

No. 847,740.

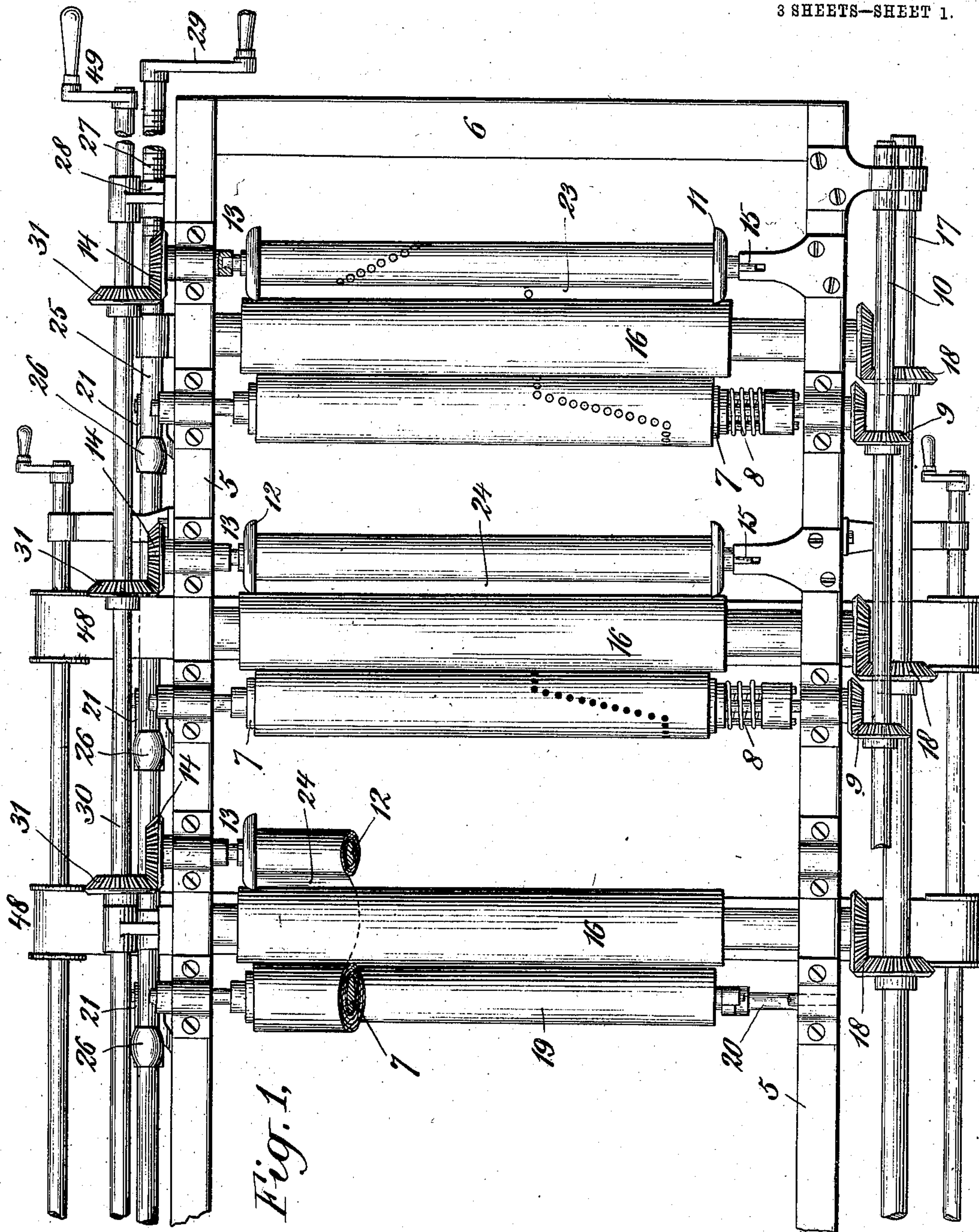
PATENTED MAR. 19, 1907.

B. S. DEAN.

MEANS FOR PRODUCING EXPRESSION MARKS ON MUSIC RECORD SHEETS.

APPLICATION FILED FEB. 21, 1906.

