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DeGroot et al.

[11] **3,894,360**

[45] **July 15, 1975**

[54] **SUPPORT-SHIELDING BLASTING MACHINE BLADE**

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[73] Assignee: **Benfur Engineering Company**, Grand Rapids, Mich.

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[21] Appl. No.: **465,550**

[52] **U.S. Cl.** ..... **51/9 R**; 241/275

[51] **Int. Cl.** **B24c 5/06**

[58] **Field of Search** ..... 51/9 R; 241/275, 300

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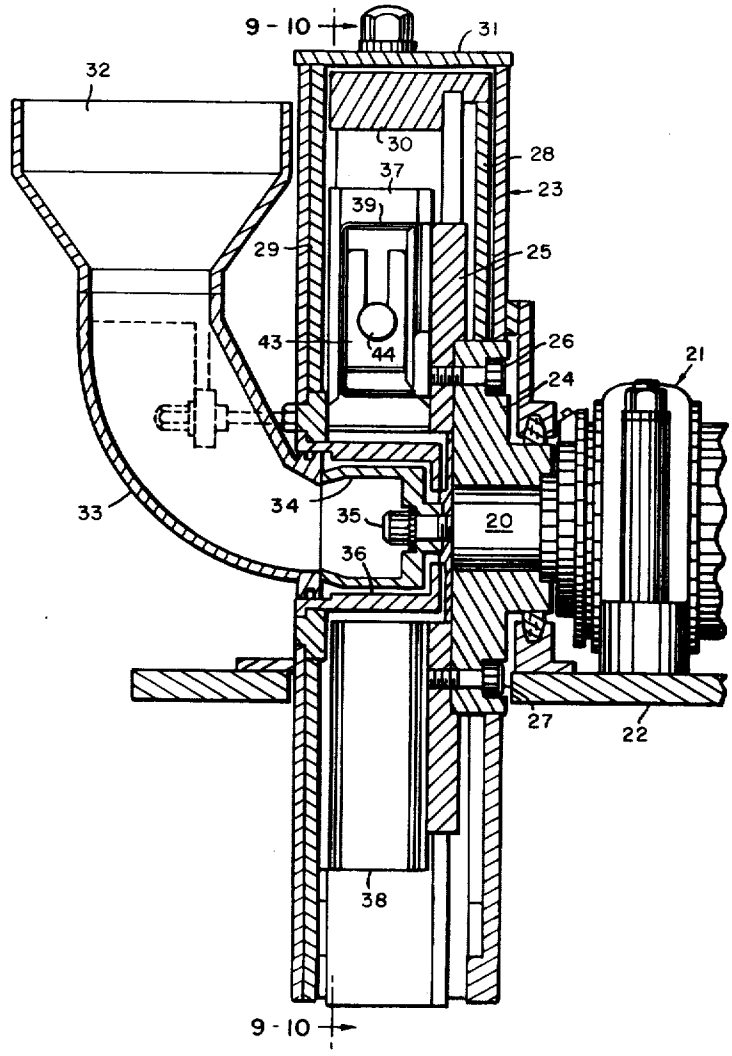
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[57] **ABSTRACT**

A blasting machine blade is mounted so that the blade configuration shields the blade support from exposure to abrasive particles.

