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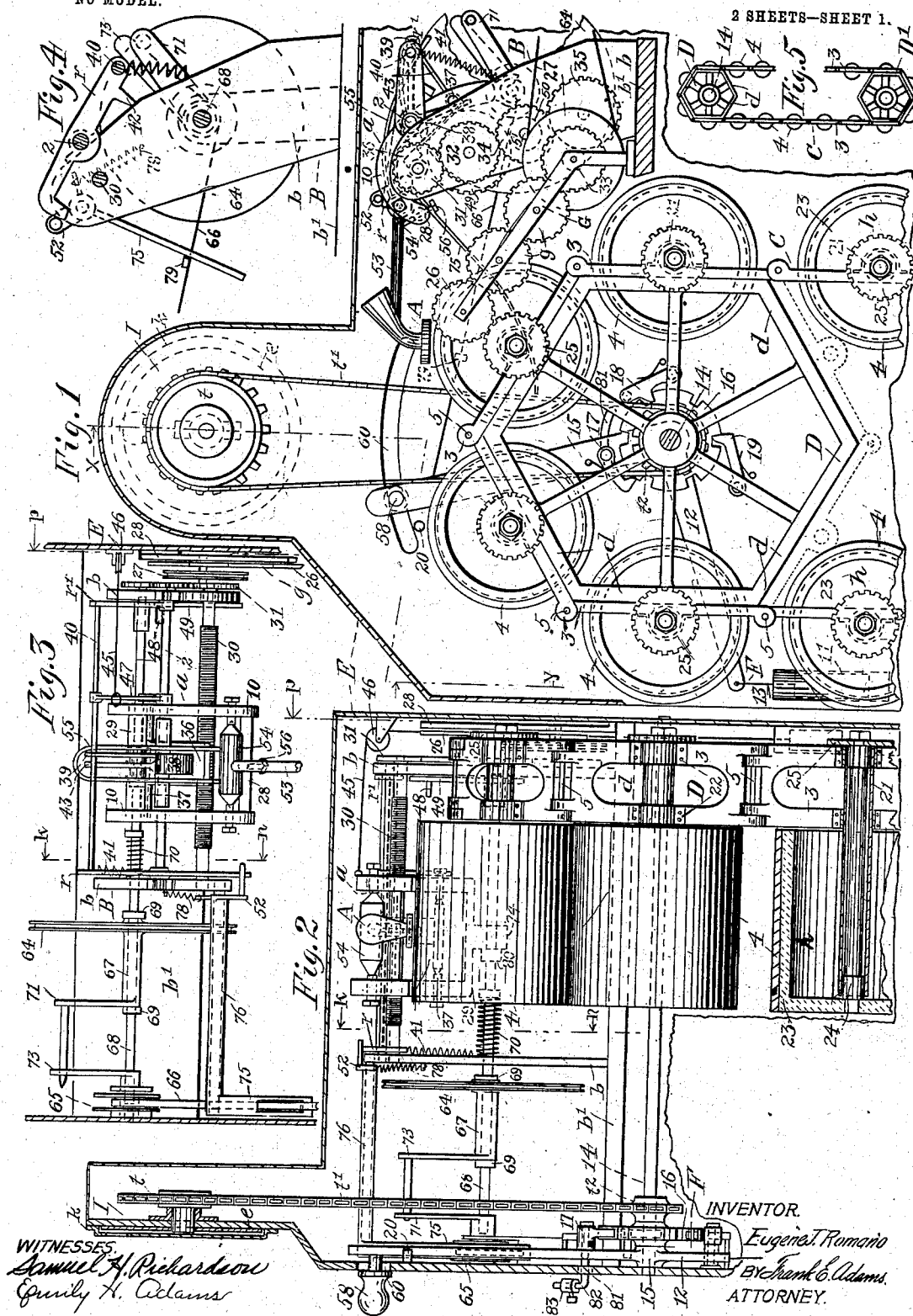
E. J. ROMANO.

INSTRUMENT FOR RECORDING AND REPRODUCING SOUND VIBRATIONS.

