July 4, 1933. E. J. GRANT 1,916,567

APPARATUS FOR PRODUCING LIGHT BOUNDARIES

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Fig. 1

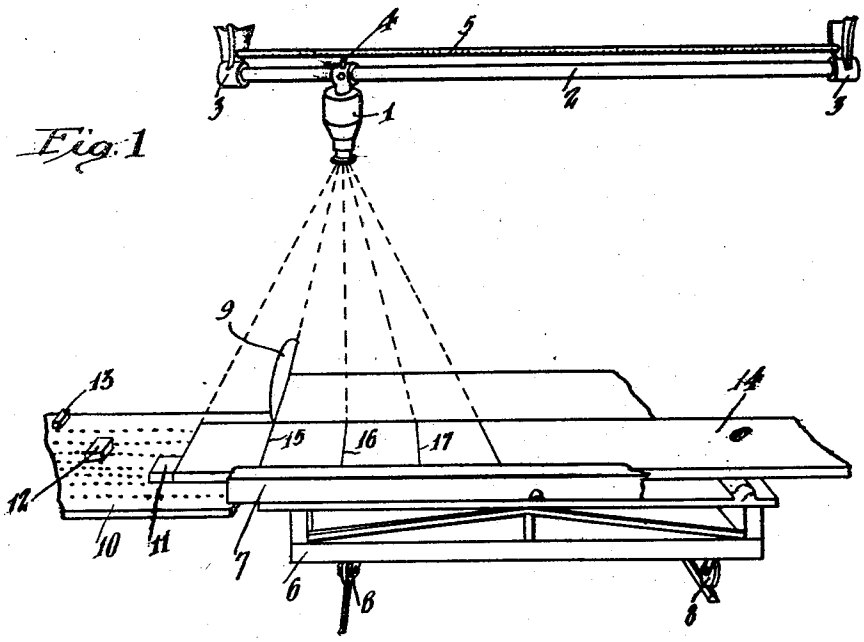
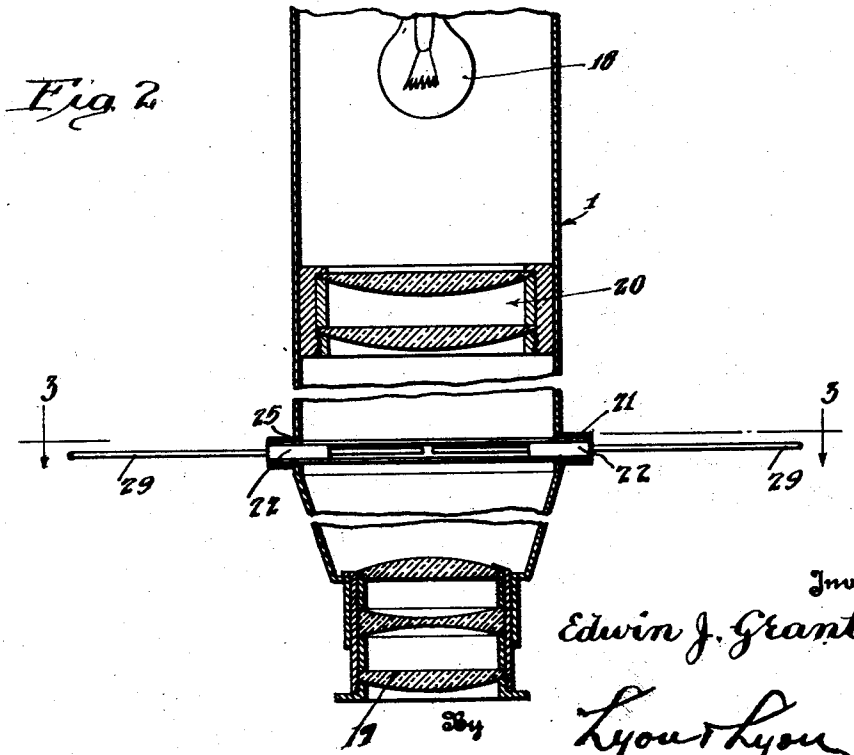


