C. F. STODDARD.

NOTE SHEET PERFORATING MACHINE.

APPLICATION FILED APR. 26, 1917.

1,400,242.

Patented Dec. 13, 1921.

2 SHEETS—SHEET 1.

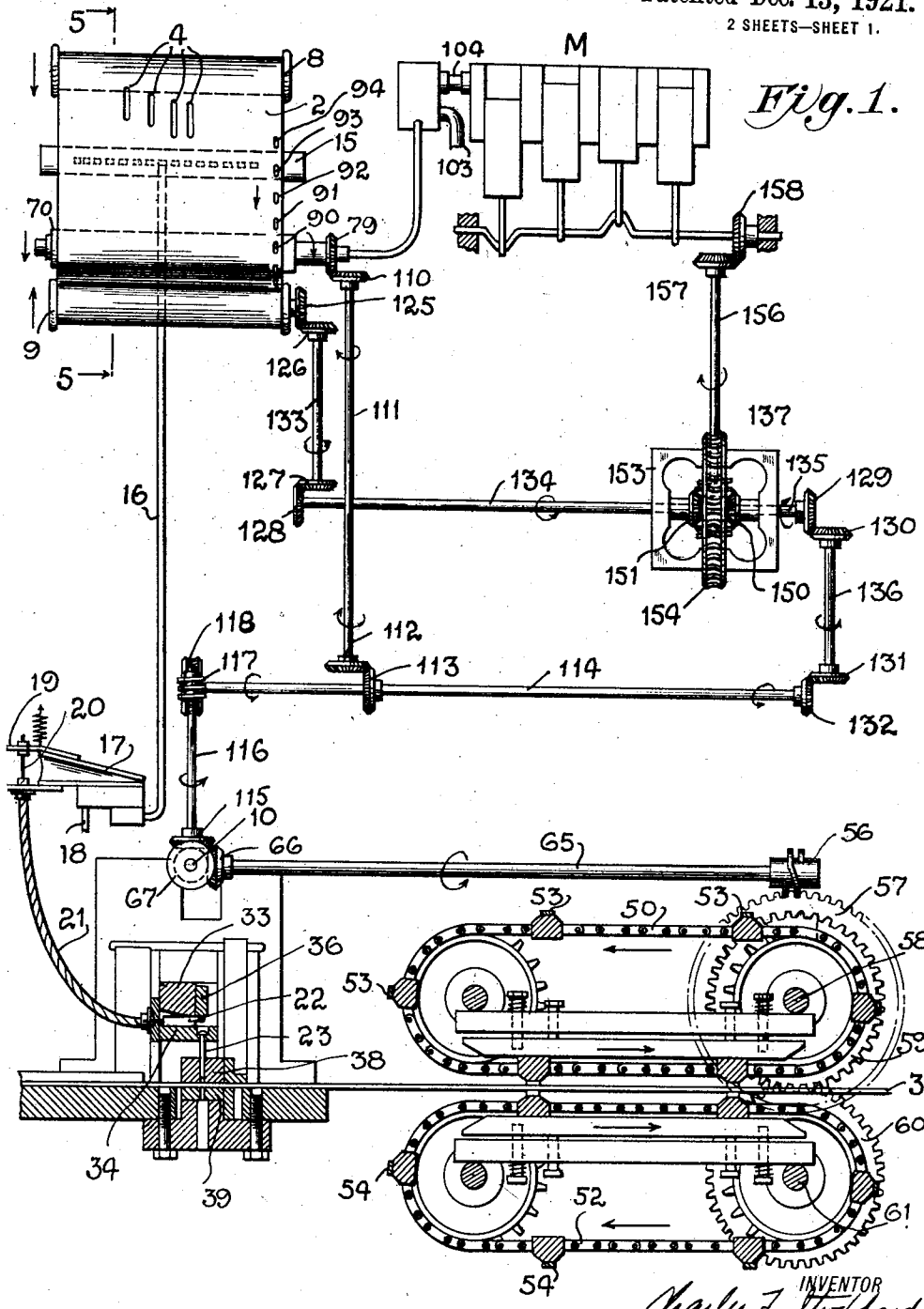


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

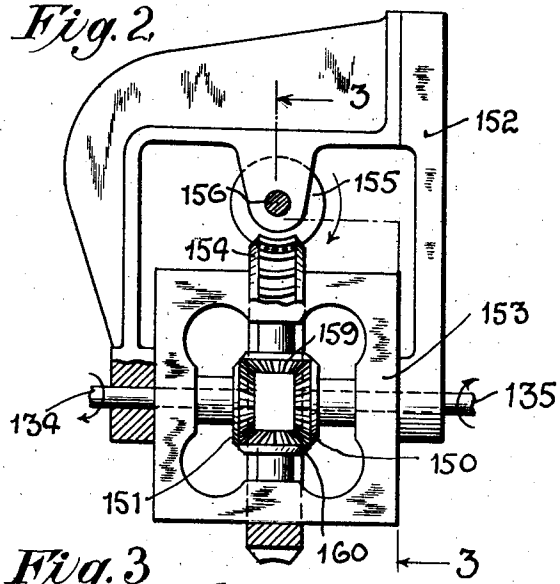
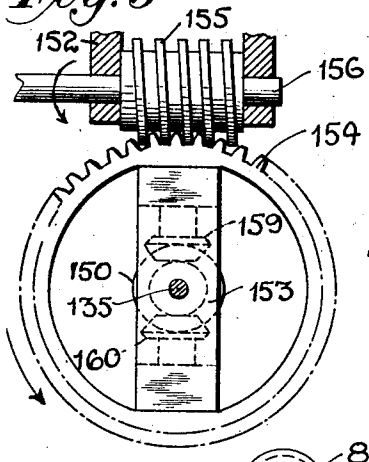


Fig. 3.



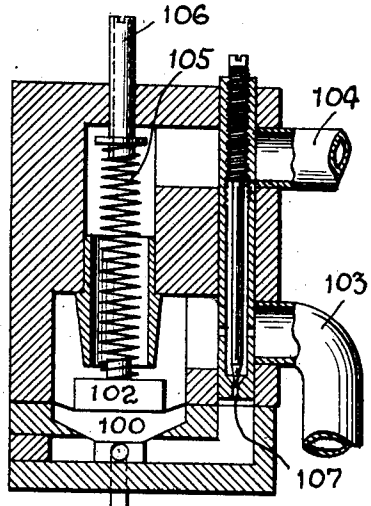


Fig. 4.

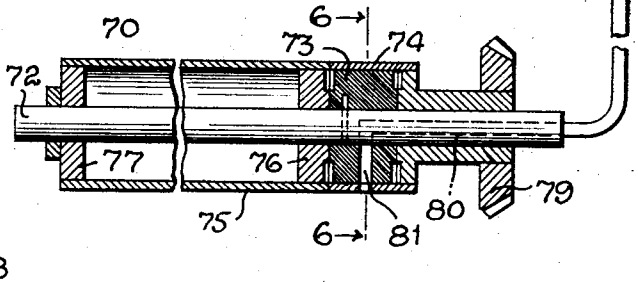


Fig. 5.

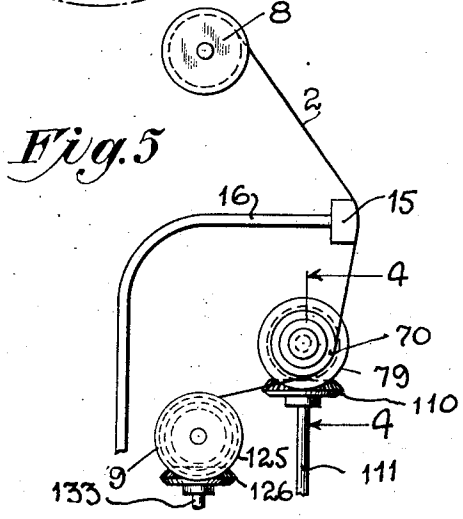
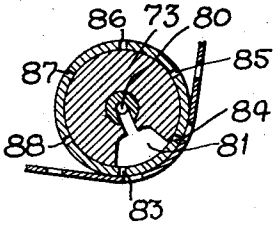


Fig. 6.



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CHARLES F. STODDARD, OF NEW YORK, N. Y.

NOTE-SHEET-PERFORATING MACHINE.

1,400,242. Specification of Letters Patent. Patented Dec. 13, 1921.

Application filed April 26, 1917. Serial No. 164,625.

To all whom it may concern:

Be it known that I, CHARLES F. STODDARD, a citizen of the United States of America, residing in the city of New York, in the county and State of New York, have invented an Improvement in Note-Sheet-Perforating Machines, of which the following is a specification.

This invention relates to machines for making perforated note sheets for mechanical musical instruments; pertaining more particularly to mechanism for determining the proper correlation between selective portions of a pattern and the perforating portions of a punching mechanism or the like.

Among other objects the invention is intended to provide a simple controlling mechanism which shall operate practically infallibly to determine proper relationship between the pattern feed and the feed of the note sheet material, to be perforated.

One illustrative embodiment of the invention is shown in the accompanying drawings, and therein—

Figure 1 is a diagrammatic representation of a machine embodying the invention; and

Figs. 2, 3, 4, 5 and 6 are detail views, later to be referred to.