APPLICATION FILED FEB. 21, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES.
Samuel H. Richardson
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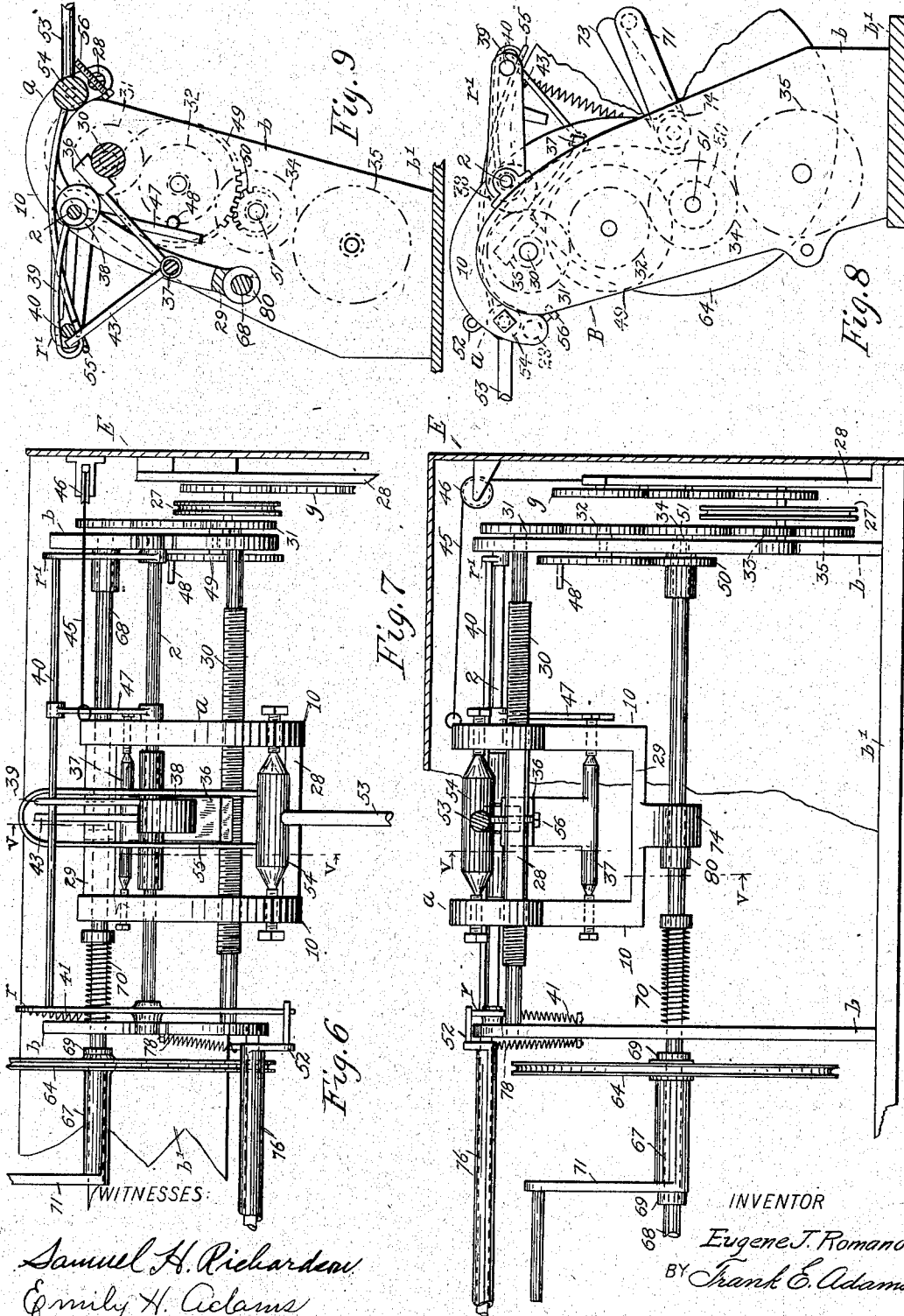
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UNITED STATES PATENT OFFICE.

EUGENE JOSEPH ROMANO, OF SEATTLE, WASHINGTON.

INSTRUMENT FOR RECORDING AND REPRODUCING SOUND-VIBRATIONS.

SPECIFICATION forming part of Letters Patent No. 729,798, dated June 2, 1903.

Application filed February 21, 1901. Serial No. 48,305. (No model.)

To all whom it may concern:

Be it known that I, EUGENE JOSEPH ROMANO, a citizen of the United States of America, and a resident of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Instruments for Recording and Reproducing Sound-Vibrations, of which the following is a specification.

My invention relates to instruments for recording and reproducing sound-vibrations, and in the present embodiment has special reference to devices of the nature above mentioned classified as "multiple-tablet" graphophones.

