Oct. 2, 1962 F. W. SCHUELER ETAL 3,056,606

DICTATING MACHINE

Filed April 15, 1958 8 Sheets-Sheet 1

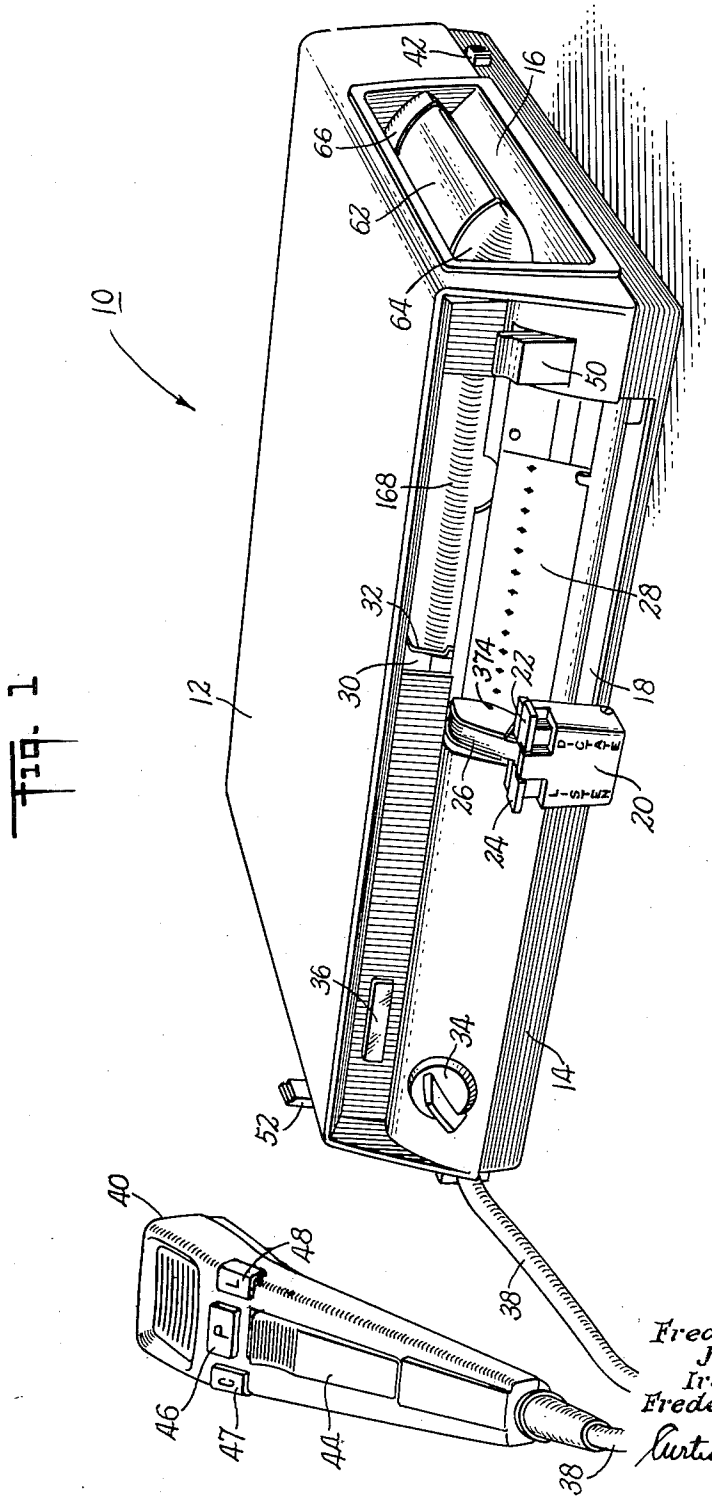

Fig. 1

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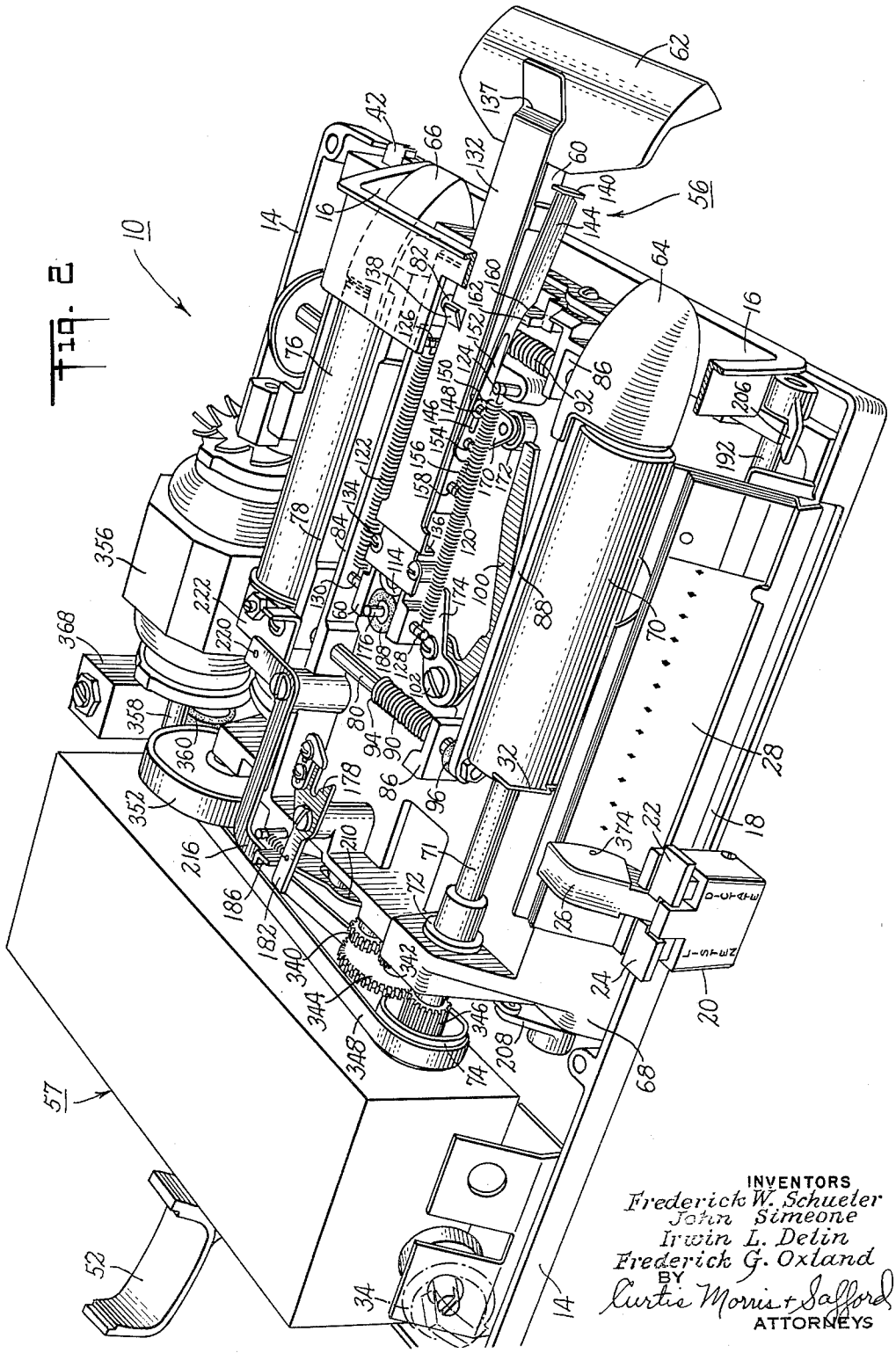
DICTATING MACHINE

Filed April 15, 1958 8 Sheets-Sheet 2

Fig. 2



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DICTATING MACHINE

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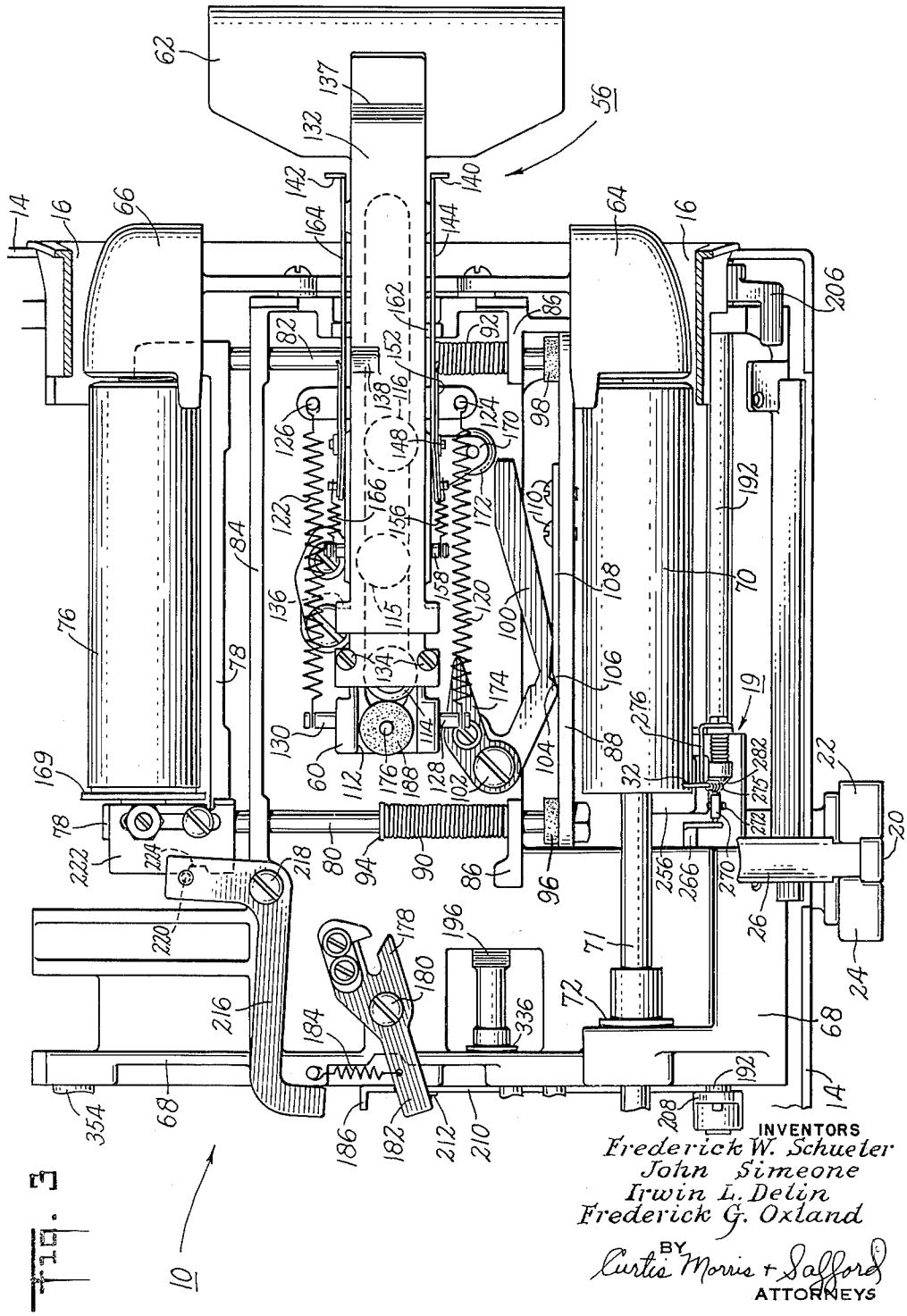

