Dec. 15, 1953 A. J. McMASTER 2,662,306

READING-TRAINING DEVICE

Filed Sept. 1, 1950 4 Sheets-Sheet 1

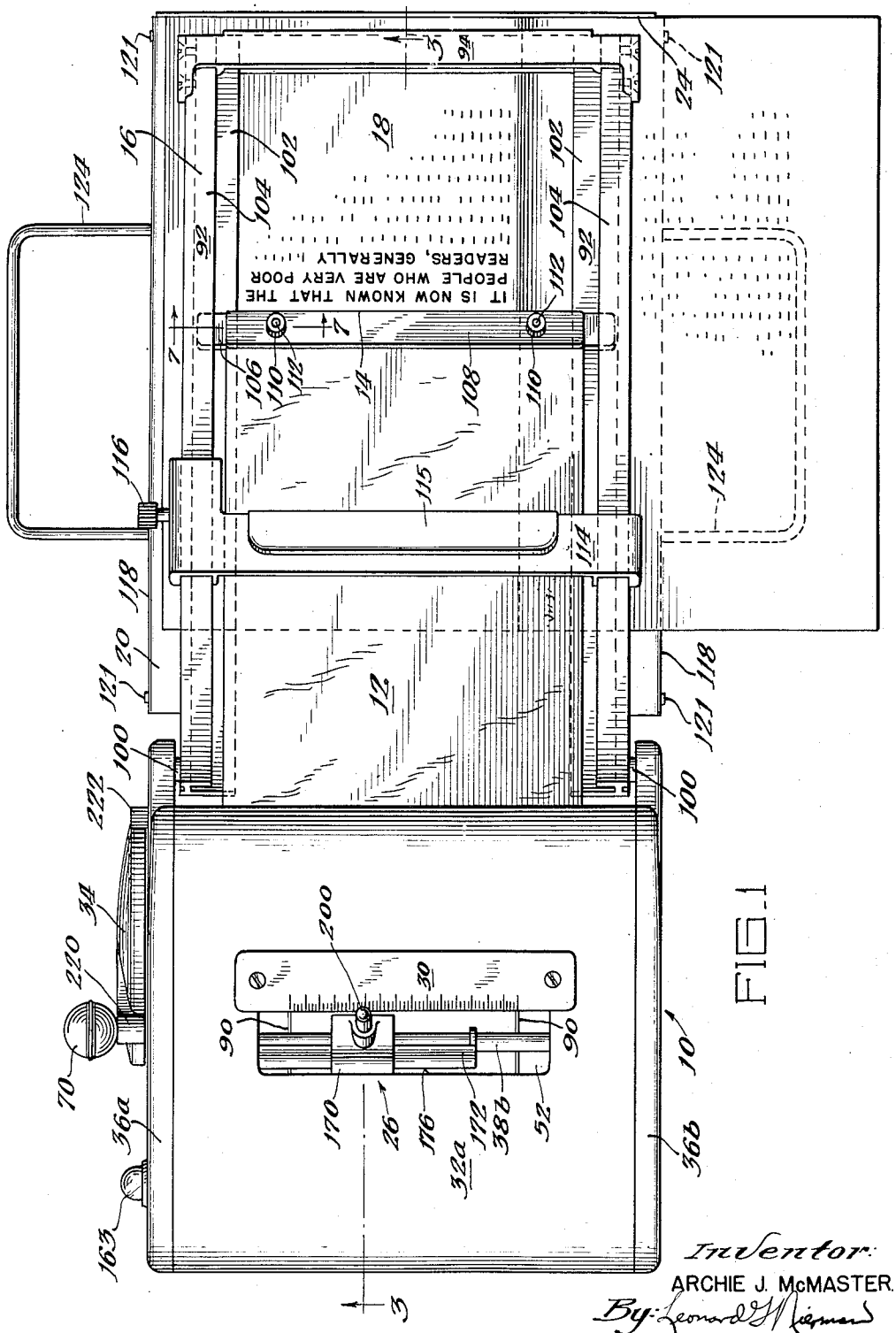


FIG. 1

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READING-TRAINING DEVICE