2 Claims, 10 Drawing Figures



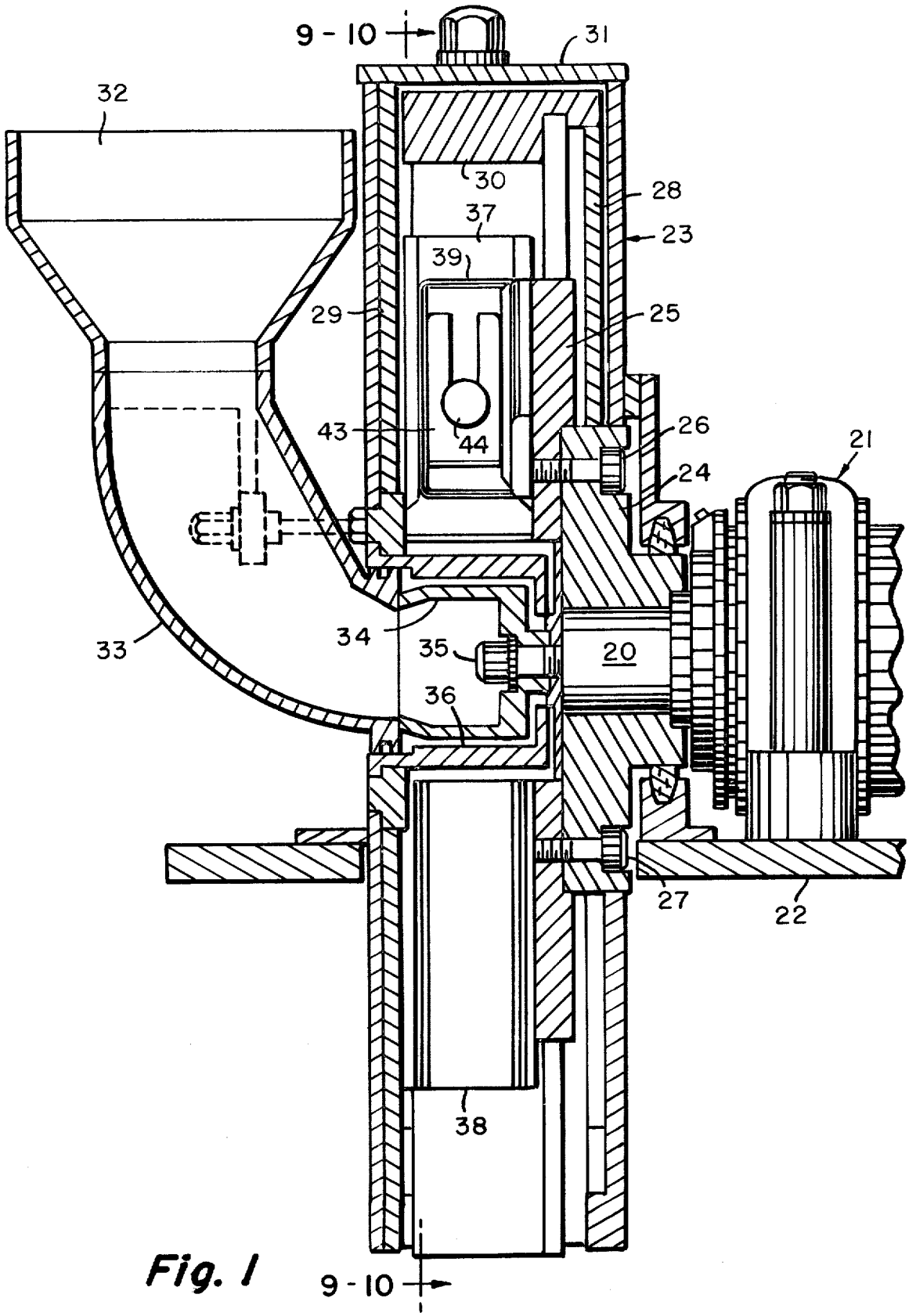

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Fig. 1

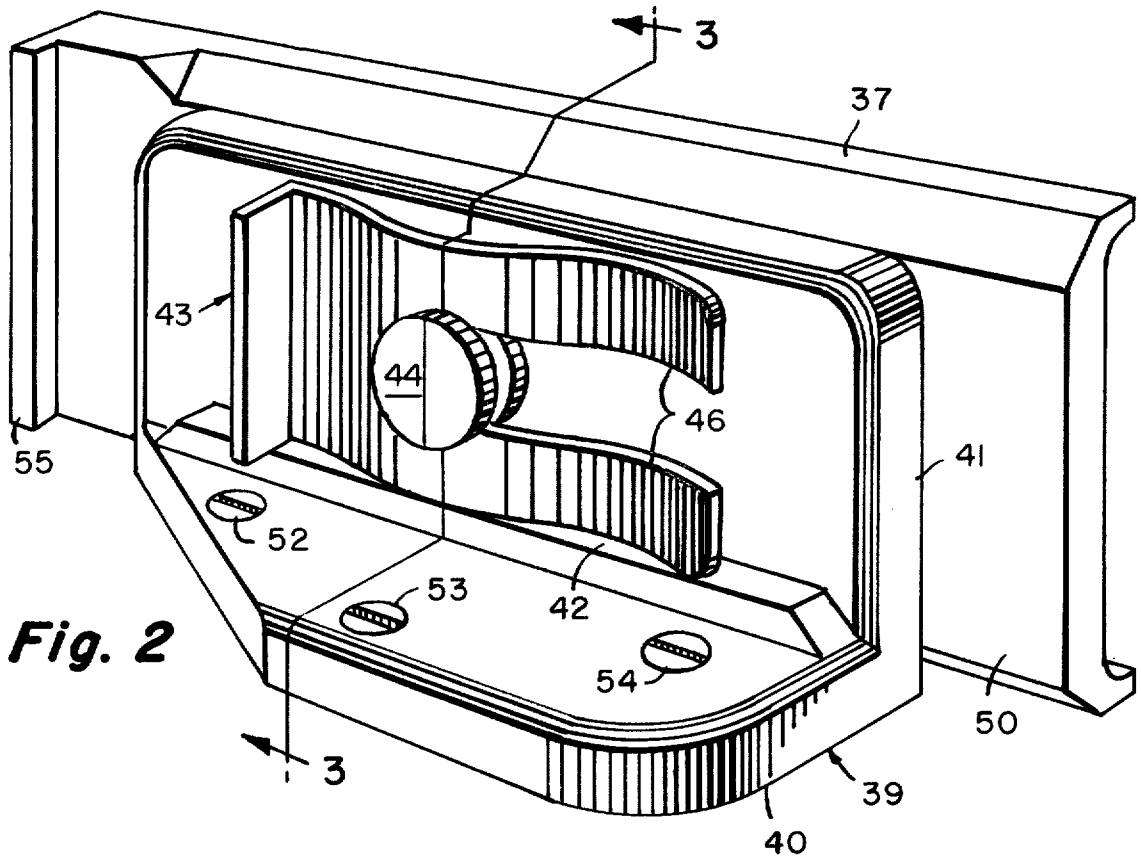


Fig. 2

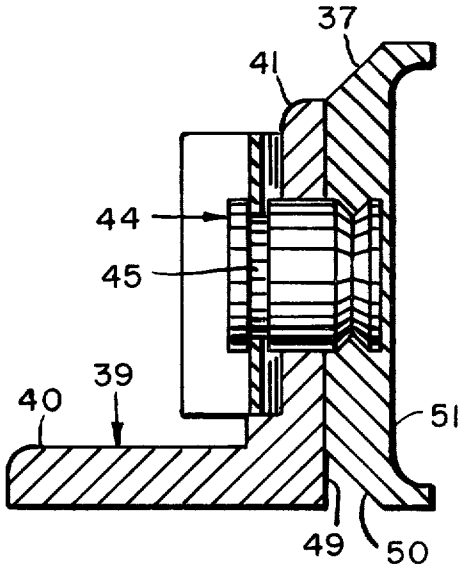


Fig. 3

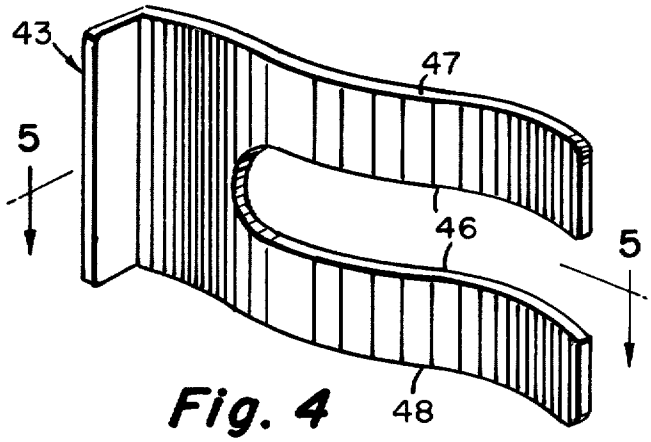


Fig. 4



Fig. 5