Referring to Fig. 1, the pattern or stencil sheet 2 is shown at the upper left hand corner and the note sheet material 3, which is to be punched, is shown in the lower right hand corner of the drawings.

The apparatus is intended to cause the pattern sheet 2 and the note sheet material 3 to be fed in proper relationship, the preferred relation involving a slightly faster speed for the pattern than for the note sheet material. To illustrate one form of pattern sheet suitable to be used, the sheet 2 is provided with perforations 4 corresponding relatively with perforations intended to be punched in the note sheet material 3. The note sheet material 3 may consist of a stack of superposed sheets which may be punched simultaneously.

The pattern sheet 2 is mounted upon a spool 8 and is wound upon a take-up roll 9. The take-up roll 9 is interconnected with and driven from the main shaft 10 of the punching mechanism.

The pattern sheet 2 illustrates a prime controller for a punching mechanism which may be of any practicable type. For purposes of illustration one practicable form of punch selecting mechanism is shown in the drawings and comprises a tracker bar 15 provided with vents to be opened by the perforations 4 of the pattern sheet 2. Each vent is connected by a duct 16 with the controlling valves of a corresponding power pneumatic 17. A chest for the several pneumatics 17 is connected by a duct 18 with a source of exhaust. As will be understood by those skilled in the art, when a vent of the tracker 15 is opened by a perforation 4 the pneumatic 17 will be connected with a source of exhaust and thereby collapsed. The movable board of the pneumatic 17 carries an arm 19 which is fast to a flexible push rod 20 within a flexible sheath 21. The other end of the push rod 20 is connected to a punch selector 22 while the sheath 21 is fast to the fixed board of the pneumatic and the cross head. When the pneumatic 17 is collapsed the punch selector will be moved to the right in Fig. 1 over a punch 23.

It will be understood that there is a series of punch selectors 22 corresponding each to a series of punches 23 for punching a note perforation in the note sheet material. One complete set of selecting and punching devices is shown diagrammatically in the drawings, and it will be understood that these parts are reduplicated as many times as may be necessary to provide for punching the desired number of rows of perforations.

The punching mechanism which carries the punch selectors 22 comprises a vertically reciprocating cross-head 33, 34 which is reciprocated in appropriate guide ways by an eccentric upon the shaft 10 which is unnecessary to be shown. For each complete revolution of the shaft 10, the cross-head 33, 34 is moved downwardly and then upwardly through one complete reciprocation. The punches 23 are carried sufficiently loosely in the cross-head bar 34 to permit them to drop against the note sheet material 3 without punching the same except when a punch selector 22 has been moved far enough toward the right to be interposed between the driving bar 36 and the head of a punch.

The punches 23 are arranged to slide vertically in a stripper bar 38 which overlies the note sheet material 3 which in turn is supported at the punching point upon a die

39. With the described arrangement, when the pneumatic 17 is open to atmosphere the selector 22 will be retracted to the position shown in the drawings so that as the cross head 33, 34 descends the punch will not be driven through the note sheet material; but if the pneumatic 17 is collapsed by opening a vent in the tracker bar 15, the selector 22 will be interposed between the punch head and the driving bar 36 so that the punch will be forced through the note sheet material into its corresponding hole in the die plate 39.

The note sheet material 3 may be fed through the punching mechanism in any practicable manner, as, for example, by some such feeding mechanism as that described in United States patent to Davis No. 659,053 dated October 2, 1900. An illustrative form of feeding mechanism is shown diagrammatically in the drawings. As there shown the note sheet feed mechanism is viewed in section on a vertical plane substantially bisecting the feed mechanism along the direction of the feed which is toward the right in the drawings. This feed mechanism comprises an upper apron 50 and a lower apron 52, each apron consisting of a pair of parallel sprocket chains connected by cross bars 53 on the upper apron, and 54 on the lower apron. The cross bars 53 and 54 on the respective aprons are so disposed that a cross bar 53 registers with a cross bar 54 on opposite sides of the note sheet material on the adjacent runs of the two aprons so as to grip the note sheet material between the cross bars with sufficient pressure to cause the note sheet material to accompany the aprons during their movement. As this feed mechanism is shown the aprons are driven intermittently by an interrupted worm 56 engaging a worm wheel 57 fast to one of the sprocket gear shafts 58. This shaft 58 carries a gear 59 meshing with a gear 60 on a shaft 61 which carries one of the lower apron sprockets. The rotating of the worm 56 drives the aprons in the direction of the arrows in Fig. 1.

The interrupted worm 56 is mounted upon a shaft 65 which carries a bevel gear 66 meshing with a gear 67 on the main shaft 10. The straight portions on the thread of the worm 56 are so disposed relatively to the eccentric on the main shaft 10 that the aprons 50 and 52 remain at rest during the downward movement of the cross head 33, 34 to drive the punches; and when the cross head 33, 34 is moved upwardly the worm 56 causes the aprons to be driven through one feed step so as to present a new part of the note sheet material 3 in position to be punched.