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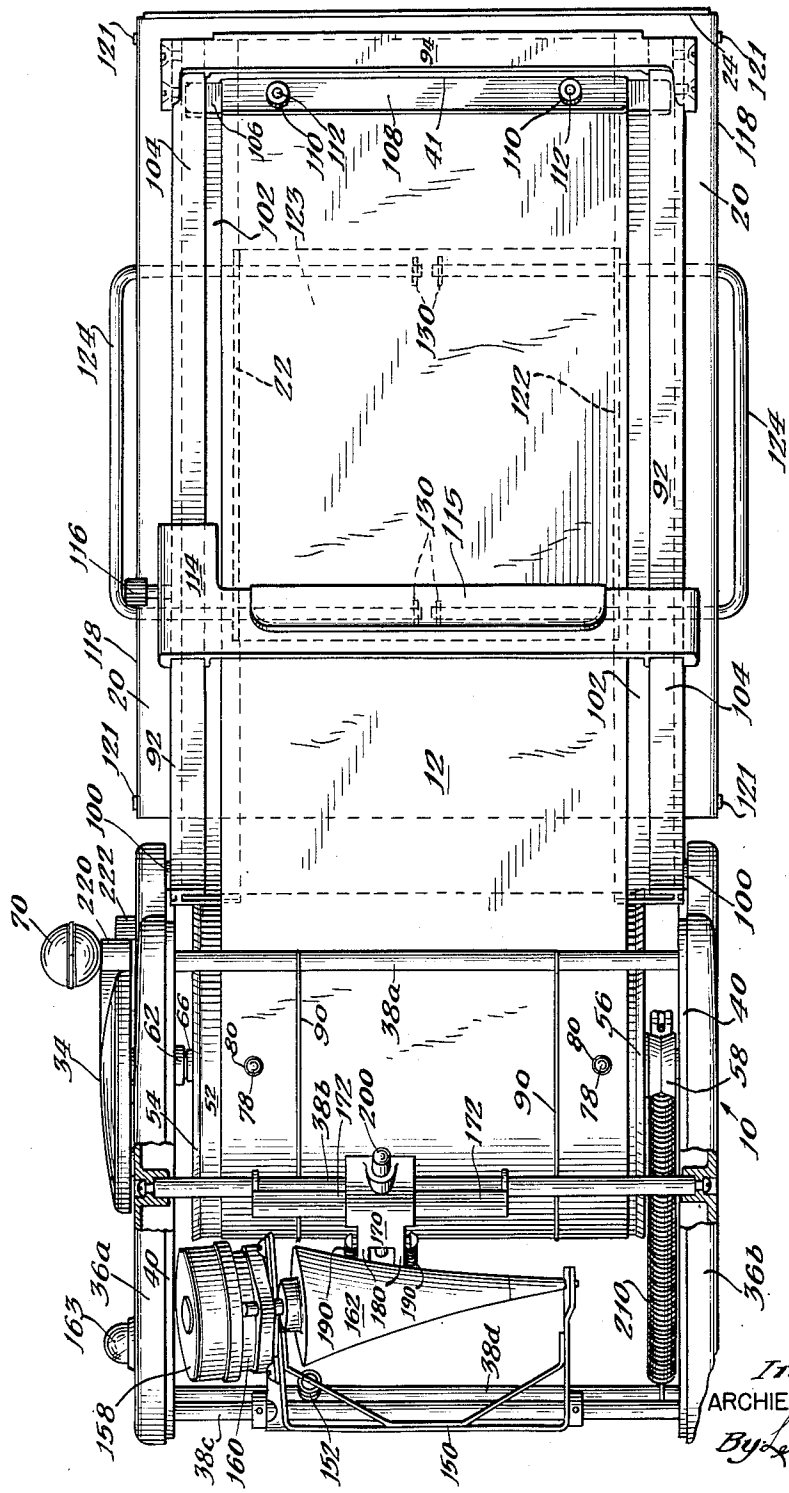


FIG. 2

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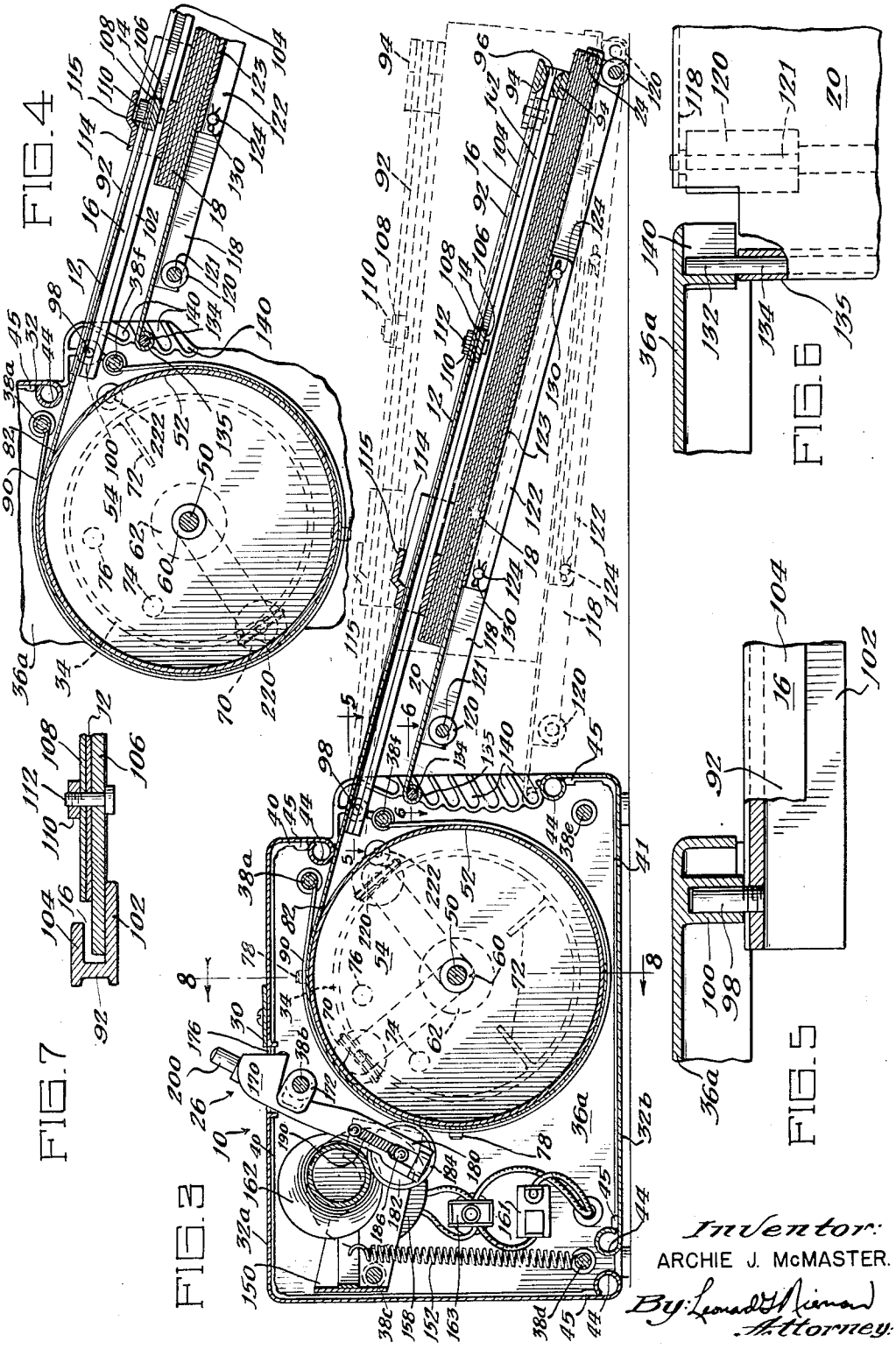