FIG. 3

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DICTATING MACHINE

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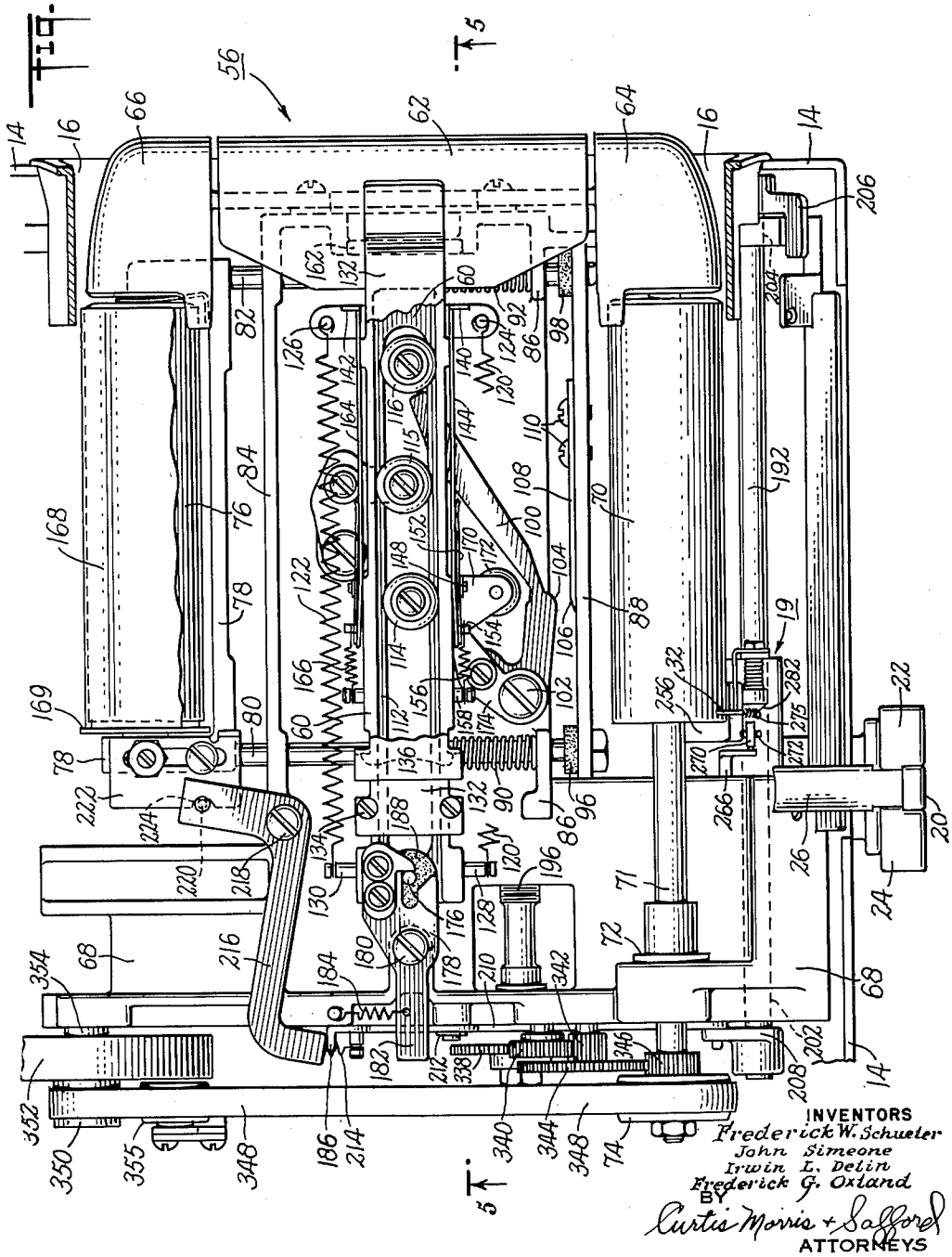
FIG. 4



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DICTATING MACHINE

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FIG. 5

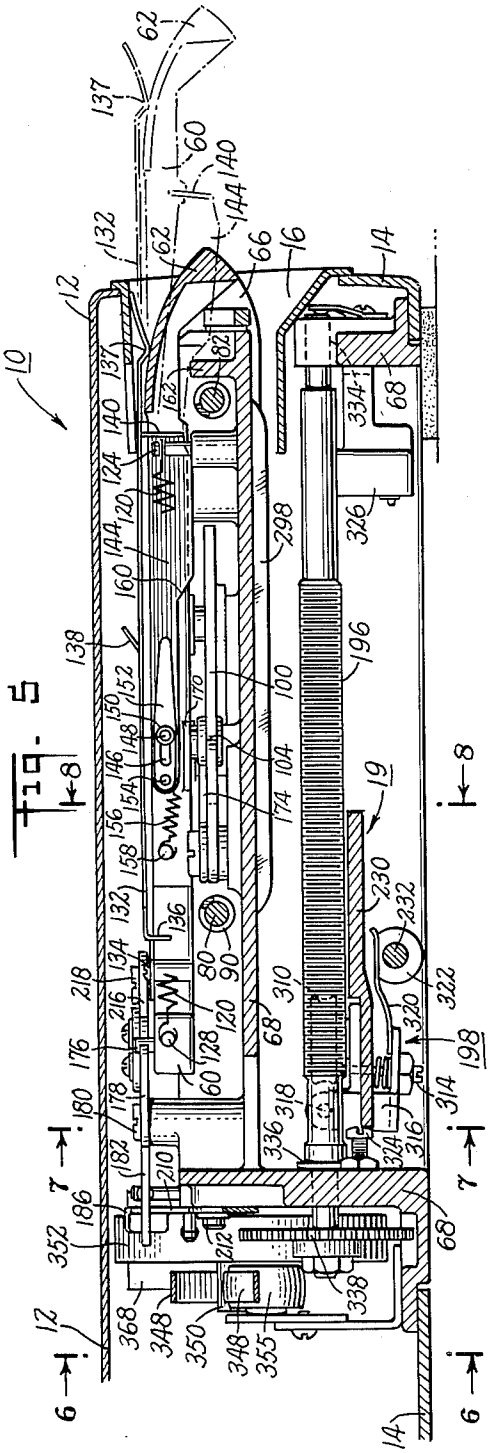
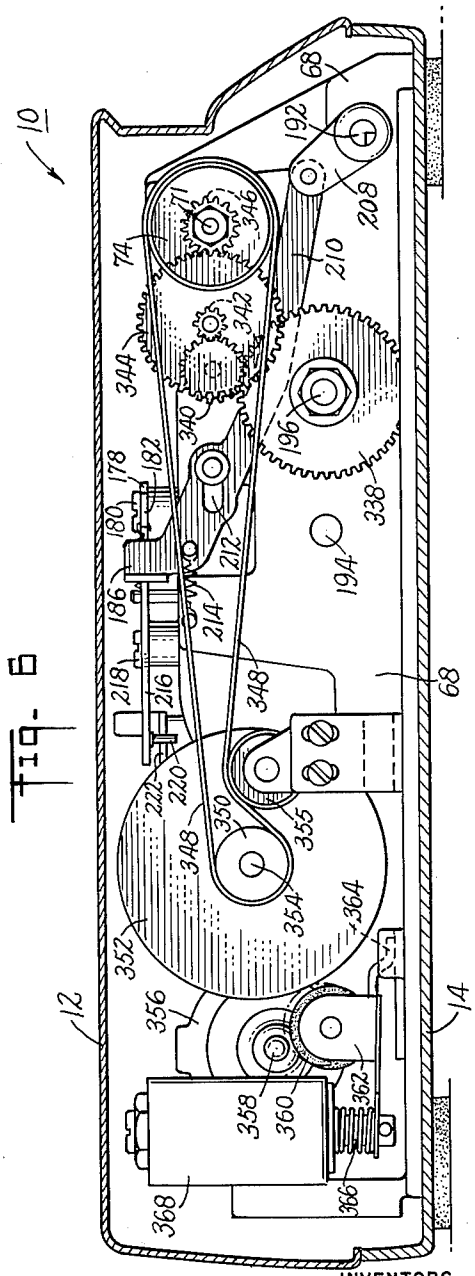