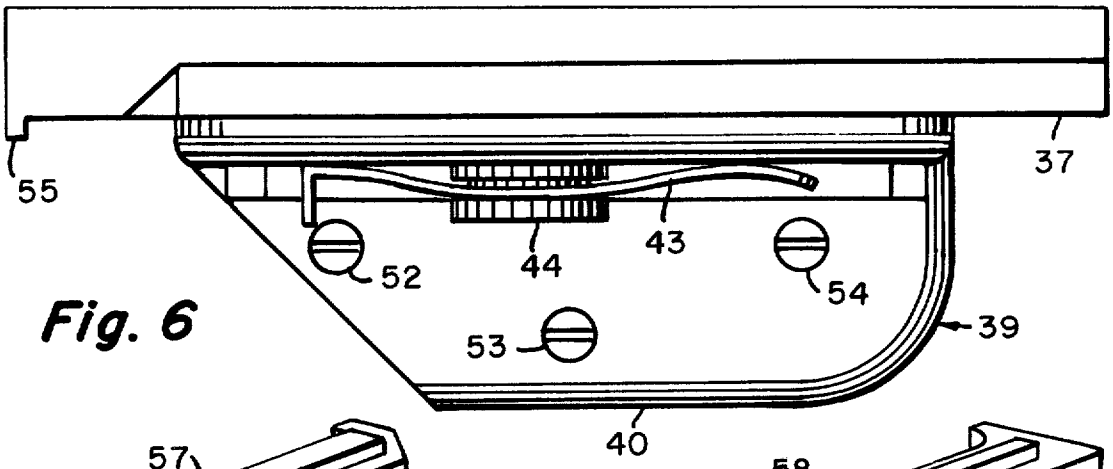


Fig. 6

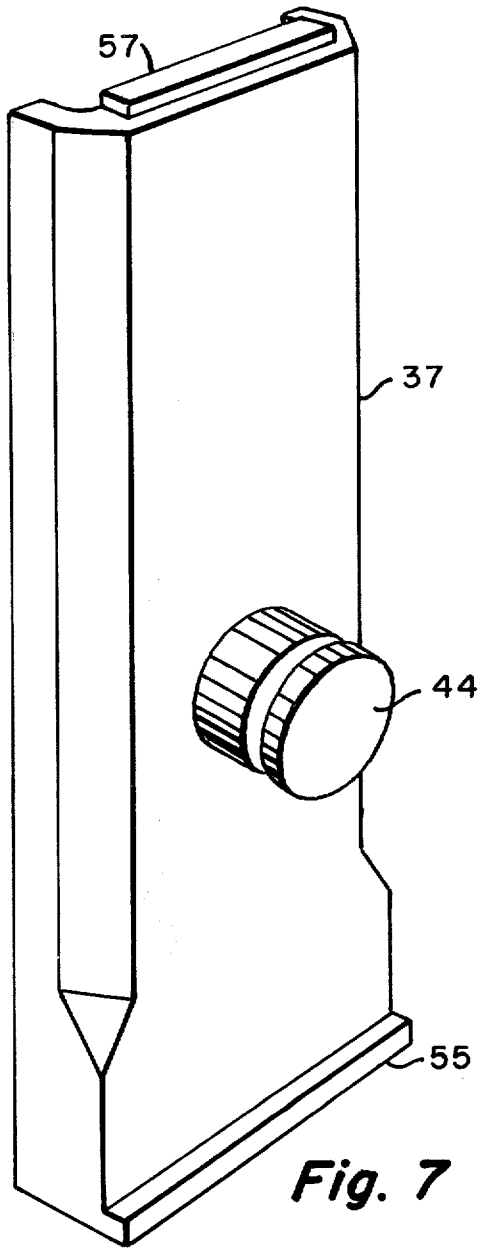


Fig. 7

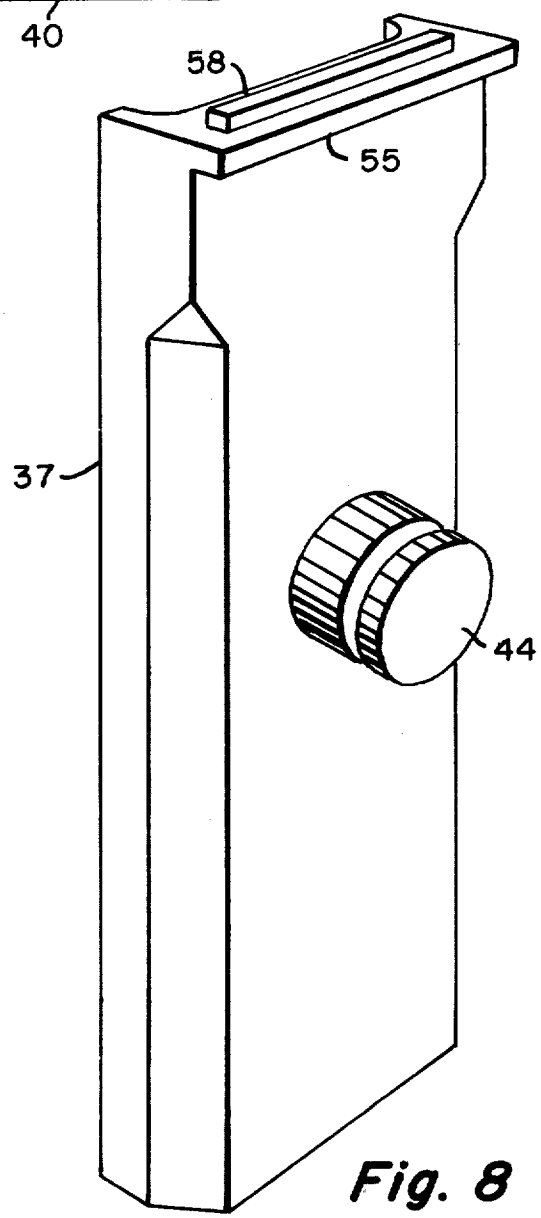


Fig. 8

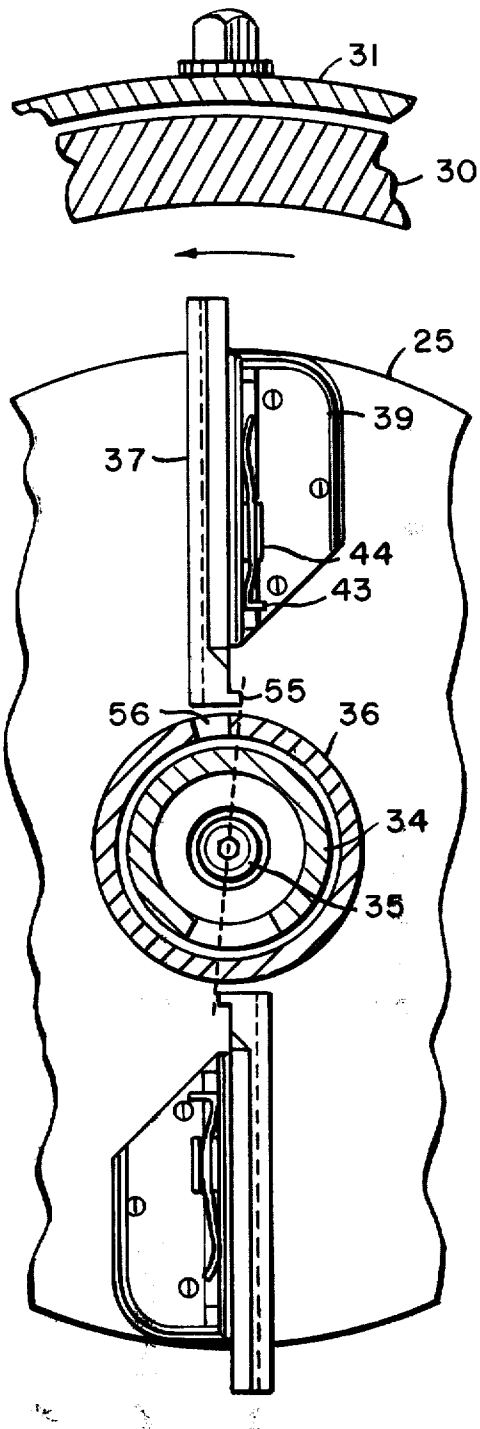


Fig. 9

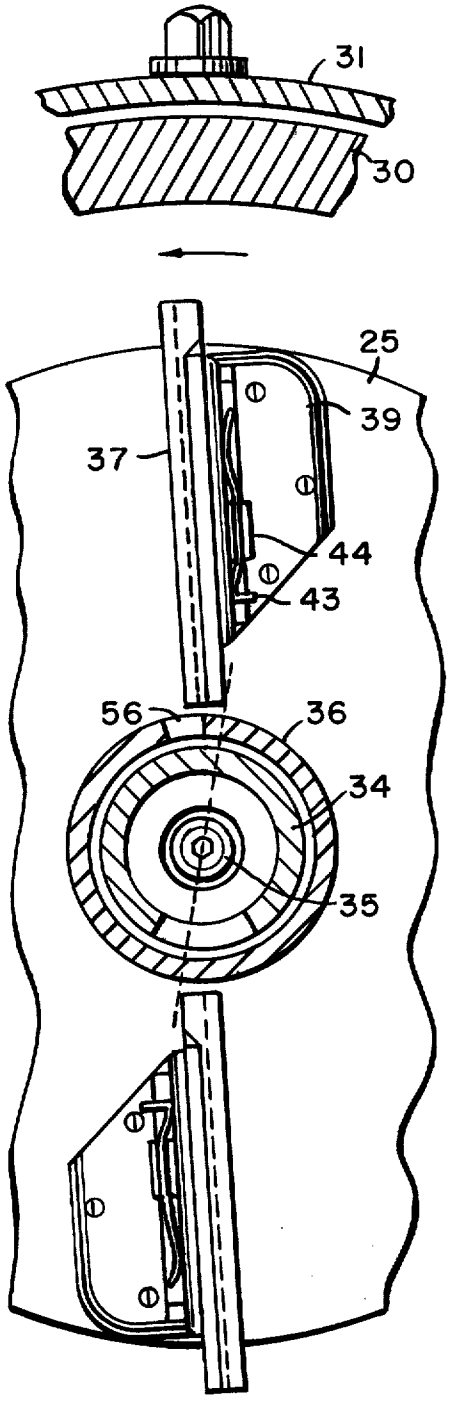


Fig. 10

SUPPORT-SHIELDING BLASTING MACHINE BLADE

BACKGROUND OF THE INVENTION

The general function of a blasting machine is to project a high-velocity stream of abrasive particles at various objects for the removal of scale or other deposits. It is common practice to clean metal castings with this procedure in preparation for painting or plating operations. The stream of particles is generated usually by a machine having a rotor with the general shape of paddle wheel. The inner ends of the blades terminate radially outward from the axis of rotation, providing a space in the central portion of the rotor into which a supply of the abrasive particles can be inserted continually during the operation of the machine. A control device limits the point at which the particles are permitted to move radially outward under the action of centrifugal force into the area swept by the blades, so that the final position of the tangential stream of particles can be controlled.