FIG. 4

FIG. 6

FIG. 7

FIG. 5

FIG. 3

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READING-TRAINING DEVICE

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FIG. 8

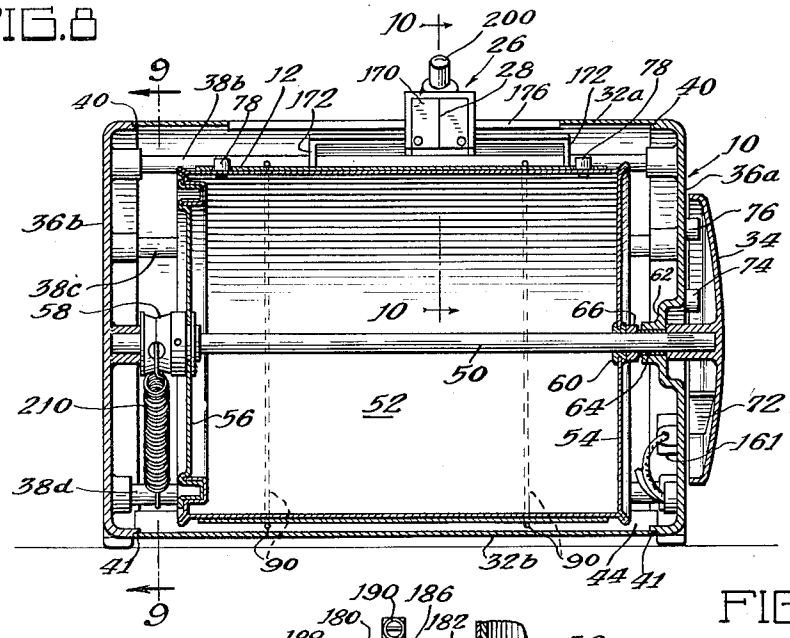


FIG. 10

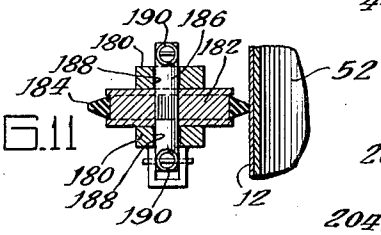


FIG. 9

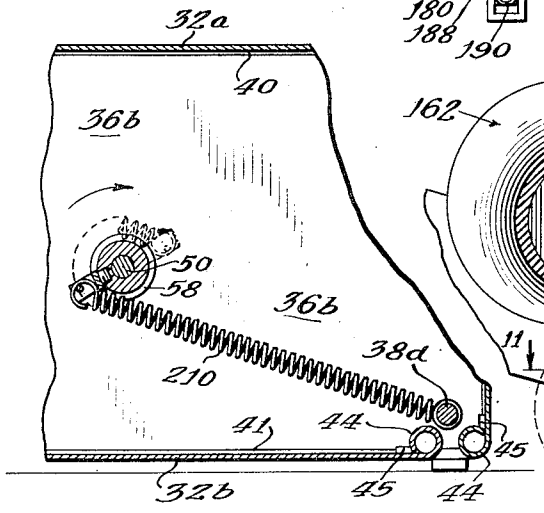
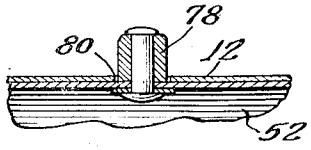


FIG. 11

FIG. 12



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Patented Dec. 15, 1953

2,662,306

UNITED STATES PATENT OFFICE

2,662,306

READING-TRAINING DEVICE

Archie J. McMaster, Deerfield, Ill., assignor to Elizabeth A. Simpson

Application September 1, 1950, Serial No. 182,743

8 Claims. (Cl. 35—35)

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This invention relates to an improvement in reading-training devices. The invention is more particularly concerned with devices for improving reading speed wherein successive lines of a printed or written page are continuously masked off in order to prevent re-reading of material previously read.

A device for improving reading speed of the general type with which the present invention is concerned is described in the copending application of Elizabeth A. Simpson, filed February 18, 1949, Serial Number 77,235, now forfeited and the continuation-in-part thereof filed April 18, 1951, Serial Number 221,558. As pointed out in this copending application, it is an established technique in the promotion of reading efficiency to continuously cover the material being read with a mask or shutter in order to aid the inefficient reader to become accomplished in absorbing and understanding printed material upon a single perusal thereof, since it is now known that the most common difficulty in obtaining efficiency in reading is that the inefficient reader is prone to re-read fragments of material a number of times. The copending application referred to describes a machine for use in such training for speedy and efficient reading.

The present invention lies in an improved machine of the type generally described above. It is the principal object of this invention to provide a machine of this type which is simple and inexpensive in construction and yet is suitable for employment with many types of reading matter, including books, magazines, cards, etc., of a large variety of sizes and thicknesses. It is a further object of the invention to provide such a machine wherein ease and simplicity of assembly, operation, and maintenance are maximized. In pursuance to these general objects, the invention provides a novel arrangement whereby diverse types and sizes of reading materials may be employed with the machine with suitable adjustments for sizes and thicknesses of materials which the user employs for practice in developing his reading skills. The invention further provides a novel type of drive mechanism for driving the mask or shutter over the printed page at a constant speed which is easily set and varied to meet the particular needs and level of accomplishment of the reader. The invention further provides a structure including a flexible shutter and a drive mechanism and mounting therefor such that the shutter may easily be replaced after continued wear has rendered it unsatisfactory for further use. The invention

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further provides a number of safeguards against misuse of the device by the user, particularly safeguards preventing damage to the mechanism due to such misuse. Additionally, as will more fully appear hereinafter, the invention affords other features of construction and mode of operation which contribute to the general objects stated above.