FIG. 6



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DICTATING MACHINE

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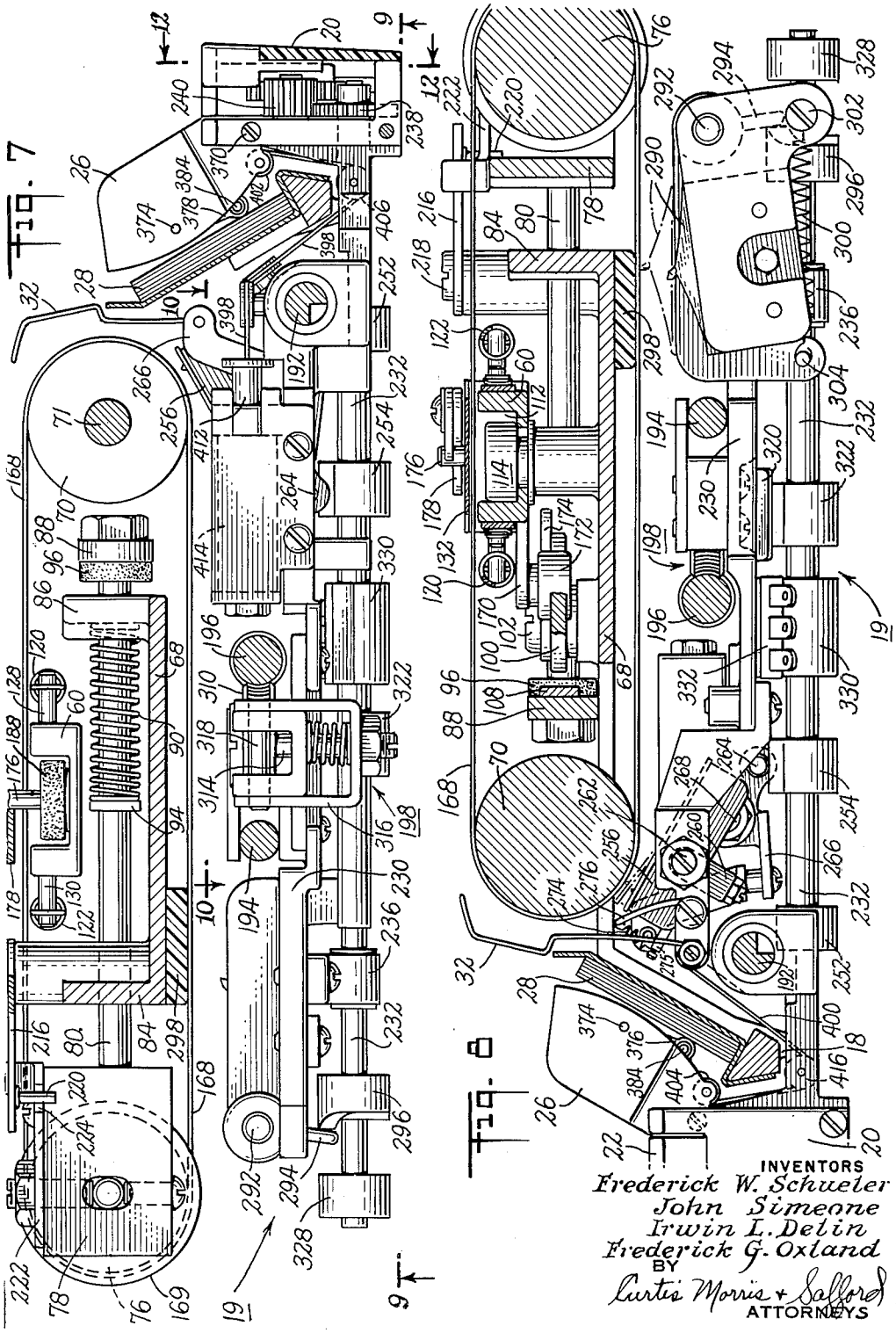

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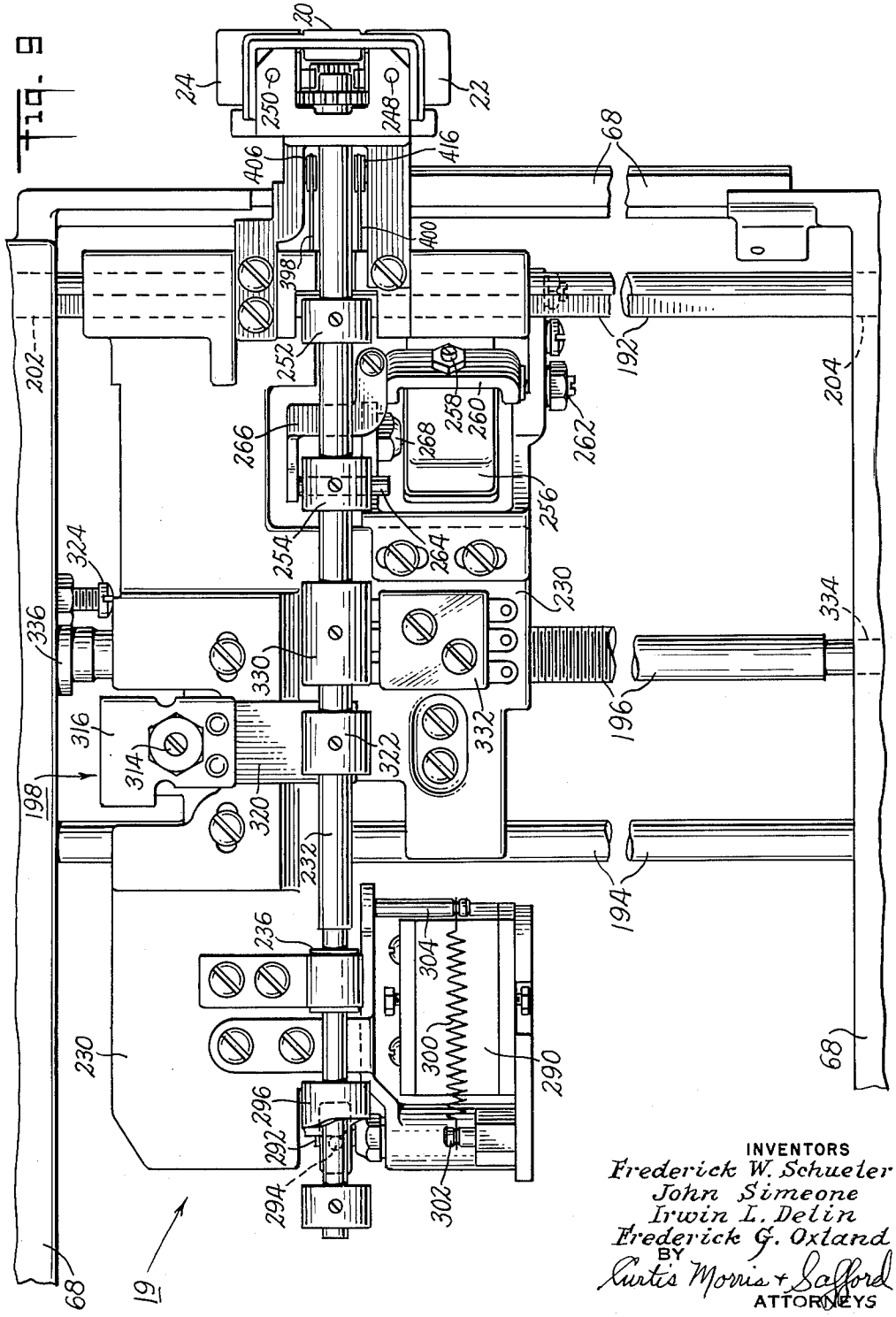
Fig. 9