3 SHEETS--SHEET 1.



**WITNESSES;**

H. Crocker  
L. A. Rineb

INVENTOR

Benjamin A. Dean  
BY  
Chapin & Raymond  
his ATTORNEYS

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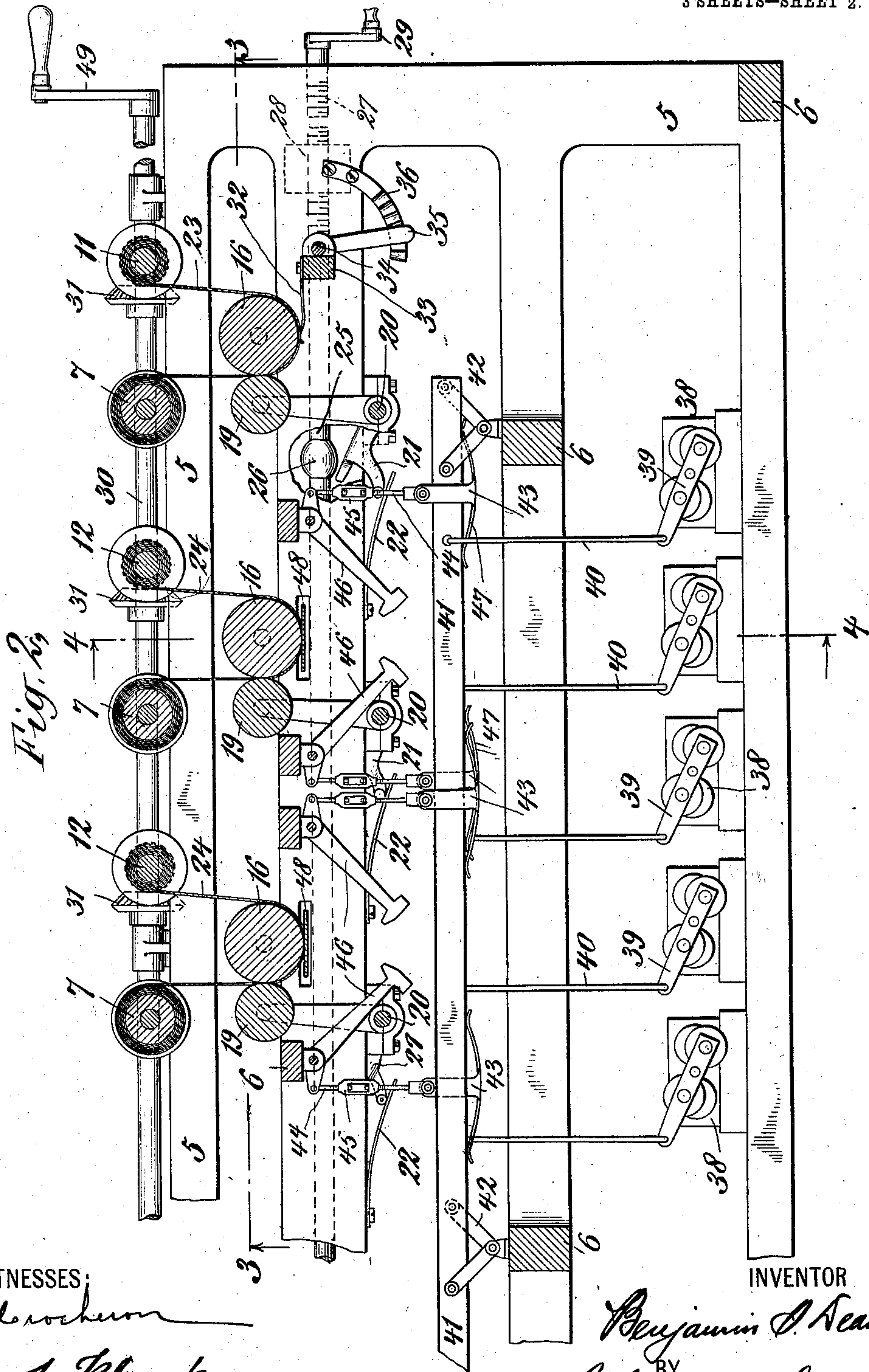


Fig. 2.