Among numerous desirable objects attained by my invention and readily comprehended from the accompanying drawings and following specification is a multiple-tablet carrier of variable and comparatively unlimited capacity, simple and inexpensive construction, and positive and reliable action, simplified and effective means for operating the tablet-carrier, like mechanism for controlling the correlative movements of the reproducer, and preferred structural features incidental to the embodiment of the objects.

With reference to the drawings heretofore mentioned and included as a part of this specification, Figure 1 is a vertical transverse section of the upper portion of a case on lines *p* of Figs. 2 and 3, disclosing the mechanism of the instrument as preferably embodied and viewed as the arrows fly. Fig. 2 is a similar section on lines *x y* of Fig. 1 looking as the arrows indicate. Fig. 3 is a plan view of the mechanisms with the tablet-carrier and attendant parts removed. Fig. 4 is a vertical transverse section, on large scale, taken on line *k n* of Fig. 3, indicating portions of the mechanism adapted to automatically control the reciprocative movements of the carriage. Fig. 5 is a side elevation of the tablet-carrier, on reduced scale, indicated with a portion broken away. Fig. 6 is a similar view to Fig. 3, on large scale. Fig. 7 is a rear elevation of the parts disclosed in same, on like scale. Fig. 8 is an elevation of the right-hand end of Fig. 7 with the case removed, and Fig. 9 is a sectional elevation on lines *v* of Figs. 6 and 7 viewed as the arrows indicate.

Like characters of reference indicate corre-

sponding parts throughout the several views of the drawings.

In the preferred embodiment of my invention the reference character A indicates a reproducer of any suitable or ordinary construction which is conveniently rendered operative for the inscription or transcription of a tablet brought to cooperate therewith and is preferably supported from a reciprocable carriage, as *a*, slidably mounted upon a way, as 2, fixed in a suitable frame B.

Related to the reproducer is a movable tablet-carrier C, whose travel, as first considered, involves a movement of the mounted tablets parallel a plane radial to their own axes and comprehends any form of a device rendered operative to move the mounted tablets in a straight course during displacement or replacement.

As now considered pliability is incorporated in the construction of the tablet-carrier to conveniently render it mountable in various ways, and in the present instance the carrier comprises a belt. This belt is preferably composed of a series of interlocking units, as links 3, which conveniently render the carrier extensible and contractible to vary the capacity thereof, and as such embraces any form of a carrier rendered adjustable for the exclusion or inclusion of tablets. Each of the units 3 is preferably adapted to carry a single tablet, as 4, and is conveniently rendered detachable from the series by means of removable pintles 5, which are included in suitable hinge-joints adapted to connect the units in any ordinary or suitable manner. The carrier is thus rendered both separable and pliable and made to include, in addition to variability in capacity, divisional features comprehending the separation of the carrier into sections which shall individually embrace any desired number of tablets for the inscription or transcription of a prolonged series of sound-waves.

The tablet-carrier is conveniently mounted in cooperative relation with a reproducer, as A, upon a rotatable wheel, as D, Fig. 1, which also preferably embodies features for driving the carrier, and comprehends any suitable device adapted for the support of a tablet-carrier, as stated, or to perform the functions of a driver therefor when operated.

As such, the mount includes a pulley of the preferred form shown, having a polygonal rim conveniently composed of a series of planes, as *d*, individually conforming in length to a unit of the carrier, whose movements are thus rendered positive.

As now considered the tablet-carrier embraces any plurality of units, including a minimum number required to form a continuous series or rim about the mount *D*, which in the present embodiment requires six. When the carrier is extended to accommodate a comparatively greater number of tablets, a suitable idler, as *D'*, Fig. 5, of substantially like form to the mount *D*, is conveniently positioned in any desired manner (not shown) at a point more or less remote, in conformity to the carrier's length, and serves to guide the same. Likewise other idlers can be placed at divergent points to guide the carrier in a sinuous course as permitted by its pliability and readily understood, and thereby support it in any length and comparatively small space.