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DICTATING MACHINE

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Fig. 10

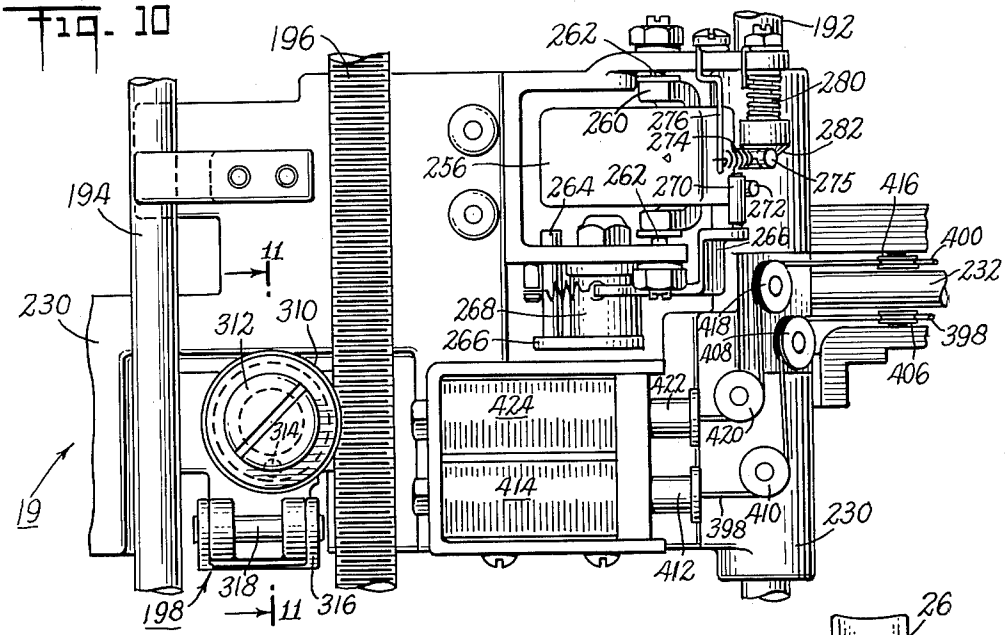


Fig. 11

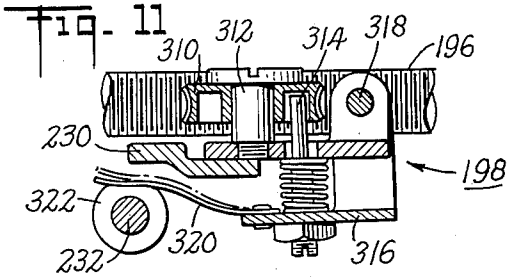


Fig. 12

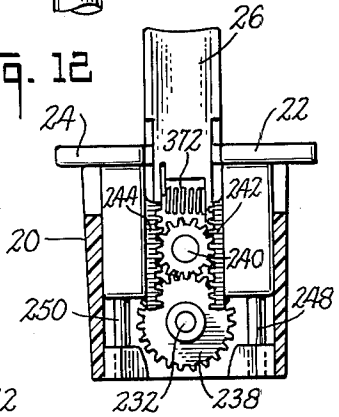
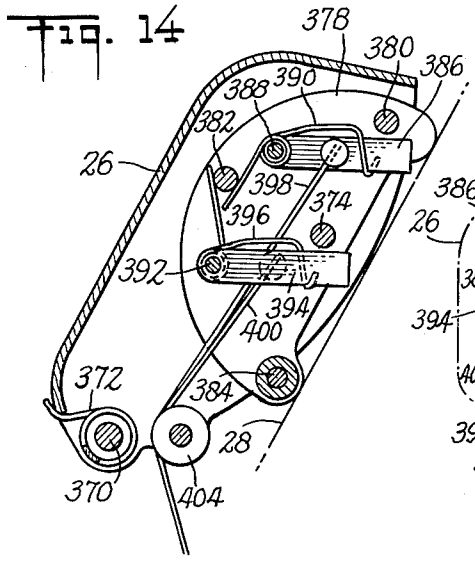


Fig. 14



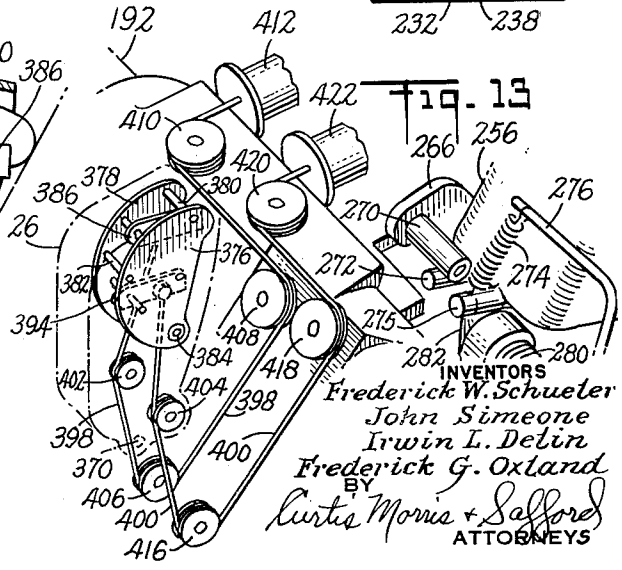


Fig. 13

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United States Patent Office

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3,056,606

DICTATING MACHINE

Frederick W. Schueler, Monroe, John Simeone, Milford, and Irwin L. Delin and Frederick G. Oxland, Bridgeport, Conn., assignors to Dictaphone Corporation, Bridgeport, Conn., a corporation of New York

Filed Apr. 15, 1958, Ser. No. 728,646
14 Claims. (Cl. 274—17)

This invention relates to a dictating machine.

An object of this invention is to provide a dictating machine which, though very compact, is unexcelled in its operating efficiency and convenience.

Another object is to provide a dictating machine which, while small in size, is very rugged and extremely reliable.

Still another object is to provide such a dictating machine which can be manufactured at reasonable cost.

A more particular object is to provide a dictating machine using a short wide belt record but having a housing much thinner than the actual diameter of the belt record.

These and other objects will in part be pointed out in and in part understood from the following description.

A dictating machine, because of the specialized service for which it is intended and to be of maximum assistance to the person using it, must possess certain unique abilities. Among these are the ease and simplicity afforded a person in handling a record used with the machine before, during, and after recording. Normally there is no need for a record having more than a certain amount of playing time, for example, fifteen minutes. Rather it is desirable to use records of limited length because it is easier and faster for a secretary to transcribe dictation from one short record while a second is being filled with dictation, than it is for her to wait and then transcribe a single record twice the length of two short ones. Now to obtain maximum advantage from short records, a dictating machine must be able to accept each one quickly and to use it in spite of innumerable starts and stops without wasting recording space. Then, it must be able just as quickly to discharge a finished record and accept a new one.

In order for a dictating machine to approximate as nearly as possible the ease and speed with which a secretary taking down dictation in shorthand can repeat a previous portion, the physical structure of the record used must lend every portion of itself to immediate playback by a reproducing head. This means that the record must be of the "area" type, such as a short wide belt or a flat disc, as distinguished from a "linear" type such as a long narrow tape or wire which would have to be wound backward to reach an earlier part. Of the two types of "area" records, the belt is preferred over the disc because recording placed on a belt record will be of uniform quality from beginning to end of the record whereas with a disc, recording quality falls off rapidly as the center of the record is approached. Moreover a belt record presents usable, high quality recording area extending effectively from one edge of the belt to the opposite edge whereas with a disc record a large center portion is not usable at all.

Perhaps the most obvious way of mounting a belt record in a dictating machine is to place the record upon a large cylindrical drum having a diameter the same as that of the belt. However for a record having of the order of fifteen minutes of recording time, the diameter of the drum, and hence the minimum thickness of the machine, is four inches or so. Another and perhaps the more important disadvantage with a single drum mount is the awkwardness and difficulty of placing a record on the drum. This requires first partially collapsing the drum and then expanding it tightly against the record after it

has been "inched" onto the drum. Removing the record is equally troublesome.

A better way of mounting a belt record which avoids these difficulties is to stretch the record taut between two small diameter mandrels. Prior to loading a record the spacing between the mandrels can be decreased as much as necessary so that there is no problem in slipping a belt record onto them. Once the belt is properly positioned, the mandrels can then be snapped apart to tension the belt and condition it for recording. Such an arrangement is shown, for example, in U.S. Patent No. 2,371,116.

The present invention provides, among other things, an improved, double-mandrel type mechanism for handling a belt record in a dictating machine. This mechanism is only a little over an inch high yet it accommodates a standard length belt record. The end or mouth of this mechanism is shaped so that a slack belt record is easily guided by hand onto it and cannot be placed improperly. After the initial manual placing of the record on the end of the mechanism, it will thereafter automatically and with precision carry the record fully onto the mandrels and then move the mandrels apart in condition for recording. The ejection of a record from the mandrels is accomplished in reverse manner almost instantaneously using energy stored in the mechanism when the record was inserted. Thus one record can be taken off the machine and another placed on it within a few seconds.

To make the loading of a record on this machine as convenient and effortless as possible, while at the same time making the machine approximately as thin as the thinnest dictating machine using a flat disc record, the guide mouth of the belt record handling mechanism is placed at a side of the machine very near the top. Thus the user has ample room for his hand above the disc or table when inserting a record in the machine. To make possible this high location of the record guide mouth, the carriage of the machine carrying the recording and playback heads is located underneath rather than above the record and its support mandrels.

A unique carriage with an arrangement for shifting its elements from neutral into recording or into playback condition also is provided in accordance with the present invention so that the carriage likewise may be very thin. Cooperating with this shifting arrangement is a simple yet effective interlock connection to the record-handling mechanism which prevents shifting of the machine out of neutral with possible damage to the transducer heads until a record is properly mounted. Conversely, this interlock prevents ejection of a record until the machine is shifted into neutral.

A clutch and drive arrangement also is provided according to the invention which is so quick in its action that a record can be started and stopped fast enough to split a single syllable of a word. Even so, this arrangement is very simple and operates reliably, a prime quality in a dictating machine.

As an added convenience to the person using this machine, there is further provided a remotely-controlled marking arrangement. This, when actuated, places different marks, such as "correction" and "end-of-letter," on an indicator slip at places corresponding to the points on the record where corrections or the ends of letters occurs.

A better understanding of the invention together with a fuller appreciation of its many advantages will best be gained from a study of the following description given in connection with the accompanying drawings wherein:

FIGURE 1 is a perspective view of a dictating machine embodying the features of the present invention with a record mounted in position ready for dictation;

FIGURE 2 is a perspective view of the machine of

FIGURE 1 with its housing removed and with the record-handling mechanism in "eject" position;

FIGURE 3 is a top plan view of this record-handling mechanism in the same position as in FIGURE 2;

FIGURE 4 is a view similar to that shown in FIGURE 3 but with the record-handling mechanism in "inject" position;

FIGURE 5 is a longitudinal section view taken as indicated by lines 5—5 in FIGURE 4 but also showing the housing;

FIGURE 6 is a cross-section view taken as indicated by lines 6—6 in FIGURE 5 and showing the motor drive elements;

FIGURE 7 is a cross-section view taken as indicated by lines 7—7 in FIGURE 5 and showing from the left side the position of the carriage with its recording and playback heads underneath the record-handling mechanism;

FIGURE 8 is a cross-section view similar to FIGURE 7 but taken as indicated by lines 8—8 in FIGURE 5 to show the right side of the carriage structure;

FIGURE 9 is a bottom view of the carriage and the recording and playback heads taken as indicated by lines 9—9 in FIGURE 7;

FIGURE 10 is a top view of the carriage structure taken as indicated by lines 10—10 in FIGURE 7;

FIGURE 11 is a sectional view taken as indicated by lines 11—11 in FIGURE 10 and showing the carriage feednut and clutch;

FIGURE 12 is a section view taken as indicated by lines 12—12 in FIGURE 7 showing details of the control buttons or tabs mounted on the carriage at the front of the machine as shown in FIGURE 1;

FIGURE 13 is an enlarged detail of the indicator-pad marking arrangement also carried on the front of the carriage; and

FIGURE 14 is a further enlarged side view of this arrangement showing the marking stylii.