WITNESSES:

*H. Crocker*

*G. A. Kline*

INVENTOR

*Benjamin S. Dean*

BY

*Chapin & Raymond*  
ATTORNEYS



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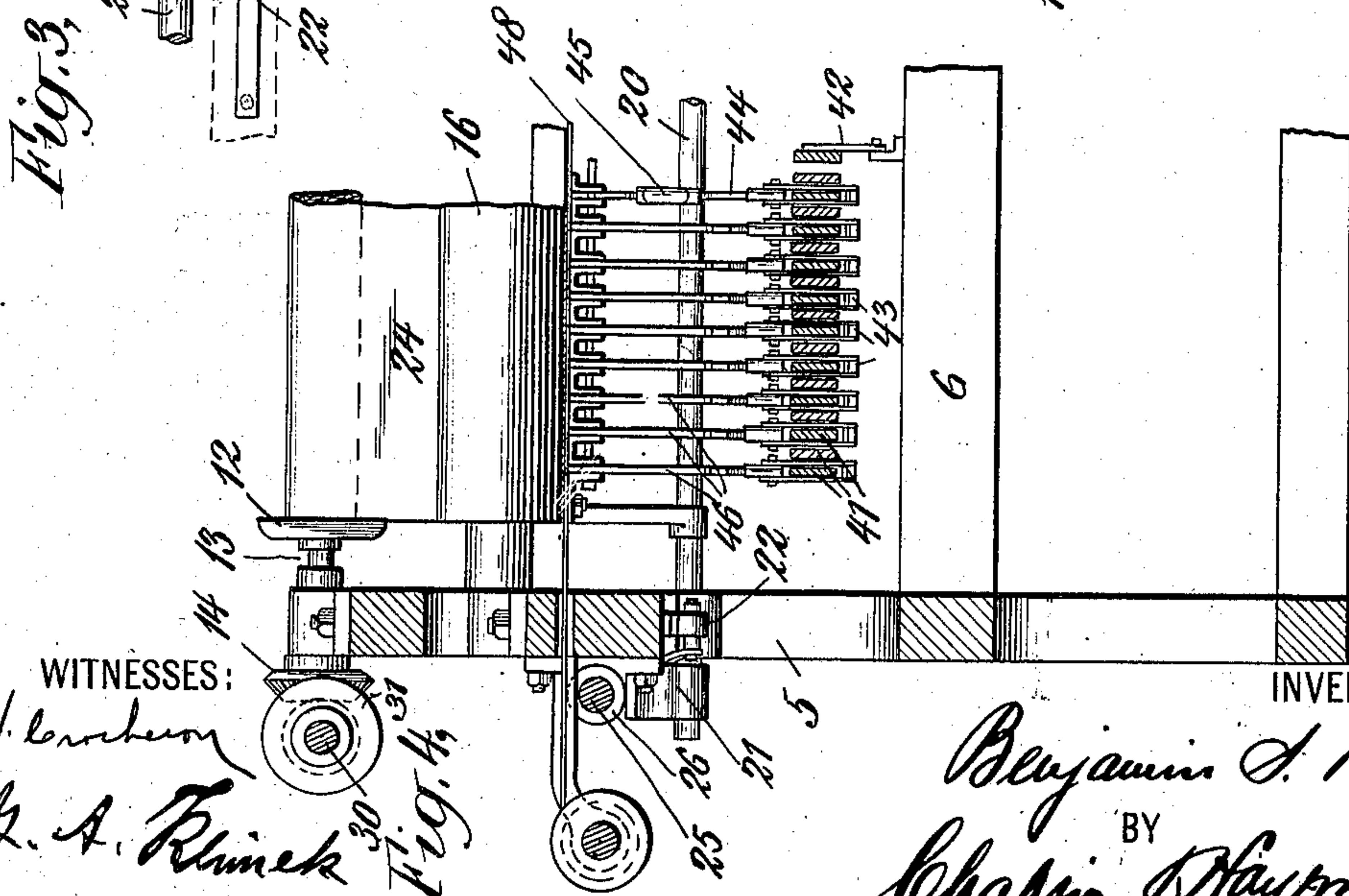
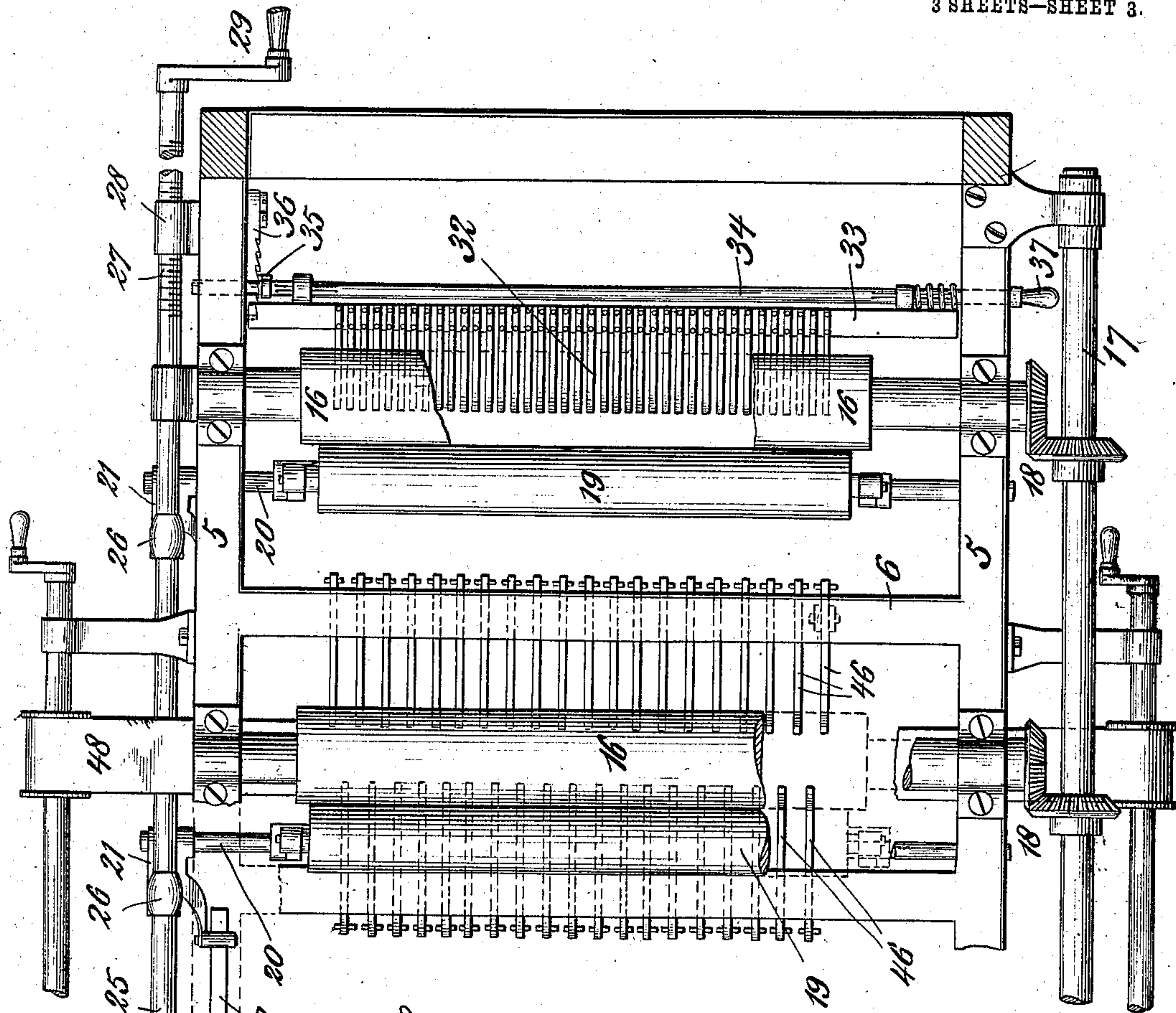
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3 SHEETS—SHEET 3.