For complete understanding of the invention, reference is made to the attached drawing in which:

Fig. 1 is a plan view of a machine for use in improving reading speed made in accordance with the invention, illustrating a sample of reading material placed thereon for use;

Fig. 2 is a plan view of the device of Fig. 1 with the cover thereof removed, the parts being illustrated in the position wherein the masking curtain employed as a shutter completely covers the reading material being employed;

Fig. 3 is a longitudinal sectional view taken along the line 3—3 of Fig. 1 in the direction indicated by arrows;

Fig. 4 is a fragmentary sectional view similar to Fig. 3 illustrating a position of the parts wherein the shutter is withdrawn to the top of the reading material being used for practice;

Fig. 5 is an enlarged fragmentary horizontal section view taken along the line 5—5 of Fig. 3 in the direction indicated by arrows and illustrating the pivotal mounting of a shutter guide constituting a portion of the machine upon the frame thereof;

Fig. 6 is an enlarged fragmentary horizontal sectional view taken along the line 6—6 of Fig. 3 in the direction indicated by arrows and illustrating the manner of mounting of a reading material support constituting a portion of the machine upon the frame;

Fig. 7 is a fragmentary transverse sectional view taken along the line 7—7 of Fig. 1 illustrating the manner in which the shutter is guided by the shutter guide;

Fig. 8 is a transverse vertical sectional view taken along the line 8—8 of Fig. 3 in the direction indicated by arrows;

Fig. 9 is a fragmentary longitudinal sectional view taken along the line 9—9 of Fig. 8 in the direction indicated by arrows;

Fig. 10 is an enlarged fragmentary sectional view taken along the line 10—10 of Fig. 8 in the direction indicated by arrows;

Fig. 11 is a detail sectional view of an idler wheel assembly taken along the line 11—11 of Fig. 10 in the direction indicated by arrows; and

Fig. 12 is an enlarged sectional view corresponding to a portion of Fig. 8 illustrating the manner in which the shutter curtain is engaged upon a drum constituting a part of the machine.

Referring now to the drawing, the machine generally comprises a housing or frame 10 from which extends a shutter 12, of the flexible opaque curtain type, the outer end 14 of the shutter 12 being driven outwardly from the frame or housing 10 over a shutter guide 16, which is pivoted on the frame 10 and rests on the book or other reading material 18 being employed, which in turn rests upon a reading material support board 20, the inner end of which is pivoted on the housing 10 and the outer end of which rests upon a table or other similar support upon which the machine is placed for use, the outer end being provided with an upward lip 24, adapted to support the lower edge of the reading material. The speed at which the shutter 12 is moved over the reading material is controlled by manual movement of a speed control generally designated by the numeral 26, control 26 having a hairline indicator 28 whose position along a calibrated scale 30 on the top cover 32*a* of the housing indicates the speed at which the machine is being operated. When the outer edge 14 of the shutter 12 reaches the outer edge of the guide 16, which is substantially coextensive with the board 20, and completely covers the page of the reading material 18, the lower end of the guide 16 may be lifted for turning the page of the book or other reading material 18. The lower edge 14 of the shutter is then restored to the top of the page by manual rotation of a crank 34 on the side of the housing 10, and upon release of the crank 34 the shutter 12 again commences its downward progress over the reading material 18 at the predetermined speed.

The above general description of the mode of operation of the embodiment of the invention illustrated will serve to clarify understanding of the particular features of construction and operation thereof to be described. The housing 10 comprises two die cast side plates 36*a* and 36*b*, which are connected by transversely extending parallel rods 38*a*, 38*b*, 38*c*, 38*d*, 38*e* and 38*f*, which serve not only as tie rods binding the side plates 36*a* and 36*b* to form a rigid frame, but also as supports, pivots and tie points for fixed and moveable parts of the machine to be described hereinafter. Each side plate 36*a* and 36*b* has along the back, top and upper end of the front edge an inwardly extending shoulder portion 40 and along the bottom and lower end of the front edge a similar shoulder 41. There is a gap between the shoulder portions 40 and 41 at the lower rear corner of the plates 36*a* and 36*b*. Two sheet metal covers 32*a* and 32*b*, bent respectively to conform with the back, top and upper front edge of the plates 36*a* and 36*b* and the bottom and lower front edge of the plates 36*a* and 36*b*, and of a width adapted to fit onto the shoulders 40 and 41 of the opposite plates 36*a* and 36*b* are secured in place by the engagement of their ends 44, bent into the form of circles, upon lugs 45 provided at the ends of the shoulders 40 and 41. The sheet metal top cover 32*a* and bottom cover 32*b* are sufficiently resilient so that the end portions 44 may be disengaged from the lugs 45 to remove the respective top and bottom covers 32*a* and 32*b* and thus expose the mechanism for servicing.

Journalled in the side plates 36*a* and 36*b* is a shaft 50 traversing the entire width of the frame 10. Affixed to the shaft 50 is a drum 52 along the axis of which the shaft 50 extends. The drum 52 illustrated is constructed in a manner similar to an ordinary paint can, having a sealed end 54 and a removable pressed-on lid 56. A hub 58 fastened centrally of the lid 56 secures the can 52 to the shaft 50, which extends through a grommet 60 in the sealed end 54 and which further extends through a boss 62 which is lined with a bearing 64 to the exterior of the housing 10. Sidewise motion of the shaft 50 is prevented by a washer 66 which prevents thrust movement.