The dictating machine 10 shown in FIGURE 1 and which embodies features of the invention includes a very thin, flat rectangular housing 12 mounted upon a base 14 which is adapted to rest upon a desk or table. Mounted within the right end portion of the machine just beneath the top of the housing are two horizontal, spaced record mandrels, to be described in detail below, which are parallel to each other and to the front of the housing 12. A short, wide belt record is placed on these mandrels at their right end through a rectangular well 16, shortly to be described in greater detail. Mounted beneath the bottom run of the record just above base 14 in a traveling carriage (hereinafter generally indicated at 19 but not evident in FIGURE 1) on which are mounted two transducer heads, a recording head for recording a helical signal track on the belt record and a playback head for reproducing a signal from such a record track. Projecting from the front of this carriage through a thin horizontal slot 18 in the right front edge of base 14, is a control arm 20 by means of which the carriage 19 can be manually shifted to the left or right across the width of the record to position the transducer heads at any desired point. Positioned at the right top corner of arm 20 is a manually-actuated button or tab 22 which, when pressed down, conditions the machine for recording dictation. At the top left corner of arm 20 is a similar tab or button 24 which, is pressed down to condition the machine for playback. As will appear later these tabs are geared together in "see-saw" fashion so that when one moves down from the position shown, the other moves up, and vice versa. When both are level with each other and the top of arm 20, as shown, the transducer heads and their carriage are in neutral, and the carriage can be shifted laterally across the record.

Projecting upward from control arm 20, is a "correction" and "end-of-letter" marking head 26 which is spring urged against the top slip of a removably mounted indicator-pad 28 positioned horizontally along the front panel of housing 12. The calibrated portion of this pad corresponds to the width of a belt record so that marks made on the topmost slip of the pad correspond to points across the record and provide a means of visually locating these points. Above pad 28 is a horizontal opening 30 through housing 12 which reveals the curved front end of a belt record when mounted on the support mandrels. Projecting upward from the movable carriage 19 across opening 30 is a wire index-pointer 32 which travels along with the carriage next to the record to at any instant show the lateral position of the transducer heads relative to the record.

Enclosed within the left end portion of housing 12 are the signal amplifier and the control relays and circuits which, because they may be of conventional design and construction, will not be described herein. The electrical recording or the playback volume provided by the amplifier is manually adjustable by a small knob 34 on the left front panel, a flashing-light type of the recording volume indication being provided through a window 36.

Connected to the left side of the machine by an electric cable 38 is a hand microphone unit 40 into which a person can speak during recording of dictation. Conversely, unit 40 also serves as a small loudspeaker in reproducing or listening back to already recorded dictation. A small loudspeaker (not shown) is mounted inside the right rear corner of housing 12 to be used for playback, if desired, instead of hand unit 40 by actuating a switch button 42. To provide for complete remote control of the machine by the user, microphone unit 40 is equipped with a "start-stop" switch button 44, a playback switch button 45, and two correction marker switch buttons 47 and 48. The latter are for producing on the top slip of indicator pad 28 "correction" and "end-of-letter" marks, respectively, at places corresponding to such points in the dictation on the record.

To initially condition machine 10 for recording, a blank belt record is inserted into well 16 as shown in FIGURE 1 so that it is positioned around the mandrels within the housing, this being accomplished as described later in detail in connection with FIGURES 2, 3 and 4. Then the movable carriage 19 with its arm 20 is set at its left end limit and the right-hand control tab 22 is pushed down. During recording of dictation the user holds hand unit 40, depresses start-stop button 44, and speaks into the microphone. When the dictation is finished or the record has been filled (with as much as fifteen minutes of recording) the transducer head carriage 19 will come against a right end limit switch and automatically stop the machine. Then, by leveling control tab 22 with tab 24 and the top of arm 20 and by depressing an "eject" plunger 50 at the right front corner of the machine, the completed record will automatically be ejected out from well 16. If the user has still more to record, he can insert another blank record into the machine and continue on as before. Otherwise he will return hand unit 40 to a cradle arm 52 located on the left side of the machine, whereupon the weight of unit 40 resting on this cradle will open a switch (not shown) to turn off all power to the machine.

FIGURE 2 shows machine 10 with housing 12 removed and with its record-handling mechanism, generally indicated at 56, in "eject" position. A boxed-in portion, generally indicated at 57, at the left-hand end of the machine encloses the signal amplifier and the control relays and circuits and will not be further described. Projecting to the right of the machine through well 16, which is a wide flat one-piece casting (here shown partially broken away) rigidly fastened to base 14, is a portion of the record-handling mechanism 56 comprising a sliding beam or track 60 whose right end carries a curved guide plate 62. Symmetrically spaced within the front and rear ends of well 16 are a front guide shoe 64 and

a rear guide shoe 66 which are mounted on a central frame 68 that is, in turn, rigidly fastened to base 14. These shoes, together with plate 62 and well 16, form a generally rectangular, annular record-receiving mouth having inwardly sloping walls for guiding a belt record into the machine.

Journalled in a bearing within the left end of the forward shoe 64 is the right end of a record-supporting mandrel 70, the left end of which is integral with a shaft 71 extending to a belt driven pulley 74 through a bearing 72 in a frame member, generally indicated at 68 and fixed on base plate 14. Positioned behind mandrel 70, parallel to it and in the same horizontal plane, is a second record-supporting mandrel 76, an idler mandrel whose ends (see also FIGURE 3) are journalled in and supported by a movable bracket 78. This bracket, in turn, at its left and right ends is fastened to a pair of slidable rods 80 and 82 extending perpendicularly to bracket 78 and mandrel 76. Each of these rods (see also FIGURES 7 and 8) passes through closely fitting openings in two spaced apart vertical portions 84 and 86, respectively, of frame 68. The forward ends of these rods are tied together by a bar 88. Rods 80 and 82, and thus bracket 78 and idler mandrel 76, are urged to the rear by compression springs 90 and 92, respectively, with spring 90 (see also FIGURE 7) acting between a stop washer 94 on rod 80 and frame portion 86, and spring 92 acting against a similar stop washer (not shown) on rod 82 and frame portion 86. These springs act equally through rods 80 and 82 to urge idler mandrel 76 to a rearmost limit determined, as indicated in FIGURE 4, by the abutment of the front faces of frame portions 86 against a resilient washer 96 on rod 80 and a similar washer 98 on rod 82.

As seen in FIGURE 3, the forward limit of bar 88, and thus idler mandrel 76, is determined by the bearing against bar 88 of a curved cam arm 100. This arm is pivoted to frame 68 at point 102 and has a cam shoulder 104 (see also FIGURE 4) which, when the record-handling mechanism 56 is in "eject" position, engages bar 88 and a sloping end shoulder 106 of a plate 108 attached to bar 88. The position of plate 108 along bar 88 is adjusted by means of a pair of screws 110 so that, as shown in FIGURE 3, the engagement of curved arm 100 against the bar 88 will be self-holding. Arm 100 is triggered out of engagement with bar 88, as will be described shortly, just after the record-handling mechanism reaches the position shown in FIGURE 4.

As mentioned previously, the record-handling mechanism is movable from the "eject" position shown in FIGURES 2 and 3 to the "inject" position shown in FIGURE 4. To facilitate the easy and wobble-free sliding of track 60, it is centrally slotted at 112 and engaged along its length by three spaced apart bearing rollers 114, 115 and 116. Each roller (see also FIGURE 8) is rotatably mounted in the same horizontal plane on an upstanding portion of frame 68, rollers 114 and 116 being engaged against the forward and bottom faces of slot 112 of track 60, and roller 115 being engaged against the rear and bottom faces of slot 112. As seen best in FIGURE 2, track 60 is urged to the right by a pair of long tension springs 120 and 122, which at their right ends are hooked to a pair of pins 124 and 126 fixed to frame 68, and at their left end are hooked to a pair of pins 128 and 130 extending outward from track 60.

The top of track 60 is covered by a thin spring plate 132 whose left end is attached by a pair of screws 134 to the track and which (see also FIGURE 5) extends a slight distance above the track to guide plate 62. The left end of spring plate 132 has a pair of downturned ears 136 which extend downward below the top of track 60 and closely on each side of it. These ears 136, as will be described in greater detail below, act as temporary stops for the left edge of a belt record when it is placed around mandrels 70 and 72. The right end of spring plate 132 is curved downward and upward to bear against guide plate 62 at 137. When track 60 is moved to inject position, as seen best in FIGURE 5, the right-most end of spring plate 132 is cammed down beneath the top undersurface of well casting 16 so that plate 132 is bowed slightly upward along its length to insure clearance between it and the top run of a record stretched between mandrels 70 and 76.

The inserting of a belt record into the machine is accomplished by holding the record generally horizontally in alignment with the mouth of well 16 and with the record-handling mechanism positioned as shown in FIGURE 2. The top run of the record is slipped over guide plate 62 and beneath spring plate 132 and the record is pushed inwardly, with its ends surrounding shoes 64 and 66, until its left edge abuts ears 136 on the left end of the spring plate 132. To prevent the record from being inserted over instead of under spring plate 132, has near its center a turned up flap 138 which extends above the top of well 16 to catch the edge of any record wrongly inserted.