WITNESSES:

*H. Crook*

*G. A. Rineck*

Fig. 4.

INVENTOR

*Benjamin S. Dean*  
BY  
*Chapin Haymont*  
ATTORNEYS



# UNITED STATES PATENT OFFICE.

BENJAMIN S. DEAN, OF SAN FRANCISCO, CALIFORNIA.

MEANS FOR PRODUCING EXPRESSION-MARKS ON MUSIC RECORD-SHEETS.

No. 847,740.

Specification of Letters Patent.

Patented March 19, 1907.

Application filed February 21, 1906, Serial No. 302,179.

*To all whom it may concern:*

Be it known that I, BENJAMIN S. DEAN, a citizen of the United States of America, and a resident of San Francisco, county of San Francisco, State of California, have invented certain new and useful Improvements in Means for Producing Expression-Marks on Music Record-Sheets, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to means for producing expression-marks on music record-sheets of the kind employed in connection with self-playing musical instruments and musical-instrument players.

The main object of my invention is to produce such marks rapidly, inexpensively, and accurately upon a number of sheets at a time, and to effect this I employ an apparatus controlled by means of a previously-prepared master or pattern sheet, said pattern-sheet adapted to electrically or otherwise control a number of printing devices arranged to simultaneously operate upon a plurality of record-sheets, the feed for the record-sheets being synchronized with the feed for the controlling master or pattern sheet. It has been the general custom heretofore to produce such marks by the use of stencils or by means of a device guided by hand. Either of these methods is very much slower and more expensive than that of my present invention, as will be well understood.

My invention also consists in certain improved details of construction and combination of parts in an apparatus specially designed for carrying out this invention, as will be more specifically pointed out hereinafter.

In order that my invention may be fully understood, I will now proceed to describe an apparatus in which the invention is embodied, and will then point out the novel features in claims.

In the drawings, Figure 1 is a top view of a part of an apparatus embodying my invention, with certain parts broken away and other parts removed. Fig. 2 is a view in central vertical longitudinal section thereof. Fig. 3 is a view in horizontal section on substantially the plane of the line 3 3 of Fig. 2. Fig. 4 is a view in transverse section of a portion of the machine, the plane of section being substantially upon the line 4 4 of Fig. 2.

The apparatus is supported by a framework composed of side frames 5 and transverse connecting elements 6. Mounted transversely upon the two side frames 5 are a plurality of take-up rollers 7, which are driven through friction connections 8 and miter-gearing 9 by a drive-shaft 10. The drive-shaft 10 derives its power from any suitable source. (Not shown herein.) Provision is made for mounting a roller parallel with each take-up roller 7, the roller adjacent the take-up roller at the extreme right-hand end of the machine, as shown, being a master or pattern sheet roller 11, while the rollers adjacent the other said take-up rollers, respectively, are record-sheet rollers 12. The rollers 11 and 12 are removable, being set into sockets at either end, the socket at one end 13 being connected to a miter-gear 14 and of such character as to bring the roller into driving relation with the said gear, while the other end 15 is dropped into a recess in which the roller has a free bearing.

Mounted beneath each pair of rollers and parallel therewith is a platen 16, all of the said platens being positively driven by means of a drive-shaft 17, with which they are in driving relation by means of suitable miter-gears 18. Idler presser-rolls 19 bear against the peripheries of the said platens 16, said presser-rolls being mounted to rotate freely in the ends of arms which are journaled in transverse shafts 20, said shafts 20 being provided with arms 21, spring-pressed by means of leaf-springs 22.

In operation a master-sheet 23 upon the roller 11 is threaded around the platen 16 with its end secured to the take-up roller 7. Record-sheets 24 upon rollers 12 are mounted in position, being wound around the platens 16 and connected at their forward ends to take-up rollers 7. The platens 16 are all arranged to have an exactly equal surface speed, and the said platens, with their presser-rolls 19, act as feeding means to uniformly feed all the sheets forward. The take-up rollers 7, which are driven through friction means 8, are arranged to be driven at a speed sufficient to always take up the amount of sheet fed to them—that is to say, the driving means therefor is driven at a slightly higher rate of speed than is ever necessary, the rollers 7 themselves having such speed transmitted to them through the friction devices as is permitted by the feed of the sheets.



thereto. The foregoing arrangement insures accurate register and synchronous feeding of the sheets at all times.