The description thus far has pertained to the mechanism for selecting the punches and operating them to punch the note sheet material, and the feed mechanism for moving the note sheet material through the punching mechanism. The manner in which the pattern sheet 2 is caused to be fed in proper relationship with the feed of the note sheet material will be next described. It is preferable that the pattern sheet be driven at a relatively greater speed than the note sheet material and it is essential to the perfect operation of the machine that proper synchronism be maintained between the pattern sheet and the note sheet material. In other words the linear speed of the pattern is preferably greater than the linear speed of the note sheet material.

In the illustrative embodiment of the invention the note sheet material 3 is fed intermittently at a uniform speed, one feed step, which preferably approximates less than the radius of a punch, for each complete revolution of the driving shaft 10. In this embodiment of the invention, therefore, the note sheet feed may be regarded as a constant, and the feed of the pattern sheet as a variable which is regulated by the apparatus about to be described so as to insure proper synchronism of the pattern sheet and note sheet material in accordance with a predetermined relation of pattern to finished note sheet.

As shown in Fig. 5, the pattern sheet 2 passes over a drum 70 which is shown in longitudinal section in Fig. 4 and transverse section in Fig. 6. As shown in Fig. 4 the drum 70 has a stationary axle 72, to which is pinned a stationary core 73 which is cylindrical and encircled by a rotating sleeve 74. The core 73 provides a snugly fitting bearing for the sleeve 74. An idler roll comprising the sleeve 75 and ends 76, 77 is mounted to rotate freely on the stationary axle 72.

The sleeve 74 has secured to it a beveled gear 79 which is positively driven, as presently described.

The stationary axle 72 has an axial duct 80 which communicates with a radially extending chamber 81 (Figs. 4 and 6) which chamber presents at the periphery of core 73 a mouth extending through substantially 60° of the circumference of the core. The sleeve 74 is provided with a series of ports 83—88 which are arranged to communicate in succession with the chamber 81 as the sleeve 74 is rotated.

In the margin of the pattern sheet 2 is provided a row of perforations 90, 91, 92, etc., spaced uniformly, and so located upon the note sheet as to register with the ports 83, 84, 85, etc., in the driven sleeve 74 as illustrated in Fig. 6. With the described arrangement the mouth of the chamber 81 remains closed at all times except when a marginal perforation in the pattern sheet 2 coincides more or less with one of the ports 83, 84, etc., of the sleeve 74. For example,

the spaces between the port 83 and the next port 84 is such that the mouth of the chamber 81 will never be open to an extent greater than the cross section of one of the ports 83 or 84. If the ports 83 and 84 be both closed by unperforated parts of the pattern sheet, then the mouth of the chamber 81 is effectually sealed.

When, however, the perforations in the pattern sheet coincide more or less with a port 83 or 84, then atmosphere is admitted in greater or less degree to the chamber 81, and thence through the duct 80 in the axle 72 to a diaphragm chamber 100, the diaphragm of which carries a throttle valve 102 controlling a port between a duct 103, leading to a source of exhaust, and a duct 104 leading to a wind motor M. A spring 105 may be provided to oppose the action of the diaphragm over the chamber 100 and to assist in the operation of the valve 102. The tension of the spring may be adjusted through the agency of a screw 106.

As will appear to those skilled in the art, when a marginal perforation on the pattern sheet coincides more or less with one of the ports 83, 84 etc., atmosphere, admitted thereby to the chamber 81 and duct 80, serves to lift the valve 102 more or less according as the admission of atmosphere is more or less compensated through an adjustable bleed 107. The lifting of the valve 102 tends to restrict communication between the source of exhaust, with which the duct 104 is connected. If a sufficient amount of atmosphere is admitted to diaphragm chamber 100 the valve 102 will close its port and the wind motor will not be operated. If the atmosphere admitted to diaphragm chamber 100 is insufficient to entirely close the valve 102 it may so restrict the opening past the valve that the speed of the wind motor will be reduced. Thus the operation of the wind motor and the speed at which it operates is regulated by the coöperation between the marginal perforations 90, 91, 92 in the pattern sheet and the ports 83, 84 etc. in the rotating sleeve 74.