Fig. 2



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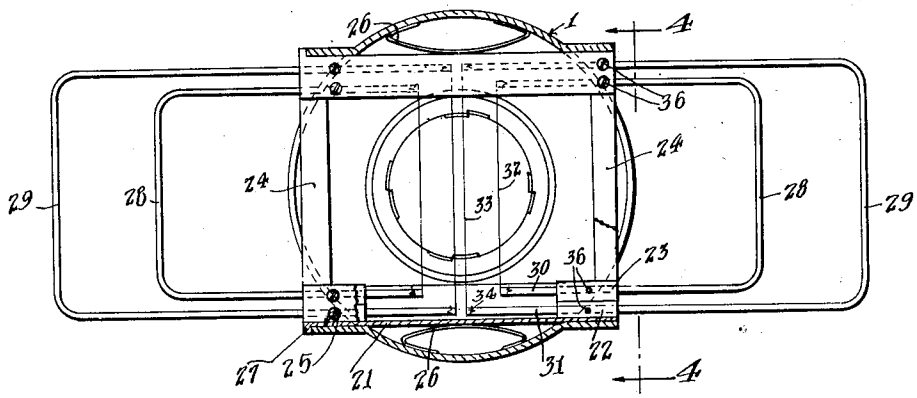


Fig. 3

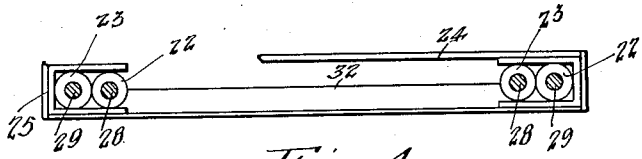


Fig. 4

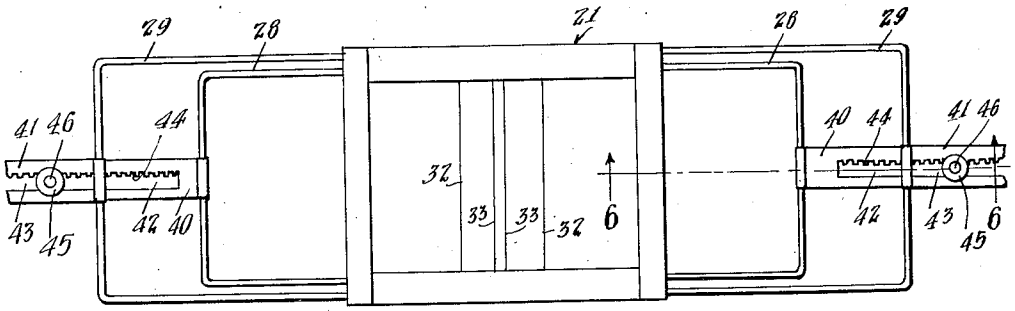
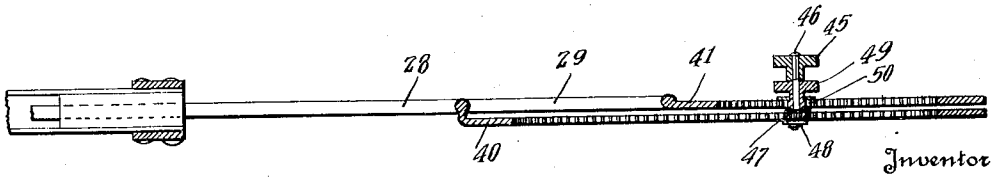