In order to provide for withdrawing all the presser-rolls at one time from engagement with their respective platens, so as to put the machine in condition for removing or inserting record and master sheets, I have arranged a cam-shaft 25 longitudinally upon the outside of one of the side frames 5, said cam-shaft provided with cam projections 26, arranged when the shaft is moved longitudinally to engage the arms 21, secured to the shafts 20, which carry the presser-rolls 19, and I have provided for the longitudinal movement of the cam-shaft 25 by screw-threading a portion thereof, as at 27, and mounting it in a correspondingly screw-threaded bearing 28, secured to the frame 5. A handle 29, fast to the end of the shaft 25, forms a convenient means by which the shaft may be rotated, so as to move same longitudinally in one direction or the other.

After the machine has run for a length of time sufficient to pay off all of the record and pattern sheets from the rollers 12 and 11 the drive may be stopped, the presser-rolls 19 freed by manipulation of the handle 29, and the record and patterns sheets 24 rewound upon their rollers 12 and 11. This is effected by means of a rewind-shaft 30 operated by a handle 49 or other means, said rewind-shaft having miter gear-wheels 31 in engagement with the miter gear-wheels 14 above mentioned. The pattern or master sheet 23 is provided with perforations corresponding in relative position with the expression-markings which it is desired to produce upon the record-sheets. Disposed beneath the first platen 16—that is, the platen 16, with which the said master or pattern sheet engages—are a number of spring-fingers 32, said fingers mounted upon and carried by a beam 33, mounted at 34, and provided with an arm 35, adapted to engage with notches in a quadrant 36. The beam is also provided with a hand-piece 37 (see Fig. 3) at the outside of the frame, by which it may be manipulated. In its operative position and in which it is shown in the drawings the spring-fingers 32 are arranged to bear against the master-sheet 23 and the platen 16, with which it is in engagement. The spring-fingers 32 comprise each an electrical conductor, and the surface of the roller 16 is arranged to be such as to close circuit through any or all of the said fingers when contact is made therewith. Thus whenever a perforation in the master-sheet 23 comes opposite a spring-finger electrical connection will be made with the individual spring-finger in register with the opening at that time, as will be well understood. These spring-fingers are arranged in electrical communication with electromagnets

38, arranged in the base of the machine, said magnets 38 having armatures 39 connected by means of links 40 with rocking-bars 41. In the present example of my invention there is one electromagnet 38 for every finger 32, and one rocking bar 41 for every electromagnet 38. Parallel movement of the rocking bars 41 is preferably enforced by means of links 42, upon which the said bars are mounted, as shown. Each bar 41 is connected by means of suitable connections, such connections herein comprising a saddle 43, a link 44, and an adjustable turn-buckle 45, with the operating-arms of pivoted impression-hammers 46. Each bar 41 is connected with one such hammer for each record-sheet to be operated upon, and while but two such record-sheets and parts for supporting and operating same are shown in the apparatus herein illustrated it will be understood that in an actual machine provision is made for operating upon very many more sheets at one time and that any number within reasonable limits may be operated upon at one time, as will be well understood. The saddle 43 is preferably connected by a spring portion 47 with the bar 41, so as not only to take up shock, but also to compensate for possible variations between the movements of the various hammers 46 connected thereto. There are two rows of hammers 46 for each record-sheet, one set mounted upon one side thereof and moving in one direction, while the other set is mounted on the other side thereof and moves in the other direction. This is in order to permit expression-marks to be made closer together than would be possible with only one row of hammers, the opposite rows of hammers being arranged in staggered or alternate relations with each other, as will be readily understood by reference to Fig. 3 of the drawings.

In the operation of the machine the master-sheet will cause the closing of circuit through selected fingers 32 in accordance with the position of the openings in said sheet, and the electromagnets 38 will be energized (from a suitable source of power) in accordance with the fingers 32 selected. This will effect movements of corresponding impression-hammers 46, wherewith to produce expression-marks upon the record-sheets 24 corresponding to the perforations in the master-sheet 23. Ink-ribbons 48 beneath all of the platens 16 except the first one supply the coloring material for marking the sheets when the impression-hammers 46 strike their blows. The ink-ribbons 48 may be fed gradually forward in any suitable and well-known manner.