At the outer end of the shaft 50 is a circular crank member 34 which is hollow on the side adjacent to the side plate 36*a*, and is provided with a crank-handle or knob 70. On the interior of the hollow crank member 34 is formed a rib 72, adapted to engage lugs or stops 74 and 76, formed on the outer surface of the side plate 36*a* for purposes hereinafter to be described.

Protruding from the drum 52, and defining a line parallel with the shaft 50, are two lugs 78, riveted to the wall of the drum 52, as shown in Fig. 12. The lugs 78 engage apertures or perforations 80 near the inner end of the masking curtain or shutter 12. The curtain or shutter 12 consists of a rectangular sheet of heavy paper or fiber which is wound upon the drum 52, the outer end thereof coming tangentially off the drum forwardly of the top of the drum 82 and extending from the housing 10 near the top of the gap which exists between the upper end of the lower cover 32*b* and the lower end of the top cover 32*a*. Secure engagement of the apertures or perforations 80 on the lugs 78 is assured by two retaining bands 90 in the form of wires having one end secured to the tie rod 38*a* slightly above the tangential portion of the shutter curtain 12, and the opposite end secured to the tie rod 38*f*, slightly below the tangential portion of the shutter curtain 12, the retaining bands 90 being wrapped fairly tightly around the entire drum except for the gap between the ends thereof wherein the tangential portion of the shutter extends out through the front wall of the housing. The retaining bands 90 thus serve both to keep the apertures 80 in secure engagement with the lugs 78, and also to insure against slackness of winding of the shutter 12 on the drum 52, thus preventing any lack of correspondence between motion of the outer end 14 of the shutter 12 and rotation of the drum 52.

The outer end 14 of the shutter 12, exterior to the housing 10, runs along the guide 16 which consists of side channel members 92 to which is secured a transverse outer end member 94. The outer end member 94 has a slot 96 extending therethrough across the width thereof to permit use of the machine with tachistoscopic attachments such as described in the copending application of Elizabeth A. Simpson mentioned above. The inner ends of the side members 92 of the guide 16 have pivot lugs 98 extending therefrom which are journalled in corresponding cups 100 formed in the side walls 36*a* and 36*b* of the housing 10. The guide members 92 are in the form of channels, the lower webs 102 extending further inwardly than the upper webs 104. The curtain 12 has the outer edges thereof resting on the lower and wider webs 102 but is narrower than the space between the upper webs 104. The outer end 14 of the shutter curtain 12 is clamped between a lower bar 106, which is of a length greater than the width of the shutter 12 and the ends of which accordingly are between the upper web 104 and the lower web 102 of the

channel members 92, and an upper bar 108 which extends only to the sides of the shutter curtain 12, the upper bar 108 being secured to the lower bar 106 by thumb-nuts 110 engaging screws 112 which are riveted to the lower bar 106 and which extend through apertures provided for this purpose in the end of the shutter curtain 12 and in the upper bar 108. Across the guide 16 extends a stop member 114, the outer ends of which engage the outer surface of the side channel members 92 in sliding fashion so that the transversely extending stop member 114 may be moved to any point along the guide 16, locking of the stop 114 into position being accomplished by means of a thumb-screw 116. The stop member 114 is manually adjusted to engage the thumb-nuts 110 to fix the inner position of the curtain shutter 12 to correspond with the top line of printing or writing of the reading material employed. The forward portion of the upper surface of the stop member 114 is upwardly recessed or offset at 115 to permit the nuts 110 to slide closely under the forward portion 115 until engaged by the main body portion of the stop 114. Thus the application of excessive force on the crank 34 in resetting the shutter will not bend or twist the outer end of the lower bar 106, since abutment of the nuts 110 against the under surface of the portion 115 prevents the application of the twisting torque to bar 106 which would result if the forward edge of the stop 114 were to engage the nuts 110 or other projections on the shutter.

It will be seen that when the crank 34 is manually rotated to reset the shutter 12, the shutter will commence its new passage over the material at the exact top of the page for which the stop 114 has been preset. It will further be seen that the stop 114 when in a normal operating position (i. e. a position corresponding to the size of reading materials normally encountered) will maintain the side members 92 of the guide 16 in the spread position wherein the pivots 98 are securely engaged in the recesses 100 in the housing. However, if it is desired to remove the guide 16 from the housing, the stop 114 may be moved to the outer end of the side channels 92, and very slight inward bending of the side channels 92 permits disengagement of the pivots 98 from the recesses 100. The shutter 12 may be freed from the guide 16 merely by removal of thumb-nuts 110 and disengagement of the shutter 12 from the lower bar 106. The structure of the channel 92 wherein the lower web 102 is wider than the upper web 104 permits the shutter 12 to be thus readily disengaged from the guide 16 but nevertheless insures that the shutter curtain 12 will not sag through the guide 16 onto the reading matter. Thus again it is assured that the outer end 14 of the shutter 12 will move at all times in accordance with the rotation of the drum 52.

The support board 20 upon which the reading material rests comprises a piece of sheet metal having downwardly bent sides 118 between which are mounted tubular members 120 of a material such as rubber, mounted on shafts 121, the members 120 thus serving as feet or support wheels for the board 20. Longitudinal webs 122 formed on a sheet-metal plate 123 secured to the under surface of the board 20 are disposed inwardly of the respective sides 118, and U-shaped extensions 124 have the legs thereof extending through apertures in the sides 118 and the webs 122 so that the extensions 124 may be slid substantially

into the board as shown in Fig. 2, or may be withdrawn from the board to accommodate large sized reading material, as shown in Fig. 1, the outermost position of each extension member 124 being fixed by abutment of cotter pins 130, inserted through the legs of the extension members 124, against the inner surfaces of the webs 122.