The wheel *D* is conveniently poised in relative position to the reproducer *A* by fixing it upon a shaft 14, suitably journaled to a case, as *E*, and preferably intermittently rotated by a suitable gravity-motor, as *F*. This motor comprises in the present instance a bell-crank 15, which is conveniently pivoted on said shaft, and a weighted cord 13, attached to an arm 12 of the crank, and the device is operatively engaged with said shaft for intermittent actuation thereof by a pawl-and-ratchet contrivance, consisting of a ratchet, as 16, fixed on the shaft, and a pawl 17, pivoted to the bell-crank in operative relation to the ratchet, whereby a forced movement of the bell-crank against gravity will ride the pawl over the ratchet, and upon expulsion of said force the pawl will engage the ratchet to drive the shaft a predetermined part of a revolution, as promoted by the fall of a suitable weight 11, attached to the cord 13, and as determined by a suitable stop 20 in the path of the returning crank.

Suitable operative dogs, as 18 and 19, are pivoted to the case *E* to engage the ratchet 16 and conveniently hold the mount steady during the setting of the gravity device for movement of the carrier. As the device is set the dog 18 is conveniently disengaged by the bell-crank 15 contacting same and forcing it to swing free of the ratchet as the pawl 17 engages therewith. The pawl 19 will then be forced to ride, as the gravity device acts to impel the mount to travel a predetermined distance, relatively conforming to the spacing of the tablets and fixed by the stop 20.

If desired, the instrument can be conveniently rendered adjustable so as to automatically repeat the transcription of the same tablet by fixing the pawl 17 to its pivot and extending same through a suitable slot 81 in the case, Fig. 2, and providing an arm 82 on the outer end of the pivot carrying an ad-

justable counterweight 83, adapted to hold the pawl from engagement with the ratchet 16 when set at the outer end of said arm.

The gravity-motor is conveniently set for operation of the tablet-carrier by force auxiliary to that driving the instrument and conveniently applied either manually or automatically to move the bell-crank 15 against gravity of the weight 11. The auxiliary force is conveniently applied in the former instance through the medium of a knob 58, attached to said crank and projecting from a suitable slot 60 of the case *E*, and in the latter instance through suitable clutch mechanism operated by a motor. This mechanism is brought into coöperative relation to automatically set the gravity device by the action of movable mediums controlled by the driving mechanism impelling the tablets to rotation and the reproducer to productive travel, as will be understood from the following:

Inasmuch as the primary object of the tablet-carrier is to bring a tablet into coöperative relation with the reproducer and to then displace it when it shall have been traversed, it is obvious that the tablet can be mounted in various ways; but in the present embodiment it is preferred that the carrier shall also be made to support the tablets, and in view of this tablets, as 4, are suitably positioned on rotatable mandrels, as *h*, said mandrels having suitable axles 24, which are operatively mounted in tubular bearings 21, fixed transversely the units or links 3 by straps 22 or other suitable means and projected to one side of the units as desired to journal the mandrels.

The mandrels are each preferably composed of a drum, as 23, upon which a tablet is removably seated in any usual manner and has a single end, to which an axle 24 is fixed. This axle is of convenient length to pass entirely through any one of the tubular bearings 21, so as to connect with suitable means for the rotation of the tablet, said means comprising in the present instance a spur-gear, as 25, fastened to said axle, and a driver therefor, as 26, which gears are coöperatively engaged when the respective tablet is brought into coöperative relation with the reproducer.

The driver 26 is preferably mounted on a suitable pivot supported by a fixed arm, as *G*, and is conveniently rendered continuously operative during productive travel of the reproducer, being in the present embodiment actuated by a train of gears *g*, individually pivoted to said arm and driven by any suitable common means, as a pulley and belt 27, which transmit power from a motor of any desirable class and are also conveniently used to drive the carriage of the reproducer, as set forth in the following:

The carriage *a* may comprise any suitable or ordinary form, but preferably consists of curved side pieces, as 10, conveniently connected at the ends by ties, as 28 and 29, whereby they are rigidly joined for the support of

the reproducer, and instrumentalities for effecting automatic reciprocative action of the carriage along the way 2, which way is fixed to suitable end pieces *b* of the frame B, mounted on a base *b'*, supported by the case E.

30 indicates the ordinary drive-screw for imparting productive movements to the reproducer and which is journaled in the frame B and mounts a gear 31 exterior thereof. This gear meshes with a suitable train consisting of spurs 32, 34, and 35, which are pivoted to said frame and operatively coupled to the spindle of the driving-pulley 27 by a gear 33, fixed thereto in coöperative relation with the gear 35, whereby the screw 30 is actuated relatively to rotations imparted to a tablet by the gear-train *g*.