The gear 79 which drives the sleeve 74 meshes with a gear 110 upon a shaft 111 which in turn carries a gear 112 meshing with a gear 113 upon a shaft 114. The shaft 114 is driven from the main shaft 10 through a gear 115 meshing with a beveled gear 67, a shaft 116, worm 117 and worm wheel 118 fast to shaft 114. In the specific apparatus the worm 117 and worm wheel 118 are so related that one revolution of the shaft 114 is accompanied by approximately 30 revolutions of the driving shaft 10. The train of gearing between shaft 114 and the gear 79 is such that the gear 79 revolves at the same speed as the shaft 114. As already explained each revolution of the main shaft 10 causes one reciprocation of the cross head 33, 34. Therefore, there are a possible 30 punching operations during one complete revolution of the sleeve 74. There are 6 of the ports 83, 84 etc. in the sleeve 74 spaced 60° apart, therefore during the revolution of the sleeve 74 through the distance between one port 83 and the next port 84, five punching operations occur. In other words during the revolution of the sleeve 74 through such a distance between one port and the next the pattern sheet 2 should move a distance corresponding to five punching operations. It is to be understood that the particular gear ratio between the main shaft 10 and the gear 79 and the particular division of the sleeve 74 constitute merely one practicable arrangement which has been herein selected for illustration.

The take-up roll 9 about which the pattern sheet is wound carries a bevel gear 125 and is interconnected with the intermediate drive shaft 114 through gears 126—132 mounted upon shafts 133—136. Means are interposed in this connection to vary the speed of the take-up roll as may be necessary to synchronize the movements of pattern with the movement of the note sheet material, or specifically to impart to the pattern sheet a linear speed equal to the peripheral speed of the sleeve 74; said means being herein shown as an epicyclic gear train or differential 137 interposed between the take-up roll 9 and the shaft 114.

The gear ratio between gear 125 and 132 is preferably such that when shafts 134 and 135 are rotating at the same speed the take-up roll 9 will not drive the pattern sheet in proper synchronism with the main shaft 10. For example, the gear ratio may be such that the speed of the take-up roll will be less than it should be to drive the pattern sheet in proper synchronism with the note sheet material. With the described arrangement this would cause the pattern to lag behind the note sheet material. Under such conditions the linear speed of the note sheet material would be less than the peripheral speed of the sleeve 74 and the marginal perforations 90, 91, etc. would not register properly with the ports 83, 84 etc. in the sleeve. This would permit the diaphragm chamber 100 to be exhausted through the bleed passage 107 and thereby open the valve 102 to connect the wind motor M with the source of exhaust and cause it to operate. The wind motor is connected with the train arm of the differential in such a way that its operation will cause the shaft 134 to be driven faster than the shaft 135, and this in turn will increase the speed of the take-up roll 9 and increase the linear speed of the pattern relatively to the peripheral speed of the sleeve 74. Thereupon one of the perforations 90, 91, etc. will register to a greater or less extent with one of the ports 83, 84 etc. and admit a

greater or less amount of atmosphere to the diaphragm chamber 100 which in turn will tend to close the valve 102 and decrease the speed of the wind motor.

The epicyclic gear train or differential includes a bevel gear 150 fast to the shaft 135 and a bevel gear 151 fast to the shaft 134. Fig. 2 is a top plan view of the differential and Fig. 3 is a section on the line 3—3 of Fig. 2. Reference may be had to these figures in the description of the differential. A U-shaped member 152 provides bearings for the shafts 134 and 135 and within the arms of the supporting member 152 a train arm 153 is journaled concentrically with the shafts. This train arm carries a worm wheel 154 engaged by a worm 155 mounted upon a shaft 156 which is journaled in the supporting member 152 and driven from the wind motor through gears 157 and 158. Journaled to the train arm 153 and meshing respectively with the bevel gears 150 and 151 are a pair of idlers 159 and 160.

The arrow to the right of Fig. 2 shows the direction of rotation of the shaft 135 (which may be considered positive) and it will therefore be apparent that when the train arm 153 of the epicyclic train is held stationary a reverse or negative rotation at the same speed will be imparted to the shaft 134. If, with the described arrangement, the worm 155 is rotated in contraclockwise direction (Fig. 3), thus imparting to it a negative rotation relatively to the shaft 135, as will be readily understood, this will increase the speed of the shaft 134 relatively to that of the shaft 135. If it is preferred to drive the pattern sheet normally slower than a proper synchronizing speed, the operation of the wind motor may be reversed and the correction still obtained as will be obvious to those skilled in the art.

The operation of the illustrative apparatus herein shown may be described as follows:

The pattern sheet 2 is inserted in the machine, passed over the drum 70 and secured to the take-up roll 9 as shown in Figs. 1 and 2. The duct 103 may then be connected to the source of exhaust. In the absence of any marginal perforations in the pattern sheet all the ports 83, 84, etc. will remain closed and the diaphragm chamber 100 will be exhausted to open valve 102 and start the motor M. The wind motor acting upon the train arm of the differential will rotate the shaft 134 while the shaft 135 remains stationary, and feed the pattern sheet across the tracker bar until the first marginal perforation 90 reaches and opens the port in the sleeve 74 which is at that time in communication with the chamber 81. Upon the opening of the port, as thus described, to a sufficient extent the influx of atmosphere therethrough will overcome the action of the bleed 107, close the valve 102, and stop the wind motor. Thus the machine automatically sets the pattern in a predetermined position before the start of the punching mechanism. This starting position may be so predetermined that any pattern controlled device, coöperating with the perforating mechanism may be brought into proper relation with the note sheet material prior to the starting of the punching mechanism. The perforating mechanism may now be started and the shaft 10 will begin to rotate.