From the foregoing it will be understood that once a master-sheet has been prepared having orifices corresponding to the perforation-markings desired to be produced such



expression-markings may be produced rapidly and accurately upon a large number of record-sheets simultaneously. These markings may be produced upon the sheets either before or after the music-controlling perforations have been made therein. It will be understood, of course, that there are no musical-controlling perforations in the master-sheet, the master-sheet being a special sheet cut for this particular purpose.

What I claim is—

1. In a machine for producing expression-marks on record-sheets, the combination with feeding means for a plurality of record-sheets, feeding means for a master or pattern sheet, synchronized in movements therewith, a set of pivoted hammers for each said record-sheet, a beam for connecting similar hammers of the several sets together, a yielding connection between the said hammers and beams, links pivoted to the beams for producing parallel movements thereof, electromagnets for operating the beams, and electric circuit-closing devices for the electromagnets controlled by the master-sheet.

2. In a machine for producing expression-marks on record-sheets, the combination with a plurality of feed-rollers arranged in parallel relation in a plane, one of the said feed-rollers adapted to be engaged by a master or pattern sheet, the others of said rollers adapted to be similarly engaged by record-sheets, a longitudinal drive-shaft therefor arranged at right angles to the axis of the said feed-rollers, bevel-gearing between the said drive-shaft and the feed-rollers, presser-rolls for pressing the sheets against the feed-rollers, take-up means for the sheets comprising rollers having a frictional drive at a high rate of speed, and means for producing expression-marks upon the record-sheets, controlled by the pattern-sheet.

3. In a machine for producing expression-marks on record-sheets, the combination with a plurality of feed-rollers arranged in parallel relation in a plane, one of the said feed-rollers adapted to be engaged by a master or pattern sheet, the others of said rollers adapted to be similarly engaged by record-sheets, a longitudinal drive-shaft therefor arranged at right angles to the axis of the said feed-rollers, bevel-gearing between the said drive-shaft and the feed-rollers, presser-rolls for pressing the sheets against the feed-rollers, means for simultaneously forcing all of the presser-rolls away from their respective feed-rollers to relieve the sheets from feeding engagement with the feed-rollers, take-up means for the sheets comprising rollers having a frictional drive at a high rate of

speed, and means for producing expression-marks upon the record-sheets, controlled by the pattern-sheet.

4. In a machine for producing expression-marks on record-sheets, the combination with a plurality of feed-rollers arranged in parallel relation in a plane, one of the said feed-rollers adapted to be engaged by a master or pattern sheet, and the others of said feed-rollers adapted to be similarly engaged by record-sheets, a drive-shaft arranged longitudinally opposite the ends of the said feed-rollers, bevel-gearing between the said drive-shaft and the said feed-rollers, presser-rolls for pressing the sheets against the said feed-rollers, take-up rollers for receiving the sheets from the respective feed-rollers, a longitudinal drive-shaft opposite the ends of the take-up rollers, bevel-gearing between the said longitudinal shaft and the take-up rollers, a frictional driving connection for the said take-up rollers, record and pattern sheet rollers for delivering the record and pattern sheets to the feed-rollers, a rewinding means for the said delivery-rollers comprising a longitudinal shaft opposite the ends of the said delivery-rollers, bevel-gearing between the said delivery-rollers and the said longitudinal shaft, and means for producing expression-marks upon the record-sheets, controlled by the pattern-sheet.

5. In a machine for producing expression-marks on record-sheets, the combination with feeding means for a record-sheet comprising a positively-fed roller which the sheet engages, and a presser-roll for pressing the sheet against the said roller, a take-up means for the sheet comprising a roller having a frictional drive at a high rate of speed, a master or pattern sheet similarly driven, and means for producing expression-marks upon the record-sheet controlled by the pattern-sheet.

6. In a machine for producing expression-marks on record-sheets, the combination with feeding means for a record-sheet comprising a positively-fed roller which the sheet engages, and a spring-pressed roll for pressing the sheet against the said roller, similar means for feeding a master or pattern sheet, means for simultaneously forcing all of the said presser-rolls away from their respective feed-rollers, marking devices for operating upon the record-sheets, and means controlled by the master-sheet for governing the marking devices.

BENJAMIN S. DEAN.

Witnesses:

THAW MALIN,  
JAS. A. TISDALL.