A part-nut, as 36, formed to fit the thread of the drive-screw 30, is conveniently mounted in the carriage *a* at the free end of a suitable arm supported by a pivot 37 and is applied to the screw by a suitable cam 38, conveniently pivoted in the carriage and adapted to force the nut to engage with the screw to drive the carriage.

The cam 38 is operated by lateral movements of a bar, as 40, to which it is operatively connected by a stem 39, and said bar is supported transversely the frame B at the free ends of suitable rock-arms, as *r* and *r'*, which are for convenience pivoted to the extremities of the way 2 and when raised cause the bar to move the cam to apply the part-nut and when lowered to operate the same and release the nut.

To insure disengagement of the part-nut as the bar 40 falls, a stem 43 is connected to the arm thereof and slidably engaged with said bar, so as to swing the nut free of the drive-screw as the cam is operated to release same.

The reproducer A is preferably supported at the free end of an arm, as 53, extending laterally from a rotatable hub 54, which is suitably pivoted transversely the carriage *a*, so as to poise the reproducer over the tablet-carrier in coöperative relation with a tablet. Fixed to the hub 54 is a stem 55, which is extended to engage the bar 40 for disengagement of the reproducer from the tablet as the bar falls and to permit it to return by gravity to engage the tablet as the bar is raised, and a screw, as 56, is adjustably engaged with the tie 28 of the carriage to support the arm 53 when lowered and is adapted to adjust the reproducer and secure proper coöperative position thereof with relation to the tablet. As the carriage rests in initial position the bar 40 is automatically raised to advance the same by the movement of an angle-lever 47; which is conveniently fulcrumed on the carriage with one extremity slidably engaged with the bar by a suitable bifurcation and the other pendent in the path of a movement of a suitable stud 48. This stud is preferably mounted on a gear 49, which is pivoted to the frame B and driven by a gear 50, fixed on the axle 51, to which the gear 34 of the drive-

screw train is attached, and thereby brought to contact with the pendent arm of the angle-lever to raise said bar as the drive-screw 30 is rotated, when a suitable catch, as 52, preferably located at the opposite end of the frame, is conveniently forced by a spring 78 to engage the rock-arm *r* and secure the bar in raised position with the part-nut engaging the drive-screw and the reproducer engaging the tablet.

The catch 52 is automatically tripped to disengage it from the rock-arm *r* as the gravity device F is set, whereupon a spring, as 41, will then act to return the bar 40 to its lowered position, and thereby disengage the part-nut 36 from the screw and raise the reproducer free of the tablet, when the carriage is free for retraction by any suitable means, as weighted cord 45, attached thereto and passed over a pulley 46 and acting to return the carriage to initial position as the gravity device actuates the tablet-carrier to replace the transcribed tablet.

The catch 52 is preferably tripped automatically by applying thereto the force employed to set the gravity device for actuating the carrier simultaneously with the expulsion of said force occurring at the termination of the productive travel of the reproducer. This trip is conveniently accomplished when the device is set manually by rendering said catch operative by the bell-crank 15 as it reaches advanced position through the medium of an arm 75, extended to lie in the path of travel of said crank from a rotatable sleeve, as 76, which carries the catch and is preferably pivoted to the frame B in coöperative relation with the rock-arm *r*. Thereby the crank when advanced will strike the arm and trip the catch for the fall of the bar 40, thus permitting productive travel of the reproducer to be terminated when desired by advancing the bell-crank.

The auxiliary force to automatically set the gravity device is applied from a suitable motor through a pulley, as 64, which is conveniently made to intermittently actuate suitable means adapted to impel the bell-crank 15 to move against gravity of the weight 11, said actuations being suitably controlled by clutch mechanisms operated by and during the travel of the carriage *a*.

Attached to the bell-crank is a tape, as 66, also attached to a reel 65, which is mounted in suitable bearings and rendered rotatably operative to wind the tape by means of clutch mechanism intermittently operated by the pulley 64 as determined by the advance of the carriage *a*. The pulley 64 is conveniently fixed to a sleeve 67, loosely mounted between fixed collars 69 on a shaft 68, which is mounted transversely the frame B and is free for reciprocative rectilinear movements as promoted by the advance of the carriage *a* and retractive action of a spring, as 70, confined between a collar fixed to the shaft and one side piece of the frame B. Fixed to the sleeve

67 is a suitable clutch in the form of a crank 71, carrying an extended pin adapted to engage with an arm 73, fixed to the reel 65, so as to cooperate with said pin when advanced by a longitudinal movement of the shaft 68. This shaft is conveniently moved by the carriage at a predetermined time by means of a lug, as 74, on the cross-tie 29 of the carriage and a collar, as 80, fixed to the shaft in the path of travel of the lug.