Fig. 5



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Fig. 6 Edwin J. Grant

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Fig. 7

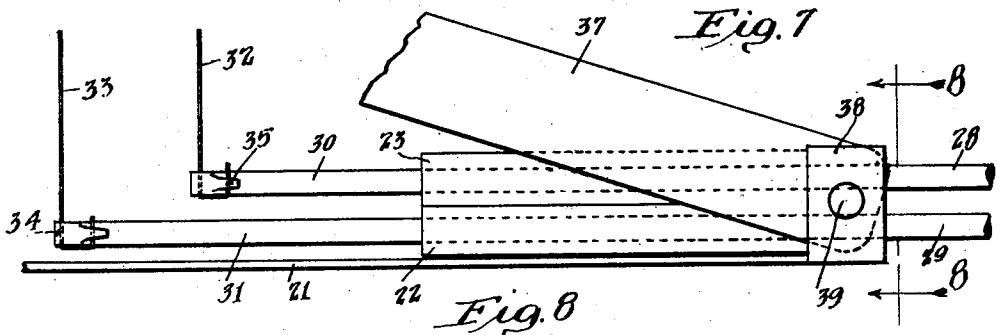


Fig. 8

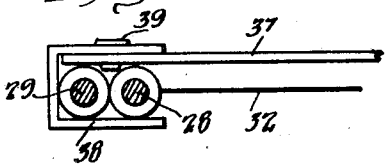


Fig. 9

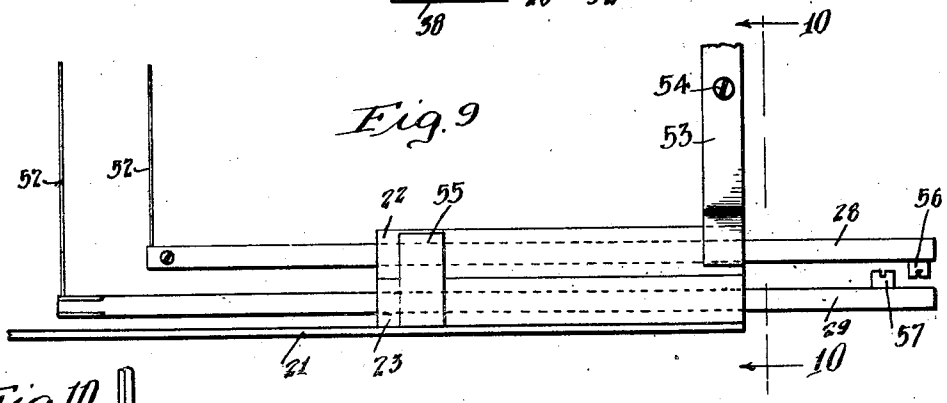


Fig. 10

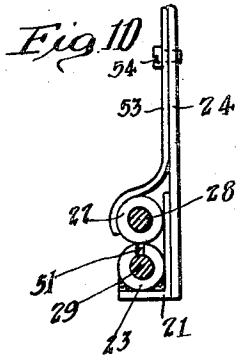


Fig. 11

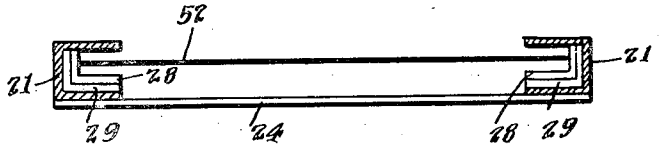
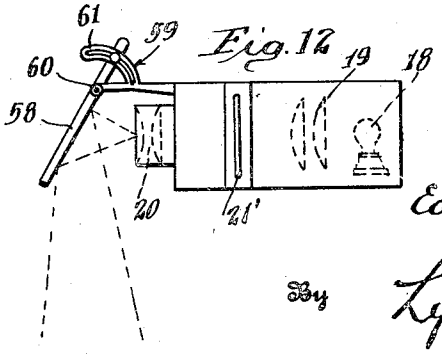


Fig. 12



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Patented July 4, 1933 1,916,567

UNITED STATES PATENT OFFICE

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APPARATUS FOR PRODUCING LIGHT BOUNDARIES

Application filed April 1, 1929. Serial No. 351,692.

This invention relates to an apparatus for producing and controlling light boundaries which are to be used for identifying, marking, measuring, or controlling purposes, during the operations of cutting, sawing, punching, shearing, or the like.

In application, Serial No. 323,080, filed December 1, 1928, relating to apparatus for and method of cutting material I have disclosed a method of coordinating cutting, shearing or punching means with material to be cut, punched or sheared by means of light boundaries projected upon the material. The present invention is an improvement upon a portion of the apparatus disclosed in the aforesaid application and more particularly relates to a light grating used in controlling and adjusting light boundaries projected upon the material being treated.

An object of this invention is to disclose and provide an apparatus for projecting light boundaries.

Another object is to disclose and provide an apparatus whereby light boundaries may be readily projected and adjusted.

Another object of this invention is to provide means for adjustably controlling delimeating members carried by a light grating.

The apparatus embraced by my invention is adapted for use in various operations, as has been stated hereinabove, but for purposes of illustration the adaptation of the device to the projection of light boundaries upon lumber to be cut will be described in detail. In describing the invention reference will be made to the attached drawings, in which:

Fig. 1 is a diagrammatic perspective of the apparatus showing one method in which it may be used.