When properly placed in initial loading position, the right edge of the record will lie beneath and far enough to the left of guide plate 62 so that (see also FIGURES 3 and 5) a pair of fingers 140 and 142 on each side of track 60 are beneath and just to the right of the record. These fingers, with the first movement of track 60 to the left, will move up to engage the right edge of the record and carry it leftward along with the track.

Finger 140, as may be seen in FIGURES 2, 3 and 5, is carried on the right end of a thin flat arm 144 which near its left end has a slot 146 to engage a pin 148 extending out from track 60. The head of this pin 148 is capped with a retaining ring 150, there being a flat similarly slotted leaf spring 152 between this ring and arm 144 to hold it against the side of track 60. Projecting from arm 144 through the left end of leaf spring 152 is a small pin 154 to which is attached the right end of a tension spring 156, the left end of this spring being hooked on a pin 158 extending outward from track 60. Tension spring 156 normally pulls arm 144 to the left so that pin 148 abuts the right end of slot 146 and so that the right end of the arm and finger 140 lie slightly below the top level of track 60.

As seen in FIGURES 2 and 5, near the right end of arm 144 along its lower edge is a cam surface 160 which engages a stationary shoulder 162 of frame 68. With the first movement of track 60 to the left from the position shown in FIGURE 2, surface 160 rides upon shoulder 162 and immediately raises finger 140 above the level of the right edge of the previously inserted belt record. Thereafter, as track 60 moves to the left, finger 140 and its corresponding finger 142, which is carried on an arm 164 mounted in identical manner on the opposite side of track 60, pull the record completely onto mandrels 70 and 76. During this leftward travel, the record pushes against arms 144 and 164 to stretch slightly the small tension spring 156 pulling on the left end of arm 144 as well as the corresponding tension spring 166 pulling on arm 164. This differentially moves each arm 144 and 164 with its corresponding finger 140 and 142, respectively, a little to the right relative to track 60 and permits the downturned ears 136 at the left edge of the record to move differentially to the left relative to the record so that neither the fingers 140 and 142 nor ears 136 will interfere with the record after it has been mounted on the mandrels.

As the record is drawn fully onto the mandrels and just before track 60 reaches its left-most limit of travel, the left edge of the record, a fragment of which is shown around idler mandrel 76 in FIGURE 4 and indicated by numeral 168, comes against a flange 169 on the left end of this mandrel. Thereafter, track 60 continues to move to the left for a short distance beyond the position shown in FIGURE 4 and in so doing triggers idler mandrel 76

into the position shown and this stretches the belt record taut. Simultaneously track 60 is itelf latched against movement to the right beyond the position shown.

The triggering of idler mandrel from the position shown in FIGURE 3 to that shown in FIGURE 4 is accomplished as follows. Track 60 on its front side near its center has an outwardly extending tab 170 (see also FIGURE 8) beneath the outer end of which is mounted a roller 172. This roller in moving with track 60 from the position shown in FIGURE 3 to that in FIGURE 4 engages a cam finger 174 adjustably mounted on the rear of a cam arm 100 behind its pivot 102 and in so doing snaps the arm out of its self-holding engagement with bar 88. The lateral position of cam finger 174 relative to cam arm 100 is adjusted so that the arm is finally triggered free by roller 172 when track 60 is slightly to the left of the position shown in FIGURE 4. Thereafter, when guide plate 62 is released by the person inserting the record, track 60, which will by then have been engaged by a latch, will return to the right to the position shown. In so doing record engaging fingers 140 and 142 will move out of engagement with the right edge of the record and downturned ears 136 will not move far enough to interfere with its left edge.

Track 60 at its left end carries an upright latch pin 176, which in the position shown in FIGURE 4, engages and is held by a latch jaw 178 pivoted to frame 68 at 180. This jaw has a leftward extension 182 and is spring urged clockwise by a tension spring 184 stretched between this extension and a fixed point on the frame. Extension 182 at its outer end is adapted to be engaged by a release tab 186 (see also FIGURES 3 and 6) of a lever, shortly to be described, and to be moved counterclockwise thereby unlatching track 60.

When track 60 is in the position of FIGURE 4, it is urged to the right by tension springs 120 and 122 which have a considerable amount of energy stored in them. Thus what latch 178 is released the track will forcibly be catapulted to the right. However, before it moves far enough for downturned ears 136 of spring plate 132 to engage the left edge of the record, idler mandrel will be retracted, i.e. moved toward mandrel 70, thereby freeing the record for ejection. The retracting of mandrel 76 is caused by roller 172 moving to the right and immediately camming arm 100 clockwise against bar 88. Thereafter, in quick succession ears 136 catch the left edge of the now slack record, and eject it out through well 16, bar 88 simultaneously being latched back by shoulder arm 104 on arm 100. The energy stored in tension springs 120 and 122 in the position of FIGURE 4 is transferred into compression springs 90 and 92 upon the retraction of idler mandrel into the position of FIGURE 3. Track 60 at its left end carries a soft bumper 188 on pin 176 which comes against bearing roller 114 and limits the rightward travel of the track.

As shown in FIGURES 7 and 8, there is mounted immediately beneath the bottom run of the belt record 168 stretched upon mandrels 70 and 76, a transducer head carriage 19 the forward end of which carries the control arm 20 previously described. A bottom view of this carriage is shown in FIGURE 9. The carriage is slidably mounted on two parallel guide rods 192 and 194 between which is mounted a feedscrew 196. The latter (see also FIGURES 5, 10 and 11) is engageable with a feed nut clutch, generally indicated at 198, mounted on the carriage and controlled from arm 20 as will shortly be described.

The guide rod nearer control arm 20, rod 192, is as seen in FIGURES 7, 8 and 9, grooved along its length at 200. As seen in FIGURE 4, it is rotatably mounted at its left and right ends, respectively, in bearings 202 and 204 in the lower front side of frame 68. This rod 192 performs the dual functions of supporting carriage 19, and of providing an interlocking connection between the record-handling mechanism 56 and carriage 19. To

this end, the right end of rod 192 carries a lever 206 which engages the bottom end of the record ejecting plunger 50 seen only in FIGURE 1. When this plunger is pressed downward, lever 206 is moved downward and rotates rod 192 clockwise as seen in FIGURE 7 and counterclockwise as seen in FIGURE 8. As shown in FIGURES 2 and 6, this causes the left end of the rod, which carries a crank arm 208, to rotate forward. In so doing, crank arm 208 pulls forward the lower end of a lever 210 pivoted to it, this lever in turn, as seen in FIGURE 6, being attached through a pin and slot connection 212 to the end of frame 68. The upper end of lever 210 is the release tab 186 which is adapted, for one of its functions as indicated in FIGURE 3, to move forward and unlatch track 60, thereby ejecting the record mounted on mandrels 70 and 76 in the manner previously described. Attached between the upper end of lever 210 and a fixed point on the frame is a short tension spring 214 which normally holds the lever in the position shown in FIGURE 6.

As will be explained in greater detail below, the angular position of front guide rod 192 determines whether or not the carriage 19, through manipulation of tabs 22 and 24 of control arm 20, can be shifted out of neutral into either record or playback condition. Unless a belt record is mounted upon mandrels 70 and 76, the carriage cannot be shifted out of neutral. Conversely, unless the carriage is in neutral, a record mounted on the mandrels cannot be ejected. To determine whether or not a record is mounted on the mandrels, as seen in FIGURES 2, 3 and 4 there is mounted behind release tab 186 an S-shaped lever 216 which is pivoted at 218 to frame 68 and is adapted to swing in a horizontal plane between the positions shown in FIGURES 3 and 4. The right end of S-lever 216 carries a downwardly projecting pin 220 (see also FIGURES 6, 7 and 8) which cooperates with a plate 222 carried on bracket 78 and having a straight left edge notched at 224. In the position of FIGURE 4 where a record is shown stretched between mandrels 70 and 76 thus determining the spacing between them, pin 220 is in notch 224 thus permitting the left end of S-lever 216 to move backward slightly under the pressure of release tab 186. When this tab, and with it lever 210, is in this position, the angular position of front guide rod 192 (see FIGURE 8) and its longitudinal groove 200 are such that carriage 19 can be shifted out of neutral by depressing either of tabs 22 or 24.

If a record is not stretched between mandrels 70 and 76 with the record-handling mechanism in the position shown in FIGURE 4, idler mandrel 76 would stand somewhat farther to the rear, as determined by the abutment of washers 96 and 98 against frame portions 86. In this position S-lever 216 would be rotated slightly counterclockwise because its pin 220 would have ridden out of notch 224. This then would change the angular position of groove 200 in rod 192 to prevent shifting the head carriage out of neutral. Similarly in the position shown in FIGURE 3 wherein the machine is in eject position, S-lever 216 is held sufficiently counter-clockwise also to prevent the shifting of carriage 19 out of neutral.

As seen in FIGURES 7, 8 and 9, transducer head carriage 19 consists of a slidable frame 230 which has projecting from its forward end the control arm 20 previously mentioned. This frame 230 slides horizontally parallel to and is carried by the front and rear guide rods 192 and 194. Extending from arm 20 to the rear along the length of frame 230 is a shaft 232 which at its front end is supported in a bearing 234 and near its rear end is supported in a bearing 236. Fastened to the front of this shaft is a gear 238 (see also FIGURE 12) which meshes with a pinon gear 240 vertically above it. The latter, as seen best in FIGURE 12, is engaged on its right side by a rack 242 integral with tab 22, and engaged on its left by a rack 244 integral with tab 24. Tab 22 is slidably mounted on a vertical pin 248 carried by arm 20 in front of gear 238, and tab 24 is similarly mounted on a pin

250. When tab 22 is pressed down, pinion 240 rotates clockwise and, in turn, rotates gear 238 and thus shaft 232 counterclockwise. At the same time tab 24 moves upwardly. The reverse of this occurs when tab 24 is pressed down. When both tabs are level with each other and the top of arm 20, shaft 232 is in neutral.