Upon the tape 66 is adjustably fixed a button 79, which is adapted to automatically trip the catch 52, Fig. 4, after a predetermined portion of the tape has been taken up on the reel relative to the desired length of travel of the carriage *a*. This is conveniently accomplished by passing the tape through a suitable slot in the arm 75, so that the button will come in contact therewith, and thereby effect automatic release of the carriage for retraction as the gravity device *F* is set and irrespective the contact of said arm and crank, when the spring 70 will retract the shaft 68 and disconnect the clutch between the pulley 64 and the reel, permitting the gravity of the weight 11 to actuate the tablet-carrier during the return of the carriage to initial position.

The character *I* refers to a suitable indicator by which the relative position to the reproducer of any one of a predetermined number of a tablet is disclosed. This indicator comprises a suitable rotatable dial *e*, preferably located exterior the case *E* and fixed to a suitable axle extending into the case and carrying a sprocket-wheel, as *t*, which is operatively involved with the movements of the tablet-carrier by means of a chain *t'* and a suitable sprocket-pinion *t''*, fixed to the shaft 14. Over the face of the dial is a cover *k*, having a suitable aperture to display characters placed on the face of the dial, each character indicating an individual tablet and being placed relatively to the position of the tablet on the carrier to indicate when displayed that the tablet designated is in cooperative relation with the reproducer.

An operation of the instrument occurs substantially as follows: The desired number of tablets for inscription or transcription are first selected and the carrier adjusted to include corresponding mandrels therefor and then operatively engaged with the mount, which is then rotated to cause a selected tablet to lie in cooperative relation with the reproducer and the gear of the respective tablet to engage with the driving mechanism. Granting initial position of the carriage *a*, power is applied to actuate the drivers 27 and pulley 64, whereupon the selected tablet and the driver-screw 30 will be caused to simultaneously rotate and the crank 71 to revolve. The angle-lever 47 will be likewise actuated by the revolving stud 48, and thereby made to raise the bar 40, which in turn actuates the cam to force the part-nut to engage the

drive-screw and likewise permit the reproducer to drop and engage with the rotating tablet, while the screw simultaneously drives the carriage to traverse the reproducer thereacross, as in any ordinary instrument of this class. As the reproducer approaches the termination of its productive travel the carriage shifts the shaft 68 to engage the clutch between the pulley 64 and the reel, which in turn winds the tape to set the gravity device until the button 79 trips the catch 52. The bar 40 is then lowered, disengages the part-nut from the screw, and also raises the reproducer, whereupon the weighted cord 45 retracts the carriage and the spring 70 acts to disengage the clutch on the wheel. After this the gravity device is free to act to replace the tablet, followed by a succeeding productive travel of the reproducer occurring as before.

From the above description it will be understood that the instrument operates automatically throughout and is continuously productive during application of driving power in accordance with the multiplicity of tablets involved with the carrier, which can be extended at will by introducing additional units. This carrier can also be divided into sections including a predetermined number of units, which sections are contained in the instrument either singly or collectively.

If desired, the instrument is rendered automatically operative for repeated transcription of the same tablet by shifting the weight 83 to hold the pawl 17 from the ratchet 16, in which event the gravity device fails to act to impel the carrier upon the return of the carriage.

By the term "reproducer," which I employ for brevity, I mean any device suitable for transmitting sound-waves to or from a tablet.

From the foregoing it will be understood that the tablet-carrier is conveniently impelled by a motor acting independently of the mechanism for driving the reproducer and relative tablet and that said motor is set for action by a force applied auxiliary to the force impelling said driving mechanism, thereby insuring steadiness of movement in the productive travels of the said reproducer and tablet, and thus rendering the instrument more perfect in operation.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tablet-carrier for use in phonographs and the like, said carrier being composed of sections detachably connected, and means upon said sections for supporting said tablets.

2. A tablet-carrier for use in phonographs and the like, said carrier comprising a flexible belt composed of detachable sections, and means on said sections for carrying tablets.

3. In a carrier mechanism for use in phonographs and the like, a rotatable mount, an idler adjustably related thereto, an extensi-

ble belt engaging said mount and idler, means on the belt to support tablets, and a driver for said belt.