Fig. 2 is a section of one form of projector which may be used.

Fig. 3 is a horizontal section partly broken away taken, approximately, along the plane of line 3—3 of Fig. 2.

Fig. 4 is a vertical section taken along line 4—4 of Fig. 3.

Fig. 5 is a plan view of a portion of a modified form of device.

Fig. 6 is a side view, partly in section, of the device illustrated in Fig. 5.

Fig. 7 is a plan view of another form of light grating made in accordance with this invention.

Fig. 8 is a vertical section taken through a portion of the device illustrated in Fig. 7.

Fig. 9 is a plan view of a portion of another modified form of light grating embraced by this invention.

Fig. 10 is a vertical section taken along line 10—10 of Fig. 9.

Fig. 11 is a modified form of light grating.

Fig. 12 is a diagrammatic representation of a modified form of projector adapted to be used in combination with the light grating.

Referring to Fig. 1, which illustrates one manner of using the invention, the projector 1 may be adjustably mounted above the material upon which the light boundaries are to be projected. For example, the projector 1 may be slidably mounted upon a shaft 2 suspended from a suitable support by means of brackets 3. The projector 1 may be provided with a pointer 4 adapted to cooperate with an index or scale 5 positioned above the shaft or guide 2.

Below the projector there may be positioned the machine or other apparatus which saws, cuts, punches or shears the material to be treated. In the embodiment shown in Fig. 1, a movable saw table 6 provided with a forward guiding edge 7 may be positioned upon guides and rollers 8 so as to move in a plane parallel to the cutting plane of a circular saw 9. A stop table 10 may be positioned beyond the cutting plane of the saw 9, suitable stops 11, 12 and 13 being positioned upon the stop table 10 at predetermined and preferred distances from the cutting plane of the saw 9. Material to be cut, such as for example, the board 14, may be placed upon the table 6 and against the edge 7 so as to extend beyond the cutting plane of the saw 9 against one of the stops 11, 12 or 13. The projector 1 may carry a suitable light grating so as to project light boundaries 15, 16 and 17 upon the material 14.

One of said light boundaries, for example

15, may form a continuation of the cutting plane of the saw 9, whereas the other light boundaries, say the boundaries 16 or 17 may be in spaced relation to the cutting plane of the saw 9, the distance between the cutting plane and the boundaries 16 and 17 being equal to the distance between the abutting faces of stops 11 and 12 and the cutting plane respectively. If desired a light boundary need not be projected upon the material to be worked in the cutting plane, but all of the light boundaries projected may be spaced from the cutting plane so that the distances marked out upon the material to be worked by said light boundaries is substantially identical to the distances between the various stops 11, 12 and 13 and the like and the cutting plane of the saw 9.

The projector 1, one form of which is shown in more detail in Fig. 2, may include a housing containing a suitable light source 18 and be provided with a projection lens system 19. In order to more effectively utilize the light from the source 18 a condenser lens system 20 may be positioned within the housing 1 of the projector. At a suitable point intermediate the condenser and projection lens system there may be positioned a light grating which, as more clearly shown in Fig. 3, may comprise a frame 21 carrying two sets of guides 22 and 23 at opposed ends of the frame 21. The frame 21 may be of channel iron or angle iron. The guides 22 and 23 may be tubular members suitably connected to the frame 21. The frame 21 may also include cross members 24. The projector 1 may be preferably provided with a suitable opening, such as the flanged opening 25, adapted to receive the frame 21 and guides carried thereby.

Springs or other suitable locking members 26 may be carried by the projector so as to retain the frame 21 within the projector. The frame 21 may be provided with stops 27 at one end thereof, said stops being adapted to cooperate with the ends of the flanges 25 so as to position the frame 21 within the projector.

Carrier members 28 and 29 may be slidably positioned in the guide members 22 and 23. If the guide members 22 and 23 are of tubular cross section then the carrier members 28 and 29 may be of cylindrical form so as to be slidably received within the guide members. It is to be understood that instead of using guide members 22 and 23 the carrier members may consist of channel shaped or other angular metallic elements adapted to telescope into the frame 21, the frame 21 thus acting as a guide. A form of light grating of this character is shown in Fig. 11.