As seen in FIGURE 9, shaft 232 near its front end carries a rotary cam 252 which has a projecting portion (see also FIGURE 7) engageable in the longitudinal groove 200 in front guide rod 192, the angular position of this rod determining whether cam 252 on rod 232 can be rotated. However, whenever shaft 232 is rotated to either "record" or "reproduce" position, cams 252 will move into engagement with groove 200 and prevent rotation of rod 192 and thus prevent the ejection of the record mounted on the machine.

Fixed to shaft 232 and somewhat behind cam 252 is a similar cam 254 which controls the vertical position of a playback head 256. This head extends through a cutout portion of frame 230 and is loosely mounted on a pin 258 extending upward from a U-shaped bracket 260, the latter being pivoted to the frame at points 262. As seen in FIGURES 8 and 9, there is positioned just above cam 254 a horizontal pin 264 which is carried on the lower end of a curved lever 266 extending forward and upward and pivoted to the frame at 268. As seen in FIGURE 10, the upper end of curved lever 266 carries a pin 270 which is adapted to move down and engage a stub 272 projecting from the forward end of playback head 256 to lower the head out of contact with the record, this lifted position of the playback head 256 is shown in full lines in FIGURE 8 whereas the record-engaging position of this head is indicated by the dotted lines. Curved lever 266 is biased by a spring (not shown) so that its upper pin 270 will move downward when its lower pin 264 is released by cam 254. Playback head 256, as seen in FIGURE 10, is urged upward by a light tension spring 274 hooked to its forward end on a pin 275 and to an upstanding transverse wire finger 276. To laterally index this head 256 on its pivot pin 258 each time the head is returned to neutral position, there is placed beneath pin 275 a set screw 280 having a tapered head 282 adapted to engage and position pin 275. The lateral position of tapered head 282 is set so that the playback head 256 normally engages the record a track or so behind the last track traced by the recording head, as will be described below. This permits a quick review of the last portion of the dictation on the record during recording without the necessity for shifting to playback position, this quick review being accomplished by actuating button 46 of hand microphone unit 40 in FIGURE 1.

As seen in FIGURES 7, 8 and 9, at the rear of carriage frame 230 is mounted a recording head 290 which is pivoted to the frame at point 292 to swing in a vertical plane. Projecting downward from this pivot and integral with the body of the head 290 is a short pin 294 which engages with a cam 296 carried on shaft 232. When this shaft is rotated by tab 22 to place the machine in condition for recording, cam 296 releases pin 294 and allows the recording head 290 to move up into contact with the bottom run of the record positioned in the machine, as indicated by the dotted lines in FIGURE 8. Placed behind the record and supporting it during recording is a nylon strip 298 (see also FIGURE 5) to act as an anvil against which the recording stylus operates. When the machine is in neutral or in playback condition, cam 296 holds recording head 290 retracted from the record. Urging this head into engagement with the record is a tension spring 300 (see also FIGURE 9) whose rear end is hooked to a pin 302 on recording head 290 and whose forward end is hooked to a pin 304 projecting from frame 230.

To provide for uniform movement of transducer head carriage 19 laterally across the belt record as it is rotated by mandrels 70 and 76, the carriage has a feednut and clutch arrangement 198 which is engageable with feedscrew 196, the feedscrew being rotated in synchronism with drive mandrel 70 as will be described below. As seen best in FIGURES 10 and 11, feednut arrangement 198 includes a worm wheel 310 which always meshes with feedscrew 196, this wheel being rotatably mounted on frame 230 by a bearing pin 312. Within wheel 310 is an annular groove into which projects a clutch pin 314, the pin in turn being mounted on a bracket 316 pivoted to the frame by a pin 318. Projecting from the free end of bracket 316 is a leaf spring 320 (see also FIGURES 8 and 9) which is engaged by a cam 322 carried on control shaft 232. When the shaft is rotated in either direction from the neutral position shown in FIGURE 11, cam 322 raises leaf spring 320 to the dotted line position shown and forces clutch pin 314 into contact with worm wheel 310. This locks this wheel relative to the carriage and causes it to travel laterally when the feedscrew rotates. Thus this clutch pin 314 and worm wheel 310, both of which are made of metal, provide a clutch arrangement which is positive, quick acting and slip-free.

As seen in FIGURES 5 and 9, the initial starting position of carriage 19 is determined by the setting of a stop screw 324 mounted on the left inner side of frame 68. As seen only in FIGURE 5, the right-hand limit of travel of carriage 19 is determined by a stop switch 326 mounted on frame 68. This switch is adapted to be engaged by a cam 328 (see FIGURES 7, 8 and 9) mounted on the rear end of control shaft 232. This cam, is provided to permit the carriage to move slightly farther to the right when it is conditioned for reproducing than when it is conditioned for recording, thus allowing for a slight lag in the position of the reproducing head during recording.

Mounted near the center of control shaft 232 is a nylon sleeve 330 having on its upper face (not seen) a metal bar parallel to shaft 232. This bar is adapted to cooperate with contacts of a switch 332 and control the amplifier and control circuits of the machine when shifting from neutral to either record or playback condition.

As seen best in FIGURE 5, feedscrew 196 is supported at its right end from frame 68 in a bearing 334 and, near its left end, it is journalled in a bearing 336 in the left wall of frame 68. The left end of this feedscrew 196 carries a gear 338 which, as seen in FIGURES 4 and 6, meshes with a first idler gear 340. The latter in turn meshes with a small gear 342 having coaxial and movable in unison with itself a larger idler gear 344. This last gear 344 is driven by a smaller gear 346 secured on shaft 71. Thus, when shaft 71 with its drive mandrel 70 rotates counterclockwise, as seen in FIGURE 6, feedscrew 196 rotates slowly clockwise to drive the transducer head carriage 19 laterally across the rotating belt record.

Shaft 71 carries on its outer end the pulley 74 which is engaged by an endless drive belt 348. The rear end of this drive belt is looped over a hub 350 projecting from a large wheel 352 rotatably mounted on frame 68 in a bearing 354. This drive belt 348 is held tightly engaged around pulley hub 350 by an upwardly adjustable idler roller 354 mounted on the frame just in front of this hub. Positioned behind wheel 352 (see also FIGURE 2) is a small electric motor 356 which has projecting from its left end a small shaft 358. Movably mounted beneath and between shaft 358 and the rim of wheel 352 is a small rubber roller or puck 360 which can be brought into firm contact, as indicated by the dotted lines in FIGURE 6, with both the wheel 352 and the shaft 358. To this puck 360 is rotatably mounted on a bracket 362 whose forward end is hinged at 364 to frame 68. The rear end of the bracket carries a solenoid plunger 366 extending upward into a solenoid coil 368. When this solenoid clutch arrangement is energized through the closing of start-stop button 44 on the hand microphone unit 40 (see FIGURE 1) the drive mandrel 70 and the feedscrew 196 are rotated. Very precise control of the starting and stopping of the machine is obtained with this arrangement.

FIGURE 7 shows elements of the remote marking arrangement provided in the dictating machine of the present invention. Marking head 26, which projects upward from control arm 20 which bears against the top slip of indicator pad 28 as previously mentioned, is pivoted to the control arm at point 370. As seen in FIGURE 14, head 26 is urged against pad 28 by a coil spring 372 surrounding pivot 370 and is fixed at its other end to the control arm (at a point not shown). Pivoted within head 26 on a transverse pin 374 are two flat, parallel plates 376 and 378 (see also FIGURE 13) which are spaced apart slightly less than the width of head 26 by three pins 380, 382 and 384 fixed between them. Between these plates near their upper end is mounted a first marking stylus 386 whose rear end is pivoted on a pin 388 midway between the plates. This stylus is urged upward to the position shown in FIGURE 14 by a coil spring 390. Similarly mounted beneath the upper stylus on a pin 392 is a second stylus 394 which likewise is urged upward by a spring 396. The upper stylus has attached to it a flexible cord 398 and the lower stylus is attached to a similar cord 400. Each cord extends downward and passes over its respective one of two pulleys 402 and 404 (see FIGURE 13) carried within head 26. The lower end of cord 398 then is looped over another pulley 406 mounted on carriage 19 and extends up around a third pulley 408 on the carriage across to a fourth pulley 410 back to a solenoid plunger 412. This plunger, as seen in FIGURE 10, is mounted within a solenoid 414 so that, when the solenoid is energized, for example, by pushing button 47 on the hand microphone unit, cord 398 is pulled and draws upper stylus 386 downward across the top slip of the indicator pad 28 to make a mark. The other cord similarly passes from pulley 404 around a lower pulley 416, and two other pulleys 418 and 420 to a plunger 422 within a solenoid 424 adapted to be energized by switch button 48, for example.

It will now be appreciated that the various parts and elements of machine 10 function together smoothly and harmoniously. Though the machine is extremely compact, its ease of operation is outstanding. No elements are subjected to excessive mechanical strain and wear has been reduced to a minimum. Accordingly the machine will operate reliably throughout a long life. The drawings herein were made from an actual machine and show its various parts substantially to scale.

The above description of the invention is intended in illustration and not in limitation thereof. Various changes may occur to those skilled in the art and these may be made without departing from the spirit or scope of the invention as set forth.