4. In an instrument of the nature indicated; 5 the combination with a reproducer and driving mechanism; of a rotatable mount fixed in relation to said reproducer, an idler adjustable with relation to the mount, and a belt composed of detachable units having means for 10 carrying tablets fixed thereto.

5. The combination with a case and a multiple-tablet carrier; of a movable indicator mounted independently of the said carrier, and driving connection between said indicator 15 and said carrier.

6. The combination with a case and a rotatable multiple-tablet carrier; of a rotatable dial, a cover thereover having an aperture to display one of a series of characters on the 20 dial, a wheel fixed to the axis of said dial, a second wheel fixed to the axis of the carrier, and a belt.

7. In an instrument of the nature indicated; the combination with a reciprocatory reproducer-carriage, a rotary multiple-tablet carrier and driving mechanism; of a gravity-motor operatively connected to said carrier, intermittently-operative clutch mechanism to set the motor and driven by a force auxiliary to the force impelling said driving 30 mechanism, means operative by said carriage during productive travel to coöperatively connect said clutch mechanism, and means operative by said auxiliary force to release said carriage from the driving mechanism. 35

8. The combination with a movable tablet-carrier; of a ratchet operatively related thereto, a gravity bell-crank, a pawl pivoted to the crank to engage the ratchet as the crank operates in one direction, and means whereby 40 said crank is impelled against gravity.

9. The combination with a movable tablet-carrier; of a ratchet operatively related thereto, a gravity bell-crank, a pawl pivoted to the crank to engage the ratchet as gravity impels 45 the crank, means by which said crank is advanced against gravity, and means to secure said carrier from movement during advancement of the pawl.

10. The combination with a rotatable mount; of a ratchet operatively related thereto, a gravity bell-crank, a pawl pivoted to the crank to engage the ratchet as gravity 50 impels the crank, means by which said crank is advanced against gravity, a dog securing the ratchet from movement by said advance, a second dog likewise holding said ratchet from moving in the opposite direction and adapted to be tripped by said crank during 60 advance.

11. The combination with a frame, a carriage and a drive-screw; of a reproducer pivoted to said carriage and having a stem, a laterally-reciprocative bar mounted on said

frame in line with the travel of said carriage, 65 and engaging said stem, a part-nut pivoted to said carriage in coöperative relation with said screw having a stem slidably engaging the bar, and a cam operatively related to the said nut and having a stem also engaged 70 with said bar.

12. In an instrument of the nature indicated; the combination with a frame, a reciprocative carriage, a drive-screw, and a part-nut on the carriage to operatively engage 75 with said screw; of an angle-lever pivoted on said carriage and operatively coupled to said screw-engaging means, and a rotatable wheel pivoted to the frame and carrying a stud eccentrically to operate said lever. 80

13. In an instrument of the nature indicated; a movable tablet-carrier, a gravity-motor operatively connected thereto, a reel, a tape fixed to said reel and having connection with a member of said motor for moving 85 said member to set said motor as said tape is wound upon said reel, and means for winding said reel.

14. In an instrument of the nature indicated; a reciprocatory reproducer, a movable multiple-tablet carrier, mechanism to 90 drive said reproducer and relative tablet, a gravity-motor operatively connected to the carrier, a reel, a tape fixed to a member of the motor for setting same and to the reel, 95 and means operative by the tape as it is taken up on the reel to release the reproducer from said driving mechanism.

15. In an instrument of the nature indicated; a reciprocatory reproducer, a movable multiple-tablet carrier, mechanism to 100 drive said reproducer and relative tablet, a gravity-motor operatively connected to said carrier, a reel, clutch mechanism to operate said reel intermittently, a tape fixed to a 105 member for setting said motor and to the reel, and means operative by said driving mechanism to throw in said clutch mechanism.

16. In an instrument of the nature indicated; a reciprocatory reproducer, a movable multiple-tablet carrier, mechanism to 110 drive said reproducer and relative tablet, a gravity-motor operatively connected to said carrier, a reel, clutch mechanism to operate said reel intermittently, a tape fixed to a 115 member for setting said motor and to the reel, means operative by said driving mechanism to throw in said clutch mechanism, and mechanism operative by said tape as it is taken up on the reel to release the reproducer 120 from said driving mechanism.

Signed by me at Seattle, Washington, this 29th day of January, 1901.

EUGENE JOSEPH ROMANO.

Witnesses:

JOHN KELLEHER,
ROBT. E. WENZEL.