The operation will be more readily understood if it is borne in mind that the sleeve 74 is rotated at a constant speed through the train of mechanism connecting it with the driving shaft 10; whereas the feeding movement of the pattern sheet 2 is dependent not only upon the speed of rotation of the main shaft 10 but also upon the operation of the wind motor M which is controlled through the valve 102 by the coöperation of the ports 83, 84, etc. in the sleeve 74, with the marginal perforations 90, 91, etc. in the pattern sheet. While the speeds of the main shaft 10 and the sleeve 74 are referred to as constants, it is not to be understood that their respective speeds may not be varied without destroying the accurate operation of the machine. A predetermined constant relation is, however, maintained between the speed of the sleeve 74 and the shaft 10. The speed of the main shaft which is referred to as a constant is more properly speaking, the normal speed to which the speed of the pattern is adjusted. It is immaterial whether the main shaft is driven at 500 R. P. M. or 700 R. P. M., or whether it varies during the operation of the machine, because the speed of the pattern feed will always be determined relatively to the speed of the main shaft.

When the perforating mechanism is started the sleeve 74 will be rotated in synchronism therewith and its peripheral speed, although it may vary from time to time, will be the speed desired for the pattern. Simultaneously the pattern will be fed forward at a speed dependent upon the component of its movement derived from the perforating mechanism. Herein this component is normally less than the proper synchronizing speed so that the relatively faster movement of the sleeve 74 will tend to close the effective opening of the successive ports 83, 84, etc., as they are brought into acting position with the successive marginal perforations in the pattern sheet. Such restriction of the opening of these ports decreases the amount of atmosphere admitted to diaphragm chamber 100 so that the bleed through 107 will predominate and cause a greater or less opening of valve 102. This starts the wind motor, and its operation through the connection

with the differential tends to increase the speed of the pattern by driving the take-up roll 9 faster. If the pattern moves faster than the periphery of the sleeve 74 there will be a tendency to enlarge the port openings in the sleeve 74, close the valve 102 and stop or decrease the speed of the wind motor.

The result of these various tendencies is to maintain at all times a partial registration between the marginal perforations 90, 91, etc., of the pattern sheet and the ports 83, 84, etc., of the sleeve 74. In view of the fact that the peripheral speed of the sleeve 74 is the speed desired for the pattern sheet this continued partial registration of perforations will maintain a corresponding speed of the pattern feed. This is accomplished without physical gripping of the pattern sheet, which is extremely objectionable.

Briefly stated, the proper registration of the pattern sheet and note sheet material is obtained in the specific apparatus herein disclosed, by driving the pattern sheet from two sources:—principally from the main shaft of the perforating mechanism and secondarily the wind motor M. The larger component of the speed of movement of the pattern sheet is preferably derived from the main shaft and of itself will not drive the pattern in proper synchronism. Herein this component is too small. The smaller component is preferably derived from the wind motor and may vary by the disclosed apparatus, so that the sum of the two components will equal a speed which will be in exact synchronism with the speed of the note sheet material. Preferably the component derived from the wind motor is sufficiently great to compensate for the maximum error which is possible with the described apparatus; so that this component need not be varied in direction, but merely in extent, to effect the necessary correction to produce the desired synchronism. Through such an arrangement the variable component is reduced to a minimum at all times. Furthermore possible errors in this component cannot exceed a very small percentage of its entire value due to the relatively high operating speed of the wind motor and the gear reduction in its connection with the differential. Taken together the several features of the invention combined in the disclosed machine provide an apparatus of extreme simplicity which will operate with almost infallible accuracy.

As the pattern sheet proceeds across the tracker bar 15 in proper synchronism with the movement of the note sheet material the perforations in the pattern sheet will operate the punching mechanism as previously described.

It is to be understood that the invention is not limited to the particular construction, organization and mode of operation hereinbefore described for illustration. On the contrary, the invention may be variously embodied and the particular apparatus may be variously modified within the scope of the subjoined claims.

