[0024] **FIG. 8** is a side elevational view of the lamp assembly and lamp assembly door of **FIG. 7**.

[0025] **FIG. 9** is a rear elevational view of the display screen of the alignment device.

[0026] **FIG. 10** is a front elevational view of the display screen of **FIG. 9**.

[0027] **FIG. 11** is a sectional view taken along line **11-11** in **FIG. 10**.

[0028] **FIG. 12** is a front perspective view of the carriage assembly with the carriage in the viewing position

[0029] **FIG. 13** is a rear perspective view of the carriage assembly of **FIG. 12** with the mirror removed.

[0030] **FIG. 14** is a front perspective of the carriage assembly with the carriage in the blocking position and the blocking chuck raised.

[0031] **FIG. 15** is a rear perspective view of the carriage assembly of **FIG. 14** with the blocking chuck raised.

[0032] **FIG. 16** is a rear perspective view of the carriage assembly of **FIG. 14** with the blocking chuck in a lowered position.

[0033] **FIGS. 17***a-b* are a flow chart showing the operation of the alignment device of the foregoing figures.

DETAILED DESCRIPTION OF THE INVENTION

[0034] Referring now to the drawings, wherein the showings are for purposes of illustrating a preferred embodiment of the invention only, and not for purposes of limiting same, **FIGS. 1, 2, 5** and **6** show a lens blank alignment and blocking device **10** according to the present invention that includes a frame **12** having a front portion **14** and a rear portion **16**. The frame **12** further comprises a base **18**, a rear wall **20** extending from rear portion **16**, and a screen support **22** extending from base **18** approximately midway between frame front portion **14** and frame rear portion **16** in the same direction as rear wall **20**, which direction will be referred to as "up" with reference to these figures. To frame **12** are mounted, proceeding generally from the front portion **14** of frame **12** toward rear portion **16**, a motor support **24** supporting a motor **26**, a carriage assembly **28**, and a generally C-shaped optics housing **30** that extends from screen support **22** along base **18** to rear wall **20**, upwardly along rear wall **20** and back toward the front portion **14** of frame **12** ending at a screen **32** mounted on screen support **22**. The optics housing **30** includes a lamp housing door **34** in a sidewall thereof. A stage **36** is supported adjacent to frame **22** by an outer housing of lens blank alignment and blocking device **10** (not shown). Stage **36** is transparent and, as shown in **FIG. 3**, includes a central opening **38** surrounded by three pegs **40** for supporting a workpiece, such as lens blank **42** shown in **FIG. 2**, over central opening **38**.

[0035] Lens blank alignment and blocking device **10** projects an image of a workpiece supported on pegs **40** onto screen **32** using a projection system **34**, as best shown in **FIG. 4**, that includes cooperating lenses and mirrors, many of which are positioned inside optics housing **30**. The relative positions of the mirrors and lens are shown schematically in **FIG. 4**. The projection system **34** includes a lamp **44**, preferably a halogen lamp having a faceted reflector, such as typically used in movie projection and the like, directed at a first mirror **46** mounted above stage **36** and angled with respect to lamp **44** and stage **36**, such that light rays **48** from lamp **44** are directed downwardly on stage **36** and any workpiece supported thereon. A Fresnel lens **50** is mounted between first mirror **46** and stage **36** to collimate the light shining onto the stage **36**. A second mirror **52** is mounted beneath 'stage **36**, and, because stage **36** is transparent, an image **42'** of lens blank **42** is projected onto the second mirror **52**. Second mirror **52** is angled to direct image **42'** toward the rear portion **16** of the lens alignment and blocking device **10** and toward a third mirror **54**, the image **42'** passing through several condenser lenses **56** between the second mirror **52** and the third mirror **54** and upwardly along rear wall **20** through an image conditioning assembly **58** that includes various lens. These lenses include first, second and third achromats **60** for correcting chromatic aberrations that could degrade the image **42'**. The remaining lenses **62** further condition image **42'** by magnifying the image **42'** approximately 1.3 times and inverting the image for reasons explained hereafter. After leaving the image conditioning assembly **58**, the image **42'** is reflected off a fourth mirror **64** angled to project the image **42'** onto screen **32**.

[0036] Lens **42** includes reference markings **43**, best shown in **FIG. 1**. The reference markings are on the front or convex side **41** of lens **42**, the side that faces stage **36** and second mirror **52** on carriage assembly **28**. Therefore, it is an image of this front side **41** that is projected toward screen **32** by the projection system **34**. Certain prior art alignment devices required reference markings to be viewed through a lens, and therefore, fact that the images of the reference markings had been refracted had to be taken into account when aligning the reference markings on the lens with fixed reference markings. This problem is avoided in the present invention by viewing the reference markings from the side of the lens blank on which they exist rather than through the lens blank.

[0037] With reference to FIGS. **9-11**, screen **32** comprises a liquid crystal display (LCD) **66** mounted to front frame **68** connected to screen support **22**. A backlight **70** covers a first region **72** of the LCD **66** and the amount of illumination provided by the backlight is controllable via keyboard **83** and processor **82**. Second portion **74** of the LCD **66** does not include a backlight and is partially translucent. The LCD **66** comprises a polarizing layer **76** and a layer **78** of liquid crystal material sandwiched between front and rear planar supports **80, 81**. Rear surface **79** of planar support **81** includes a translucent film **87** on which projected image **42'** appears when the image is projected on screen **32**. The liquid crystal material lies essentially in a first plane, and the rear surface of screen **32** is formed by the translucent film **87**. The distance separating the translucent film **87** and the liquid crystal layer **78** is less than 1 mm and, preferably, less than about 0.5 mm, to minimize parallax between images produced in the liquid crystal layer **78** and images projected on the translucent film **87** on planar support **81**. The ideal separation would be 0 mm or as close thereto as possible given the physical dimensions of the LCD.

[0038] The LCD **66** is connected to a processor **82** having a memory **85**, as best shown in **FIG. 5**, in a well known manner and serves as a display for displaying images produced by processor **82** and characters input using keyboard **83** as best shown in **FIG. 1**. The first backlit region **72**