At the upper or inner end of the support board 20, which is of reduced width, pivot lugs 132, which constitute the ends of a rod 134 secured to the board by bending of the inner end 135 thereof, extend laterally outwardly. In the front edges of the inner surfaces of the side plates 36a and 36b are formed a series of vertically spaced inwardly and downwardly sloping slots or notches 140. The inner end of the support board 20 is pivotally supported on the housing 10 by insertion of the lugs 132 into any one of the opposed pairs of slots or notches 140. The pair of slots or notches 140 selected for use depends upon the thickness of the book, magazine or other reading material which is being used, and, in the case of a thick book is of course determined by the portion of the book which is being used, the scanning of pages near the back of the book requiring a smaller spacing between the support board 20 and the guide 16 then the scanning of pages at the front of the book, where most of the thickness of the book will appear between the board 20 and the guide 16. The user selects a pair of slots 140 appropriate to maintain the guide 16 and the board 20 parallel when the guide 16 rests on the reading material which is in turn supported by the board 20, the lower end of which rests on the table or desk upon which the machine is placed.

It will be noted in the drawing that the inner ends of the slots 140 are not disposed in a vertical line, but are disposed in the shape of an arc, the ends of slots 140 which are most withdrawn from the front edge of the side plates 36a and 36b being those more or less central between the pivot point of the guide 16 and the bottom of the machine. In explanation of this arcuate disposition of the ends of the slots 140, which constitute manually selectable support points for the inner end of the support board 20, it is to be pointed out that changing the elevation of the inner end of the support board 20 would effect a relative "sliding" change of position between the board 20 and the guide 16 if the selectable pivot points for the board 20 were disposed along a straight line. Remembering that the outer end of the support board 20 will rest on the table or other flat support upon which the machine is placed, and further remembering that the reading material placed between these two members will hold them substantially parallel, it may be seen that the change of angle of the support board 20 with reference to the table which would be effected by changing the support point of the inner end of the support board would, if such support points were disposed along a vertical line, produce an effect whereby a plane normal to the support board and extending through the outer edge 14 of the masking curtain or shutter 12, for any given position of the shutter 12 on the guide 16, would intersect different lines on the support board 20. Thus, if the stop 114 were set to make the inner position of the shutter 12 correspond exactly with the commencement of the printed matter on a page in one position of a book the lower edge of whose cover is engaged by the upward flange 24 provided at the lower edge

of the board 20, then as progress is made through the book, requiring adjustment of the position of the support board 20 to accommodate an increased or decreased thickness between the support board 20 and the guide 16 and permit these members to remain parallel, in the new position of the support board the lower edge 14 of the mask 12 would no longer be exactly above the commencement of the printed material on the printed page, assuming that all the pages are identical as to top and bottom margin, etc. Thus if the selectable positions of the inner end of the support board 20 were along a vertical line, it would be necessary in using the machine on different portions of the same book either to adjust the stop 114 or to change the longitudinal position of the book on the board 20 in order to maintain the withdrawn or innermost position of the edge of the shutter 12 in alignment with the commencement of the printed matter. Such alignment is necessary in order to prevent masking of the first few lines on a page or, on the other hand, leaving of a margin permitting the reader to obtain a "head start" on the printed material. Upon study, it will be seen that in order to secure such correspondence for all positions of the board 20, and corresponding thicknesses of reading material, the support points of the board 20 may be disposed in an arc to eliminate the "sliding" effects caused by change in the angle made by the parallel members with the flat surface upon which the machine rests and change in the distance between these parallel members. The exact shape of the arc along which the support points of the board 20 should be disposed, i. e. the shape of the arc describing the required distance of withdrawal of the inner end of the support board from the front of the machine for various heights of support may be determined by means of trigonometry for any given position of the pivot point of the guide 16, and length of the board 20. More simply, the arc may be constructed with drafting instruments on a scale drawing for any particular dimensions.

The mechanism for driving the drum 52 at manually selected constant speeds may now be described. Synchronous motor systems employing cone drives for speed variation have heretofore been used in machines of the type with which the invention is concerned. However, it is found that in order to drive the masking shutter, whether of the curtain type herein illustrated, or of the bar type (wherein only the portion of the reading material just above the outer edge of the shutter is masked, the shutter consisting of a bar directly driven by the motive mechanism, or of a bar and rigid or flexible members which are driven by the motive mechanism) the synchronous motor employed as the drive must be of substantial power in order to produce constant speed stall-free driving action. This problem is aggravated by the fact that the actual motive mechanism of synchronous motors ordinarily runs at speeds of the order of 3600 R. P. M. and that the gearing required to bring the speed down to the order of 1 R. P. M. introduces a substantial additional load by reason of friction and inertia of the gearing system. In the illustrated embodiment of the present invention, a synchronous motor of very low power is employed to control the speed at which the shutter is driven, the driving power being supplied by a simple spring which of course could not otherwise drive the shutter at a constant speed. The advantage of this simple and inexpensive mode of operation arises from two sources. In the first place, the friction in the gearing is now removed from the load of the synchronous motor and instead appears as a load upon the spring, which can of course be designed for substantial power at very little expense; in the preferred mode of operation in accordance with the present embodiment of the invention, the spring not only aids the motor, but always tends to over-drive the motor, thus preventing irregularity of operation due to back-lash in the gear train. In the second place, it is found that a synchronous motor is able to maintain its constant speed against forward torque or force loads which would be easily large enough to stall the synchronous motor were such torque or force loads applied as backwards or retarding loads. Thus, this aspect of the invention diminishes both the bulk and expense of the synchronous motor employed and also increases the reliability of constant speed of operation.

