

FIG. 11 is a diagrammatic wiring diagram with connected transistors, resistors and rectifier components of one of the series of amplifier circuits associated with the sensor head and photo-transistor components thereof for recurrently actuating each of the solenoids controlling the release of balls from the ball-retaining hopper illustrated in FIGS. 3-5 inclusive.

FIG. 12 is a schematic view of a sine wave form ensuing from alternating current transformer before rectification.

FIG. 13 is a schematic view of the wave form resulting from the pulsing direct current output of the rectifier circuit illustrated in FIG. 11 which is employed in the embodiment of our invention illustrated in the accompanying drawings.

FIG. 14 is a diagrammatic view of a 20 volt direct current regulated power supply employed in the embodiment of our invention shown in the annexed drawings and which is associated with a corresponding photo-transistor optical circuit connected to the sensor head as well as associated with one of the amplifier circuits illustrated in FIG. 11.

FIG. 15 is a top plan view, with cover and work-holder removed of the portable machine of our invention illustrated in the drawings; this view illustrating the drive means for the perforated endless belt with gear reduction drive units for the sensor head platform and linear actuator for the work-holder and associated manual control dial for adjusting work holder movement for various line arrangements of delineated characters in different works.

FIG. 16 is a plan view of the line to line adjustment dial shown in FIG. 19 for varying the movement of the work-holder to accommodate for the different line to line arrangements of delineated characters in works set up to be tactually sensed by a blind person.

FIG. 17 is an elevational view of a fan-shaped sensor head including lenses and excitor lamps as well as individual photo-transistors and fragmentary portions of associated individual conductors for transmitting light energy to the components of the amplifier circuits illustrated in FIG. 11.

FIG. 18 is an elevational view of the pivotally mounted sensor head with depending casters which ride across the work when the sensor head is lowered to operating position and moved across the work, this view illustrating in fragmentary showing a cable in which the light conductors from the photo-transistors are carried.

FIG. 19 is a schematic longitudinal view of the sensor head carriage and mounting platform therefor and mechanism for effecting linear movement of the sensor head.

FIG. 20 is an end view of the mounting element for the sensor head carriage with ball bearings for facile sliding of the carriage in opposite linear directions.

FIG. 21 is a diagrammatic view of the interconnecting alternating current circuit; this view showing in block diagram the sensor head with limit switches at opposite extreme limits of the linear movement of the sensor during scanning of the delineated characters in the successive lines of a work.

In the embodiment illustrated in the accompanying drawings constituting views of the best mode of construction of the invention and showing the manner of using the same, it is clear that our present invention comprises, in combination with a movable photo-

optical sensor unit containing a plurality of photo-transistors, communicating with a like number of light conductors, as well as in combination with a like number of amplifier circuits activated by light energy transmitted by said light conductors and each containing an actuatable solenoid, a portable case housing and supporting all of the machine components, a work or text holder underlying said photo-optical sensor and movably mounted on said case, together with an endless perforated belt journaled on said casing, a hopper underlying the end of a predetermined section of said endless perforated belt for receiving and releasably-retaining a multiplicity of balls some of which are disposable and temporarily retained in the perforations of said belt when selectively released and disposed in predetermined assembled relationship on said belt in response to the re-energization of said solenoids, and means for recurrently moving said photo-sensor and said endless belt to enable scanning the lines of said text and temporarily assembling replicas of the delineated characters thereon in a read-out section of said perforated belt for tactual sensing by a blind person.

In accordance with our present invention, we provide an improved reading machine for the blind which, as hereinabove indicated, comprises seven principal components consisting of a portable case, a work or text holder, a photo-sensor unit with associated light conductors, a carriage for the photo-sensor unit, amplifier circuits with associated solenoids, an endless perforated belt with read-out section, a hopper for releasably-retaining character-building balls, and an interconnection electrical control circuit which are generally designated, respectively, by the reference numerals 3, 4, 5, 6, 7, 8 and 9 and 10 in the accompanying drawings. The portable case 3 may be fabricated of wood, metal or any suitable light in weight plastic material and conveniently houses and supports the aforementioned principal components compactly and in serviceable assembly for the convenience of the blind operator who may employ the machine under his sole control.

As particularly illustrated in FIGS. 1, 2, 6 and 7 of the annexed drawings, the endless perforated belt 8 is mounted for rotation on a drive drum 11 fixedly secured to a driven shaft 12 which is journaled in suitable bearings 13 secured in brackets 14 attached to the under side of the top 16 of the case 3; and we provide an end drum 17 suitably journaled in case 3 as well as an intermediate supporting drum 18 similarly journaled in case 3, about which three drums the endless perforated belt 8 is trained for rotation therewith. To insure a positive drive to the belt 8, we additionally provide a drive belt 19 which closely underlies and engages the endless belt 8 and extends between the drive drum 11 and the intermediate drum 18, such drive belt being fabricated of an endless solid continuous sheet of rubber, preferably, or of canvas or fabric webbing, and serves the additional function of retaining balls 21 within the perforations 22 of the endless belt 8 immediately upon their deposition into the perforations 22 and until the termination of a read-out section 23 of the upper reach of belt 8 which extends between the top center of drive drum 11 and the top center of the intermediate drum 18. When the drive belt 19 passes out of engagement with perforated belt 8 adjacent to the top center of intermediate supporting drum 18, the removal of support causes the balls 21 to drop by force of gravity from the perforations of belt 8 and enter into