechanism, and a bodily vibratory feeding clamp and means for operating the same, said clamp being adapted and timed to pull the paper forward while the punching mechanism is at rest, and means for varying the extent of vibration of said clamp.

13. In a machine for making perforated music, the combination of punching mechanism, means for carrying a master-sheet, means for intermittently feeding the paper and also the master-sheet, vertically arranged primary selectors having horizontally arranged pivoted fingers adapted to engage the master-sheet, and pivoted vertically arranged intermediate selectors controlled by said primary selectors and suitably connected with said punching mechanism, the said punching mechanism having a stationary support over which the paper travels.

14. A machine for making perforated music, comprising a plurality of punches, means for selectively controlling the operation of said punches, a bodily vibratory and automatically opening and closing clamp for intermittently feeding the paper beneath the punches, a slotted crank arm, and a power transmitting member connected for adjustment along the slot of said crank arm, whereby said arm may be, in effect, length-

ened and shortened for the purpose of varying the extent of feed.

15. A machine for making perforated music, comprising a plurality of punches, means for selectively controlling the operation of said punches, a bodily vibratory and automatically opening and closing clamp for feeding the paper beneath said punches, crank arms mounted on a rock shaft, means for oscillating said shaft, connections between said crank arms and the opposite end portions of said clamp, and means whereby said crank arms may, in effect, be lengthened and shortened for the purpose of insuring an accurate fed.

16. A machine for making perforated music, comprising a plurality of punches, means for selectively controlling the operation of said punches, a bodily vibratory and automatically opening and closing clamp for feeding the paper to said punches, a pair of suitably actuated crank arms, connecting means extending between said crank arms and the opposite end portions of said clamp, means for adjusting said connecting means relatively to the crank arms, and thereby, in effect, lengthening and shortening the latter for the purpose of insuring an accurate feed.

17. A machine for making perforated music, comprising a plurality of punches, means for selectively controlling the operation of said punches, a bodily vibratory and automatically opening and closing clamp for feeding the paper to said punches, and means including a longitudinally slotted crank arm, together with a connection adjustable along the slot of said arm, for vibrating said clamp, and whereby the extent of feed may be varied at will.

18. A machine for making perforated music, comprising a plurality of punches, means for actuating said punches, means for carrying a pattern sheet, a plurality of gravity-actuated primary selectors having horizontally arranged pivoted fingers adapted to engage the openings in said pattern sheet, a plurality of spring-actuated intermediate selectors controlled by said primary selectors, and suitable connections between said intermediate selectors and said means for actuating the punches.

19. A machine for making perforated music, comprising punching mechanism provided with a vertically vibrating member having hammers and punches, means for carrying a pattern sheet, a plurality of sets of selectors constituting the means through which the said pattern sheet selectively controls the said punching mechanism, one set of selectors engaging the under side of the pattern sheet, and the other set of selectors having rods extending longitudinally of the machine and connected with the punching mechanism.

20. A machine for making perforated music, comprising punching mechanism having hammers and punches, means for carrying a pattern sheet, primary selectors mounted to engage the under side of said pattern sheet by force of gravity alone, and intermediate spring selectors having rods connected with said punching mechanism and controlled by said primary selectors.

21. A machine for making perforated music, comprising a plurality of normally stationary punches, a corresponding number of normally vibrating hammers for actuating said punches, means for carrying a pattern sheet, primary selectors engaging the under side of said pattern sheet by force of gravity alone, and intermediate spring selectors having rods connected with said hammers and controlled by said intermediate selectors.

22. A machine for making perforated music, comprising normally stationary punches, a constantly vibrating member, hammers mounted on said member, said hammers being adapted to swing into and out of engagement with said punches, means for carrying a pattern sheet, primary selectors engaging the under side of said pattern sheet by force of gravity alone, and intermediate spring selectors having rods connected with said hammers, said primary selectors having portions provided with notches adapted to be engaged by said intermediate selectors, whereby the primary selectors are controlled by the pattern sheet, and the intermediate selectors in turn controlled by said primary selectors.

23. A machine for making perforated music, comprising normally stationary punches, means including a plurality of hammers, and connecting rods, primary selectors, intermediate spring selectors and means for carrying a pattern sheet for actuating and selectively controlling the operation of said punches, a vibratory bar for retracting said punches, and swinging supporting and actuating means for said bar.

24. A machine for making perforated music, comprising normally stationary punches, vibrating hammers for actuating said punches, stationary partitions separating said hammers, a pivotally mounted swinging support for said hammers, and means including means for carrying a pattern sheet and a plurality of primary selectors and intermediate spring selectors having longitudinal connecting rods for selectively controlling the operation of said punches through the medium of said hammers.

25. A machine for making perforated music, comprising punching mechanism having hammers and punches, means for carrying a pattern sheet, primary selectors engaging the under side of said pattern sheet, intermediate spring selectors controlled by said primary selectors and having rods con-

nected to said punching mechanism, means including a horizontally vibratory bar for retracting said intermediate selectors, and means including a vertically vibratory bar for retracting the said primary selectors.

26. A machine for making perforated music, comprising punching mechanism having hammers and punches, means for carrying a pattern sheet, primary selectors adapted to engage said pattern sheet, intermediate spring selectors controlled by said primary selectors and having rods connected with said punching mechanism, means including a vibratory bar adapted to retract the primary selectors subsequent to the retraction of the intermediate selectors.

27. A machine for making perforated music, comprising punching mechanism provided with a vertically vibrating member having hammers and punches, means for carrying a pattern sheet, means for selectively controlling said punching mechanism, a vibratory feeding clamp timed to feed the paper while the said controlling means is dormant, a cam for automatically opening said clamp, and a spring for insuring the closing of said clamp, said clamp being operative to actuate a portion of the said controlling means simultaneously with the feeding of the paper.

28. A machine for making perforated music, comprising punching mechanism having hammers and punches, means for carrying a pattern sheet, primary selectors mounted to engage the under side of said pattern sheet by force of gravity alone, and intermediate selectors connected with said punching mechanism and controlled by said primary selectors.

29. A machine for making perforated music, comprising a plurality of normally stationary punches, a corresponding number of normally vibrating hammers for actuating said punches, means for carrying a pattern sheet, primary pivoted selectors engaging the under side of said pattern sheet by force of gravity alone, and intermediate pivoted selectors connected with said hammers and controlled by said primary selectors.

30. A machine for making perforated music, comprising normally stationary punches, a constantly vibrating member, hammers hung on said member, said hammers adapted to swing into and out of engagement with said punches, means for carrying a pattern sheet, primary selectors engaging the under side of said pattern sheet by force of gravity alone, and intermediate selectors connected with said hammers, said primary selectors having vertically reciprocating portions provided with notches adapted to be engaged by said intermediate selectors, whereby the primary selectors are controlled by the pattern sheet, and the intermediate selectors in turn controlled by said primary selectors.

31. A machine for making perforated music comprising a plurality of punches, a vertically vibrating member having hammers for actuating said punches, means for carrying a pattern sheet, a plurality of pivoted gravity-actuated primary selectors adapted to engage the openings of said pattern sheet, a plurality of spring-actuated intermediate selectors controlled by said primary selectors, and rods having their opposite ends pivotally connected respectively with the intermediate selectors and the said means for actuating the punches.

Signed by me at Chicago, Cook county, Illinois, this 24th day of October, 1903.

PHILIP J. MEAHL.

Witnesses:
S. B. CHABOWSKI,
WM. A. HARDERS.