We claim:

1. In a dictating machine of the character described, a belt record supporting and handling mechanism comprising a first rotatably mounted drive mandrel, a second rotatably mounted idler mandrel spaced apart parallel to said drive mandrel and adapted to be moved toward and away from it, first spring means urging said idler mandrel away from said drive mandrel, a slidable track member mounted between said mandrels and movable from a position wherein it extends outward from the ends of said mandrels to a position wherein it is telescoped between said mandrels, second spring means urging said track member outward, a manually releasable latch for holding said track member telescoped, and cam linkage means inner connecting said track member and said idler mandrel so that when said track member is moved inward between said mandrels said idler mandrel is moved under the action of said first spring means away from said drive mandrel to tension a belt record between them, and when said track member is moved outward from said mandrels said idler mandrel is moved by said cam linkage means toward said drive mandrel against the action of said first spring means, the amount of energy stored in said second spring means upon the loading of a belt record being sufficient when said track member is unlatched to move it outward and to move said idler mandrel toward said drive mandrel.

2. The structure as in claim 1 wherein said track member has an inner stop finger and at least one loading finger adapted to project over the outer edge of a record and to pull it along with said track member into telescoped relation with said mandrels, said loading finger having a lost motion connection with said track to permit said stop and loading fingers to stand clear of the edges of said record when mounted on said mandrels.

3. An improved record handling mechanism for a short, wide belt record, said mechanism including a stationary frame portion is very thin and has a length greater than the width of the record and a width substantially less than the length of the record, a drive mandrel rotatably mounted closely alongside said frame, an idler mandrel mounted on the opposite side of said frame and movable toward and away from said drive mandrel, a track slidably mounted on said frame between said mandrels and movable inward into telescoped relation with them and movable outward beyond their ends, the thickness of said track and said frame being less than that of said mandrels, a first spring urging said idler mandrel away from said drive mandrel, a second stronger spring urging said track outward, and cam arm and trigger means controlled by the position of said track and acting to hold said idler mandrel retracted toward said drive mandrel against said first spring until said track reaches said telescoped position and then to release said idler mandrel and acting to move said idler mandrel into retracted position when said track initially moves outward.

4. The structure as in claim 3 wherein said idler mandrel is mounted on a slidable bracket, and said cam arm and trigger means include a somewhat V shaped lever having two arms and pivoted near its point to said frame, adjacent said track and generally in the plane of said mandrels, a cam roller carried by said track for engaging the inside of one of said arms on the inward stroke of said track and for engaging the other of said arms on the outward stroke, the outside of said other arm having a self-holding latch shoulder adapted to bear against a similar shoulder on said bracket.

5. The structure as in claim 4 in further combination with two carriage guide rods parallel to said mandrels, a transducer head carriage movable along said rods closely adjacent one run of a belt record mounted on said mandrels, one of said rods being grooved along its length and being rotatable, a latch engageable with the inner end of said track to releasably hold it, and a linkage connecting one end of said grooved rod with said latch so that rotation of said rod releases said latch.

6. The structure as in claim 5 in further combination with interlock means on said carriage responsive to the angular position of said grooved rod, and positioning means carried by said slidable bracket for varying the angular position of said grooved rod in accordance with whether a record is mounted on said mandrels, or is not mounted on said mandrels.

7. A compact and efficient dictating machine for use with a short belt record, said machine comprising a very thin housing, a transducer head carriage mounted for lateral sliding closely along the bottom of said housing, a pair of small mandrels mounted parallel at the top of said housing for supporting and driving a belt record in a very flat loop immediately above said carriage, a record loading well member extending through a side of said housing near its top at one end of said mandrels and providing a funneled opening for guiding a record onto said mandrels, a pair of stationary shoes at the ends of said mandrels respectively, said shoes being wedge shaped and extending through and beyond said well member to distend said record and guide it onto said mandrels, and a track member slidably mounted between said mandrels and having on its outer end a guide plate which is posi-

tioned between said shoes to initially guide a record onto them and into said well member, said track having an outer finger to contact the outer edge of a record and draw it fully onto said mandrels when said track is moved manually inward.

8. The machine in claim 7 wherein there are two laterally spaced apart outer fingers each comprising the end of an arm pivoted to said track behind said guide plate and adapted to swing upward to contact only the upper outer edge of said record near its center when said track is initially moved inward into telescoped relation with said mandrels.

9. An improved record handling mechanism for a short, wide belt record, said mechanism including a stationary frame which is very thin and has a length greater than the width of the record, a drive mandrel rotatably mounted closely above said frame on one side thereof, an idler mandrel similarly mounted on the opposite side of said frame and movable toward and away from said drive mandrel, a track slidably mounted on said frame between said mandrels and movable inward into telescoped relation with them and movable outward beyond their ends, the thickness of said track being less than that of said mandrels, spring means urging said idler mandrel away from said drive mandrel and urging said track outward, and cam arm and trigger means controlled by the position of said track and acting to hold said idler mandrel retracted toward said drive mandrel against said spring means until said track reaches said telescoped position and then to release said idler mandrel and acting to move said idler mandrel into retracted position when said track initially moves outward, said cam arm and trigger means including a double-arm lever pivoted near its midpoint to said frame, adjacent said track and generally in the plane of said mandrels, a cam roller carried by said track for engaging the inside of one of said lever arms on the inward stroke of said track and for engaging the inside of the other of said lever arms on the outward stroke, the outside of said other arm having a self-holding latch shoulder to lock said idler mandrel retracted toward said drive mandrel.

10. A belt record type dictating machine having improved operating convenience and efficiency and substantially reduced size, said machine comprising a very thin housing, a pair of belt record supporting mandrels spaced apart parallel to each other closely beneath the top of said housing and extending perpendicular to the edge thereof, belt record inject-eject means for placing a belt record on said mandrels and for thereafter moving said mandrels apart to tension said record, drive means for rotating said record at a substantially constant speed, carriage means carrying a recording head and a playback head, said carriage means being movable transversely across said record closely across it, and interlock means controlling said inject-eject means to prevent a record being removed from said machine when either of said heads is in operative position, and conversely to prevent either of said heads from being placed into operative position when there is no record on said mandrels, said carriage means being supported on a pair of parallel and generally horizontal guide rods, one of said guide rods being positioned along the front bottom edge of said housing and rotatable about its axis to control said record inject-eject means, said rod having a cam surface along its length which comprises a portion of said interlock means.

11. A compact and efficient sound transducing machine for use with a short belt record, said machine comprising a very thin housing, a transducer head carriage mounted for lateral sliding closely along the bottom of said housing, a pair of spaced apart small diameter mandrels mounted parallel at the top of said housing for supporting and driving a belt record in a very flat loop immediately above said carriage, a wide thin record loading well member extending through a side of said housing near its top at one end of said mandrels and providing a sloping wall for guiding a record onto said mandrels, a pair of stationary wedge-like shoes at the ends of said mandrels respectively, said shoes extending into said well member and slightly beyond its outer edge to distend said record and guide it onto said mandrels, and a track member slidably mounted between said mandrels and having on its outer end a thin wide tongue-like guide plate to bridge the gap between said shoes and to initially guide a record onto them and into said well member, said track having an outer finger to contact the upper outer edge of a record and draw it fully onto said mandrels when said track is moved manually inward, the width of said guide plate being a substantial part of the folded-over length of the record.

12. In a sound recording and reproducing machine, a frame and housing having a front top bottom two sides and a back, a pair of record supporting mandrels rotatably mounted closely beneath said top with one mandrel extending along the right front edge and being exposed through an opening in said housing, a record loading well on the right side of said housing for guiding a short wide belt record onto the ends of said mandrels, a transducer head carriage slidably mounted beneath said mandrels, said carriage having a control arm projecting through a slot in the front of said housing near the bottom, the length of said slot being substantially equal to the width of a record, means to mount an indicator slip on the front of said housing above said slot and along a rearwardly inclined generally vertical plane, a marking head pivotally mounted on said control arm and having at least one slip-marking element, a solenoid mounted on said carriage, and a cord connected between said element and said solenoid, whereby marks can be made on said slip by remote control.

13. In a sound recording and reproducing machine, a frame and housing having a front top bottom two sides and a back, a pair of record supporting mandrels rotatably mounted closely beneath said top with one mandrel extending along the front edge and being exposed through an opening in said housing, a record loading well on the side of said housing for guiding a short wide belt record onto the ends of said mandrels, a carriage slidably mounted beneath said mandrels, said carriage having a control arm projecting through a long, narrow slot in the front of said housing near the bottom, the length of said slot being substantially equal to the width of a record, a transducer head pivotally mounted on said carriage, a rotatable control shaft extending along said carriage for engaging said head with a record, said shaft extending transversely through said slot to said arm, and means carried by said arm for rotating said shaft along its lengthwise axis in either direction to engage or disengage said head.

14. A belt record type dictating machine having improved operating convenience and efficiency and substantially reduced size, said machine comprising a very thin housing, a pair of belt record supporting mandrels spaced apart parallel to each other closely beneath the top of said housing and extending perpendicular to the edge thereof, belt record inject-eject means for placing a belt record on said mandrels and for thereafter moving said mandrels apart to tension said record, drive means for rotating said record at a substantially constant speed, carriage means carrying a recording head and a playback head, said carriage means being movable transversely across said record closely beneath it, interlock means controlling said inject-eject means to prevent a record from being removed from said machine when either of said heads is in operative position, and conversely to prevent either of said heads from being placed into operative position when there is no record on said mandrels, said inject-eject means including a record supporting and guiding track which telescopes between said mandrels from an extended position, first spring means urging said track to its extended position, second spring means urging said

mandrels apart, and latch and cam means cooperating between said track and said mandrels so that when said track is moved between said mandrels said first spring means is tensioned and said mandrels are moved apart, and when said track is unlatched it will move to extended position and move said mandrels closer together against the action of said second spring means, the energy stored in said first spring means being greater than the energy stored in said second spring means.

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