One of the simplest embodiments of the invention comprises U shaped carrier members 28 and 29, the free ends of said U shaped members extending into the guide members 22 and 23. By having the guide members 22 and 23 in the same plane relative to the plane of the projection and condenser lens of the projector, the ends of the carrier members 28 and 29 are also in the same plane. Delineating members may be carried by the free ends of the carrier members 28 and 29. For example, the ends 30 and 31 of the carrier members 28 and 29 extending into the frame 21 may be provided with means for holding delineating members such as the wires 32 and 33, respectively. Instead of wires, ribbons or even solid members provided with slots may be used as delineating members.

Various means for attaching the delineating members to the carriers may be employed. One of the simplest means, when wires are used as delineating members, may comprise notches 34 cut in the ends of the carrier members and inclined notches or slots 35 cut in the sides of the carrier members 28 and 29 and their ends. The wires 32 may be passed through the slot 34 and then tightened into position by passing the wires through the inclined notches 35. This form of hitch is very suitable for the purpose and permits wires to be readily connected to the ends of the carrier members.

Means for locking the carriers 28 and 29 in position within the frame 21 may be provided. For example, as shown in Fig. 3, such locking means may comprise set screws 36 passing through threaded apertures in the guide members 22 and 23 and bearing against the carrier members 28 and 29 positioned in said guide members.

In order to provide access to the ends 30 and 31 of the carrier members 28 and 29 and to the locking means, such as the set screws 36, the frame 21 may be provided with a removable cover, such as, for example, the cover member 37, illustrated in Fig. 7. As shown in Fig. 7, the frame 21 is substantially in the form of an angle iron. Near one end of the frame 21 there may be a lug 38 extending over the guide members 22 and 23 and slightly spaced therefrom. A cover member 37 may be exteriorly connected to the lug 38 as by means of a pin 39.

As shown in Figs. 5 and 6, a modified means for locking the carrier members 28 and 29 in position and for adjusting the same relatively to each other may be employed. For example, extension members 40 and 41 may be provided, said extension members being connected by suitable means to the carrier members 28 and 29, respectively.

The extensions 40 and 41 are preferably in a plane parallel to the plane in which the carrier members 28 and 29 may be moved. The extensions 40 and 41 may be provided with alined slots or apertures 42 and 43, respectively, each of said slots being provided along one inner edge with rack gears 44. An adjustment means may be provided, such as, for ex-

ample, a knurled knob 45 mounted upon a pin 46 which extends through the longitudinal openings 42 and 43. A small spur gear 47 may also be mounted upon the pin 46, a locking nut and washer being positioned on the pin 46 on the opposite side of the members 40 and 41 from that on which the knurled knob 45 is positioned. A second knurled knob 49 may be rotatably mounted upon the pin 46 beneath the knob 45, the knurled knob 49 being rigidly connected to a secondary spur gear 50 adapted to engage with the rack gear made in one side of the slot 43 of the extension 41. The spur gear 47 is similarly in operative contact with the rack gear formed in one side of the slot 42 of extension member 40.

By loosening the lock nut 48 and manually rotating the knurled knob 45 while maintaining knob 49 from rotation, the rotatory motion may be imparted to the spur gear 47 and thereby translated into a longitudinal movement of the extension 40 which in turn imparts a longitudinal motion to the carrier member 28 relative to the carrier member 29 which is stationary. Similarly a rotary motion of the knurled knob 49 imparts a similar motion to the spur gear 50 which imparts a longitudinal motion to the extension 41 and the carrier 29. In this manner the two carrier members 28 and 29 may be moved accurately relatively to each other and locked in a desired position thereafter.