With understanding of the basic principle of the drive mechanism as described immediately above, the structure of the drive mechanism shown in the drawing and the purpose and advantages thereof may be more readily understood. A motor support bracket 150 is pivoted on the tie rod 38c and is biased in the general direction of the drum 52 by a spring 152 having one end secured to the bracket 150 and other end secured to the tie rod 38d. A synchronous motor assembly comprising synchronous motor 158 and a speed-reducing gear train 160 are mounted upon the bracket 150. The synchronous motor assembly is not illustrated in detail in the drawing, since the motor and gear train assembly is of the type which will readily be recognized by persons skilled in the art as being commercially available from many manufacturers, the motor proper and the gear train being incorporated in a single unit and commercially designated by the mere term "synchronous motor" although in fact the assembly contains both a motor and a gear train 160. There are provided a power switch 161 and an "On-Off" pilot light 163. Journalled in the bracket 150, and having a shaft coupled to the gear train 160 is a rubber-like generally cone shaped hollow friction gearing member 162 of a hard plastic material. It will thus be seen that the cone member 162 rotates at a constant speed.

Pivotally mounted on the tie rod 38b is a carriage 170 having extended arms 172 which engage, and are slideable on, the tie rod 38b, which thus constitutes a track parallel with the axis of the drum 52 upon which the carriage 170 may be moved from side to side. The carriage 170 extends upwardly through a slot 176 in the top cover 32a of the housing, so that the carriage 170 may be moved along the rod 38b manually. The carriage 170 extends through the region between the drum 52 and the cone 162, and has at the end thereof slotted depending arms 180 defining a yoke or guide, an idler wheel comprising a hub 182 and a rubber or rubber-like tire or liner 184 being disposed in and guided by the yoke so formed, the arms 180 preventing sidewise motion of the idler wheel 182. The idler wheel is on a short shaft 186 which is slideable in the longitudinal slots 188 in the arms 180, the ends of the shaft 186 being secured to the ends of springs 190 the other ends of which are attached to the carriage 170 so as to bias the wheel 182 upwardly in the slots 188. The shaft 186 on the idler wheel 182 and the shaft 50 on the drum 52 are parallel. The axis of the cone 162 is so disposed with re-

spect to the axis of the idler wheel 182 and the drum 52 that the periphery of the idler wheel 182 is in contact with both the cone 162 and the drum 52 (or the portion of the shutter 12 wound thereon) in all positions of the carriage 170 along the tie rod 38b. A plunger 200 extends downwardly through the carriage 170 but is biased upwardly by a spring 202 into a position wherein a bevelled portion 204 thereon is in tight contact with the rod 38b, thus locking the carriage 170 in position along the rod 38b. When the outer end of the plunger 200 is pressed, as by the thumb of the user, the inner end of the plunger strikes the wheel 182 and overcomes the force of the springs 190 to disengage the idler wheel 182 from both the cone 162 and the drum 52. At the same time, the bevelled portion 204 of the plunger 200 is withdrawn from the rod 38b, and the carriage 170 may be freely moved along the rod 38b to set the machine for another speed of passage of the shutter 12 over the reading material.

A spring 210 has one end wound upon the hub 58 of the drum 52 and the other end secured to the tie rod 38d. The spring 210 provides the actual motive force for driving the drum 52, the balance of the drive mechanism serving as a speed control. It will be seen that the spring 210 after manual rotation of the crank 34 to bring the curtain 12 to its uppermost position as determined by the stop 114 will, upon release of the crank, rotate the drum 52 in a direction to unwind the shutter 12 from the drum (the clockwise direction in Figs. 3 and 10). The small amount of friction which exists between the drum 52 (or the shutter 12) and the tire 184 of the idler wheel, will tend to urge or wedge the idler wheel 182 upwardly between the cone 162 and the drum 52. There is thus assured tight coupling of the cone 162, the idler wheel 182 and the drum 52 as the drum is urged by the spring 210 to unwind the shutter 12 from the drum. The drum will thus unwind the shutter at a constant speed which speed may be varied by varying the position of the carriage 170 on the rod 38b. It will be noted that if the cone 162 were a right circular cone, as is common in cone drives, equal increments of motion of the carriage 170 would produce equal increments of speed of the shutter 12. However it is found that in use of a device of the type herein described, a more advanced reader will, with any given time of practice, require a greater increment in the rate of progression of the shutter 12 (in terms of inches per minute or words per minute) than will a slower reader. Therefore the cone is made somewhat concave, describing a solid of revolution about the apex of a curved, rather than a straight line, the curve generating the cone being of the general character of an exponential curve, so that equal movements of the carriage 170 along the rod 38b produce changes of speed more equal to similar units of progress in the various speed ranges than would be the case were the cone 162 a true right circular cone.

The drum 52 will continue to eject the shutter 12 down through the guide 16 until a protrusion 220 on the periphery of the crank 34, bearing the handle 70, strikes a thumb-screw 222 secured to the outer surface of the side plate 36a. This point corresponds to the point where the lower end 14 of the shutter 12 is at the bottom or outer end of the guide 16, as illustrated in Fig. 2. When the drum 52 thus stops rotating, the frictional force urging the wheel 182 upward between the cone 162 and the drum 52 is withdrawn, and the continued rotation of the cone 162 tends to drive the idler wheel 182 out of secure engagement with the drum 52. It will be understood that the springs 190 exert extremely small force, barely more than necessary to support the wheel 182 against gravity. Thus the springs 190 do not hold the wheel 182 in secure engagement with the drum 52, the secure and tight engagement being only obtained when the drum 52 is rotating in the direction to feed the shutter 12 outwardly and thus wedging the wheel 182 between the drum 52 and the cone 162. Therefore, when the drum so ceases rotation the friction exerted on it, or upon the portion of the shutter 12 which is actually in contact with the wheel 182, is negligible. Likewise, this friction is sufficiently small so that when the crank 34 is manually operated to reset the shutter 12 to the top of its path, this may be done without damaging, stalling, or otherwise interfering with the continued forward rotation of the cone 162. Upon manual release of the crank 34, after the resetting operation, the idler wheel 182 is again wedged into secure frictional contact with both the cone 162 and the drum 52.