I claim as my invention:

1. A note sheet perforating machine comprising, in combination, perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern having operative connection with the perforating mechanism; speed controlling means for said feeding means independent of the entire selecting mechanism other than the pattern governed conjointly by said pattern and perforating mechanism,

2. A note sheet perforating machine comprising, in combination, perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern having operative connection with the perforating mechanism; speed controlling means for said pattern feeding means including a differential interposed between said feeding means and said punching mechanism; and means independent of the entire selecting mechanism other than the pattern governed conjointly by said pattern and the perforating mechanism for controlling said differential.

3. A note sheet perforating machine comprising, in combination, perforating mechanism; selecting mechanism including a pattern; driving means for the perforating mechanism; driving means for the pattern having operative connection with the perforating mechanism; independently operable driving means for the pattern; and means governed conjointly by the perforating mechanism and the pattern for controlling said pattern driving means.

4. A note sheet perforating machine comprising, in combination, perforating mechanism; selecting mechanism including a pattern; means for feeding the pattern having a variable operative connection with said perforating mechanism; means driven by the perforating mechanism and coöperating with the pattern; and speed governing means for the pattern controlled conjointly by said pattern and said means driven by the perforating mechanism.

5. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising sheet moving means having connection with the perforating mechanism; a differential in said connection; a rotatable drum over which the sheet passes; and pneumatic means acting upon the differen-

tial for maintaining linear speed of the sheet in desired relation with the peripheral speed of said drum.

6. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising sheet moving means having connection with the perforating mechanism; a differential in said connection; a rotatable drum over which the sheet passes; coöperating openings in the sheet and said drum; and pneumatic means acting upon the differential for maintaining said openings in desired correlation.

7. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising sheet moving means having connection with the perforating mechanism; a differential in said connection; a rotatable drum over which the sheet passes; coöperating openings in the sheet and said drum; and speed governing means for the sheet moving means controlled by coöperation between said openings and acting upon the differential.

8. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising variable speed sheet moving means including a differential; a device driven at a uniform speed; and coöperating means on the sheet and said device for governing the speed of movement of the sheet.

9. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism comprising variable speed sheet moving means including a differential; a device driven at uniform speed; and speed controlling means for the sheet governed by said device.

10. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising variable speed sheet moving means; a device moving at uniform speed; and means including a differential for causing the sheet to move at a substantially uniform speed predetermined by the speed of said device.

11. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism comprising variable speed sheet moving means; a device moving at uniform speed; means controlled conjointly by the sheet and said device for varying to effective opening of a pneumatic bleed; and means acting upon a differential and governed by said bleed for regulating the speed of the sheet.

12. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising a variable speed motor; a differential operatively connected therewith; means for governing the speed of said motor; and means governed by the sheet for operating said speed governing means.

13. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising a pneumatic motor; a differential operatively connected therewith; a drum over which the sheet is moved; cooperating openings in the sheet and drum; and a throttle valve for said motor controlled by said coöperating openings.

14. In a perforating machine the combination with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising a motor; a differential operatively connected therewith; a drum over which the sheet moves; and coöperating means on said sheet and drum for controlling the operation of said motor.

15. In a perforating machine the combination, with perforating mechanism of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising a motor; a differential operatively connected therewith; means governed by the sheet for producing a variable atmospheric bleed; means for producing a suction bleed opposed to said atmospheric bleed; and governing means for said motor controlled by coöperation of said bleeds.

16. In a perforating machine the combination, with perforating mechanism, of speed governing means for a moving sheet adapted to control said perforating mechanism, comprising means including a differential for moving the sheet; a rotatable drum over which the sheet passes having ports therein to coöperate with perforations in the sheet; and means to govern the movement of the sheet controlled by coöperation between said ports and perforations.

17. A note sheet perforating machine comprising, in combination, perforating mechanism; a movable selecting means for performing a succession of selecting offices; means for moving the selecting means including a differential having connection with the perforating mechanism and a variable speed motor; a member operatively connected to and moving synchronously with the perforating mechanism; and governing means for the means for moving the selecting means having operative connection with the selecting means and governed thereby to

maintain the selecting means in desired correlation with the said member.

18. A note sheet perforating machine comprising, in combination, a movable selector; selector feeding means; perforating mechanism, including a member moving at the speed desired for the selector; and governing means, including a variable speed motor and a differential operatively connected therewith and with the perforating mechanism, having operative connection with the selector and controlled thereby for feeding the selector at substantially the same speed as that of said member.

19. A note sheet perforating machine comprising, in combination, a selector; selector feeding means; perforating mechanism including a member proximate the selector and moving at a speed substantially equal to the average speed desired for the selector; and governing means, including a variable speed motor and a differential operatively connected therewith and with the perforating mechanism, having operative connection with the selector and governed thereby to synchronize the movement of the selector and said member.