A modified form of light grating is shown in Figs. 9 and 10. Tubular guide members 22 and 23 are employed in this modification and cylindrical carrier members 28 and 29 are also employed. The modifications shown in the drawings facilitate the insertion of the carriers with delineating members attached and in that way obviates the somewhat awkward process of connecting the delineating members to the carriers while said carriers are within the guides and within the frame. These objects may be accomplished by the following construction:

The guide member 23 may be rigidly connected to the frame 21 by any suitable means, for example, by welding. A slot, or opening, 51 may extend longitudinally down the guide 23, the slot or opening 51 being substantially in the same plane as that assumed by the delineating members 52 carried by the carriers 28, 29. The adjoining guide 22 may rest freely upon the bottom portion of the frame 21 and be rigidly connected to spacing member 53 adapted to be positioned immediately above the cross piece 24 connected to the frame member 21. Means for connecting the spacing member 53 and the cross member 24 may be provided, such means comprising, for example, a machine screw 54. A lug 55 may be connected to the frame 21 or to the fixed guide 23 and extend over the guide member 22 so as to maintain the guide member 22 in operative position.

By means of this construction the end light grating may be disassembled by removing the machine screw 54 and then pulling the carrier member 28 together with its guide 22 and the spacing member 53 out of the frame 21.

It is not necessary to remove the delineating member carried by the carrier 28 in order to remove the carrier member from the frame 21. The delineating member carried by the carrier 28 may be adjusted exteriorly of the frame 21. After the carrier 28 has been removed, as described hereinabove, then the carrier 29 together with its delineating member 52 may be removed from the frame 21 by merely moving the carrier 29 longitudinally out of the frame 21, the delineating member 52 passing through the slot 51 of the stationary guide 23. By reversing the operations described hereinabove, namely, by inserting the carrier 29 into the frame 21 and then inserting the carrier 28 and its guide 22 into the frame, the apparatus may be assembled.

In order to prevent the delineating members carried by the carriers 28 and 29 from coming into forcible contact with one another, stops 56 and 57 may be carried by the carriers 28 and 29, respectively, exteriorly of the frame 21. The stops 56 and 57 may be machine screws inserted into the carriers 28 and 29 in such position as to come into abutting relation whenever the delineating members carried by the carriers 28 and 29 come into substantial contact.

In Fig. 12 is shown a diagrammatic representation of a projector adapted to be carried in projecting light boundaries in accordance with this invention. This projector may consist of a housing containing a light source 18, a condenser lens system 19 and a projection lens system 20. The frame carrying the delineating members is shown at 21'. A mirror 58 may be exteriorly supported as at 60 in front of the projection lens system 20 upon outwardly extending arms 59 projecting from the projector housing. The arms 59 may also carry a slotted sextant 61 cooperating with a pin and lock nut carried by the mirror 58 whereby the mirror 58 may be positioned at any desired angle to the plane of the projector lenses 20.

I claim:

1. In an apparatus for producing light boundaries on material for cutting, the combination of a housing provided with a light source and an aperture, a frame held by said housing between said light source and aperture, said frame lying in a plane transverse to the path of light from said source to said aperture, said frame being provided with a plurality of U-shaped carriers slidably mounted in each end of said frame, the open ends of said carriers extending toward the middle of said frame, and a delineating wire carried by and extending between the open

ends of each of said carriers, said delineating members lying in substantially the same plane transversely to the path of light from said source to said aperture, whereby a plurality of light boundaries may be cast by said light upon material to be cut.

2. In an apparatus for producing light boundaries on material for cutting, the combination of a housing provided with a light source and an aperture, a frame held by said housing between said light source and aperture, said frame lying in a plane transverse to the path of light from said source to said aperture, said frame being provided with a plurality of angle iron carriers of U shape in nested relation with each other slidably positioned in each end of the frame, the open ends of said carriers extending toward the middle of said frame, and a wire carried by and extending between the open end of each of said carriers, said wires lying in the same plane transversely to the path of light from said source to said aperture, whereby light boundaries may be cast upon material to be cut.

3. In an apparatus for producing light boundaries on material for cutting, the combination of a housing provided with a light source and an aperture, a frame held by said housing between said light source and aperture, said frame lying in a plane transverse to the path of light from said source to said aperture, said frame being provided with a plurality of U-shaped carriers slidably mounted in each end of said frame, the open ends of said carriers extending toward the middle of said frame, and a delineating wire carried by and extending between the open ends of each of said carriers, said delineating members lying in substantially the same plane transversely to the path of light from said source to said aperture, and means for adjustably positioning each of said carriers relatively to the other within said frame, whereby a plurality of light boundaries may be cast by said light upon material to be cut.

Signed at Los Angeles, Calif., this 1st day of March, 1929.

EDWIN J. GRANT.