Removal and replacement of the flexible shutter curtain 12 may be done without opening the housing. The extreme forward position of the shutter as dictated by engagement of the thumb screw 222 by the protrusion 220 on the crank 34 brings lugs 78 and perforations 80 to the top of the drum 52, as illustrated in the dotted position of lugs 78 in Fig. 3 (corresponding to the clockwise position of the crank 34 in the same figure). In this position the shutter 12 is still secured to the drum 52. However, by removal of the thumb screw 222, the drum 52 may be rotated beyond this position to the position wherein the lugs 78 and perforations 80 are opposite the gap in the retaining bands 90 between the tie rods 38a and 38f, and the curtain or shutter 12 is thus easily removed from the drum 52. In this same position, a new shutter 12 may be placed on the drum. The rib 72 on the interior of the crank 70 strikes the lug 74 to prevent further manual rotation of the drum 52 which might otherwise wind the spring 210 in the wrong direction on the hub 58 when the thumb screw 222 is absent and thus damage the mechanism. Likewise, in order to safeguard against excessive cranking of the drum 52 when its motion is not limited by the engagement of stop 114, as when no shutter is on the drum, the rib 72 strikes the lug or stop 76 to prevent damage to the spring 210 due to overwinding.

There is herein illustrated and described, in accordance with the patent laws, a single embodiment of the present invention. Persons skilled in the art, upon reading of the above description and inspection of the drawing, will readily have suggested to them many modifications and will readily adapt the teachings of the invention to reading-teaching and other devices which, although far different in appearance and operation, nevertheless are adapted to incorporation of some or all of the inventive improvements herein described. Therefore, the scope of the invention shall not be deemed to be limited by the particular machine herein described but shall be defined only by the attached claims.

A divisional application Serial No. 322,789, filed November 26, 1952, claims subject-matter which is disclosed, but not claimed, herein.

What is claimed is:

1. In a reading-training device, in combination, a rotatable drum, a flexible shutter member

wound upon the drum and having the outer end thereof extending tangentially from the drum, mutually engaged fastening means on the drum and on the inner portion of the shutter member disengageable by radially outward motion of said inner portion of the shutter from the drum, means coupled to the drum operable to rotate the drum in a direction to unwind the shutter from the drum, and a removable stop member engaging the drum to fix an extreme unwinding rotational position of the drum short of the position wherein the fastening means are at the point of tangency of the shutter to the drum, whereby the inner end of the shutter remains in fixed position on the drum when the removable stop member is in place, but may be removed from the drum for replacement by contained unwinding rotation thereof upon removal of said stop member.

2. In a reading-training device, in combination, a housing, a drum journalled in the housing, a flexible shutter member wound upon the drum and having the outer end thereof extending tangentially from the drum through the housing and having transversely spaced apertures near the inner end thereof, lugs protruding from the drum and engaging said apertures in the shutter to fix the position of the inner end of the shutter upon the drum, a first stop member limiting rotation of the drum in the direction of winding the shutter on the drum, means coupled to the drum operable to rotate the drum at manually variable constant speed in a direction to unwind the shutter from the drum, and a removable stop member affixed to the housing and engaging the drum and limiting rotation of the drum in the direction of unwinding the shutter from the drum, the rotational path of the drum between the limits imposed by said stop members excluding the position wherein the lugs are at the point of tangency of the shutter to the drum, whereby the inner end of the shutter remains in fixed position on the drum when the removable stop member is in place, but may be removed from the drum for replacement without opening the housing by continued unwinding rotation of the drum upon removal of said removable stop member.

3. In a reading-training device, in combination, a frame, a guide pivoted on the frame, a line-indicating member, means for driving the line-indicating member over the guide, a reading material support, and cooperating support means on the frame and on the reading material support for supporting the inner end of the reading material support at selectable varying distances below the pivotal axis of the guide, the outer end of the reading material support being free to rest on a table or other support upon which the device is placed.

4. The apparatus of claim 3 wherein the cooperating support means support the inner end of the reading material support along an arc to maintain constant the relative longitudinal position of the guide and the reading material support.

5. In a reading-training device, in combination, a housing, a guide pivoted on the housing, a line-indicating member, means for driving the line-indicating member over the guide, and a reading material support beneath the guide having one end pivoted on the housing and the opposite end free and adapted to rest on a table or other support upon which the reading-teaching device is placed.

6. In a reading-training device, in combination, a shutter, a rigid guide supporting said shutter, said shutter being slideable over the guide, a member projecting from the surface of the shutter, and a fixed stop member engaging said projecting member to fix a terminal position of the shutter, said stop member having an offset portion closely clearing said projection, whereby abutment of the projection against the offset portion prevents the application of bending torque to the shutter.

7. In a reading-training device, in combination, a shutter guide comprising opposed channel members having an upper web and a lower web extending further inward than the upper web, a flexible shutter member having its side edges resting on the lower webs of the channel members, the width of the shutter being less than the space between the upper webs of the channel members but greater than the space between the lower webs, means for driving the shutter member over the guide, and a rigid bar affixed transversely of the flexible shutter and having its ends slideably engaged between respective upper and lower webs, whereby the shutter is prevented from sagging but may be removed from the guide merely by disconnection of the shutter from the bar.

8. In a reading-training device comprising a housing, a shutter guide extending from the housing, a shutter, and means within the housing for driving the shutter over the guide, the improved construction wherein the shutter guide consists of two parallel side members and an outer end member affixed thereto, and there are provided cooperating mounting means on the inner ends of the side members and on the housing disengageable by relative motion of the side members, and a shutter stop engaging and extending between the side members and longitudinally slideable thereon, whereby sliding of the shutter stop to the outer end of the guide permits disengagement of the guide from the housing.

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