20. A note sheet perforating machine comprising, in combination, a selector; selector feeding means; perforating mechanism; a member arranged to move synchronously with the perforating mechanism, said member being located proximate the selector and having successively acting points thereon corresponding with successively acting points on the selector; and governing means, including a variable speed motor and a differential operatively connected therewith and with the perforating mechanism, for maintaining corresponding points on the selector and said member in desired correlation.

21. In a perforating machine the combination, with perforating mechanism, of controlling means for a moving sheet adapted to govern the operation of said perforating mechanism, comprising sheet moving means including a variable speed motor and a differential having connection therewith and with the perforating mechanism; a moving member over which the sheet passes; cooperating openings in the sheet and said member; and means for maintaining said openings in desired correlation.

22. In a perforating machine the combination, with perforating mechanism of controlling means for a moving sheet adapted to govern the operation of said perforating mechanism, comprising sheet moving means including a variable speed motor and a differential having connection therewith and with the perforating mechanism; a moving member over which the sheet moves; cooperating openings in the sheet and said member; and means for maintaining said openings in the sheet in partially overlapping relation to the openings in said member.

23. In a perforating machine the combination, with perforating mechanism, of controlling means for a moving sheet adapted to govern the operation of said perforating mechanism, comprising sheet moving means including a variable speed motor and a differential having connection therewith and with the perforating mechanism; a member having a movement like the movement intended for the sheet; and governing means for the sheet moving means for causing the sheet to move at substantially the speed of said member.

24. In a perforating machine the combination, of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means; and driving means acting upon the train arm of said epicyclic gear train to synchronize the operation of the selecting and perforating mechanism.

25. In a perforating machine the combination, of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means; and means to synchronize the perforating mechanism and pattern comprising variable speed means acting upon the train arm of said epicyclic gear train.

26. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means; and pneumatic means acting upon the train arm of said epicyclic gear train to synchronize the operation of the selecting and perforating mechanism.

27. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means; means controlled conjointly from said perforating mechanism and said pattern acting upon the train arm of said epicyclic gear train to synchronize the operation of the selecting and perforating mechanism.

28. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means; a moving member adjacent the pattern driven from the perforating mechanism at substantially the speed desired for the pattern; and means

controlled conjointly by said moving member and pattern and operatively connected with the train arm of said epicyclic gear train to synchronize the speed of the pattern with the perforating mechanism.

29. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means adapted to drive the pattern at less than synchronous speed with the perforating mechanism; and means to drive the train arm of said epicyclic gear train to synchronize the speed of the pattern and perforating mechanism.

30. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means adapted to drive the pattern at a non-synchronous speed relatively to the speed of the perforating mechanism; and means to drive the train arm of said epicyclic gear train to synchronize the speed of the pattern and perforating mechanism.

31. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means adapted to drive the pattern at less than synchronous speed with the perforating mechanism; and variable speed means to drive the train arm of said epicyclic gear train to synchronize the speed of the pattern and perforating mechanism.

32. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means adapted to drive the pattern at a non-synchronous speed relatively to the speed of the perforating mechanism; and variable speed means to drive the train arm of said epicyclic gear train to synchronize the speed of the pattern and perforating mechanism.

33. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means adapted to drive the pattern at less than synchronous speed with the perforating mechanism; and variable speed means controlled conjointly by the perforating mechanism and the pattern and operatively connected with the train arm of said epicyclic gear train to synchronize the speed of the pattern and perforating mechanism.

34. In a perforating machine the combination of perforating mechanism; selecting mechanism including a pattern; feeding means for the pattern; an epicyclic gear train connecting said perforating mechanism and pattern feeding means adapted to drive the pattern at a non-synchronous speed relatively to the speed of the perforating mechanism; and variable-speed means controlled conjointly by the perforating mechanism and the pattern and operatively connected with the train arm of said epicyclic gear train to synchronize the speed of the pattern and perforating mechanism.

35. In a perforating machine the combination of feeding means for note sheet material; feeding means for a pattern; means to synchronize said feeding means; punch selecting mechanism including, a pneumatic; punching mechanism including a reciprocating punch carrying cross head; a punch selector mounted in said cross head; a flexible cable connecting said pneumatic and said punch selector; and a flexible push rod inclosed within said cable.

36. In a perforating machine the combination of a reciprocating cross head; punches and punch selectors carried thereby; motor pneumatics for said punch selectors; flexible cables connecting the stationary boards of said pneumatics with said cross head; and flexible push rods within said cables and connecting the movable boards of said pneumatics with said punch selectors.

37. In a perforating machine, a punch selecting device comprising a series of motor pneumatics; flexible cables connecting each of said motor pneumatics with its respective punch selector; and flexible sleeves for said cables.

In testimony whereof, I have signed my name to this specification this 24th day of April, 1917.

CHARLES F. STODDARD.