The highly abrasive nature of this stream of particles creates a necessity to use an extremely hard and abrasion-resistent material for the blades, and to replace them frequently. A variety of systems have been devised for releasably securing the blades to the rotor, one of these arrangements being described in our co-pending application Ser. No. **404,273,** filed in the U.S. Pat. Office on Oct. **9, 1973,** and now abandoned. In the machine disclosed in that application, the blades are mounted on brackets having an angular cross-section producing flanges having a **90°** relationship to each other. One of these flanges is secured to a plate forming the frame of the rotor, with the other flange providing a mounting surface receiving the blades. A locking system for interengaging the blades with this support flange is described and claimed. The present application is associated with this type of machine, and is directed at removing one problem that has emerged during the operation of such machines. Vibration in the machine appears to induce a tendency for the blades to bounce slightly on the support brackets. This is accompanied by a slight flexing of the holding spring. During the short periods in which a gap exists between a bracket and a blade, fine particles of abrasive tend to enter and lodge in this space. Accumulation of these ultimately distorts the operating position of the blade enough to present two problems. One is the resulting shifting in direction of the abrasive stream, and the other is an uneven distribution of wear on the blade as the stream tends to follow the most rotatively trailing blade area. The primary accumulation of particles has been noted adjacent the rotor plate, resulting in a slightly trailing position of the opposite edge of the blade. The necessary resilience of the leaf-spring retaining clip can permit enough flattening to accommodate a considerable accumulation of material. Once the tilting in this direction develops, the intruding mass of particles forms an inviting trap for succeeding accumulation.

This problem obviously will occur in some applications, and not in others. The sizes of abrasive particles in use, the number of blades on the machine, and the relative placement of the various surfaces responsible for the induction of movement of the particles will all influence the path taken by them. In summary, the machine as disclosed in our co-pending application Ser.

No. **404,273** will work better under some applications than in others, and it is the purpose of the present invention to remove the problem of abrasive lodging between the back of the blade and the support bracket, so that the benefits of the locking system claimed in that application may be available in all situations.

SUMMARY OF THE INVENTION

The blades of a blasting machine rotor are positioned such that the blade configuration provides a shielding by the hard-alloy blade material for the brackets supporting the blade. The supporting flange is located in a sector (with respect to the axis of rotation of the rotor) into which the stream of abrasive particles is blocked by the presence of the blade. In the preferred form of the invention, the blade is mounted with its throwing surface substantially radial, and a depending shielding skirt at the inner extremity of the blade projects from the back a sufficient amount to provide shelter for the supporting flange of the bracket. The presence of the shielding skirt permits the blade to be mounted in the standard position provided by existing machines. This is important, as a substantial amount of marketing activity for the blades is centered in replacement.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional elevation through the axis of rotation of a blasting machine of the type in which the frame of the rotor is defined by a single plate to which the blades are secured by the support system.

FIG. **2** is a perspective view showing a blade removably secured to a mounting bracket.

FIG. **3** is a section on the plane **3—3** of FIG. **2.**

FIG. **4** is a perspective view of a locking clip shown in the FIG. **2** assembly.

FIG. **5** is a section on the plane **5—5** of FIG. **4.**

FIG. **6** is a top view of the structure as shown in FIG. **2.**

FIG. **7** is a perspective view showing one arrangement for "gating" the casting forming the blade.

FIG. **8** is a perspective view showing an arrangement for gating the blade at the opposite end from that shown in FIG. **7.**

FIG. **9** is a fragmentary section through the rotor assembly on a plane perpendicular to the axis of rotation.

FIG. **10** is a view similar to FIG. **9,** showing a modification of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The blasting machine shown in FIG. **1** includes the shaft **20** rotatably supported in the bearing structure generally indicated at **21** mounted on the base plate **22.** A rotor operating within the housing **23** includes the hub **24** mounted on the shaft **20,** and the plate **25** secured to the hub **24** by screws as shown at **26** and **27.** The inside of the housing is protected by liner plates of hard alloy as shown at **28, 29,** and **30,** and access to the interior of the housing for replacement of the blades is normally obtained through removal of the cover **31.** A supply of abrasive material is deposited in the hopper **32,** and proceeds through the elbow **33** into the open end of the impellor **34** secured to the end of the shaft **20** by the bolt **35.** The impellor **34** is perforate around its periphery, and the rotation of the impellor with the shaft **20** imparts enough rotation to the supply of abra-

sive particles to induce them to move radially outward into the control cage **36.** This cage is adjustably fixed with respect to the housing **23,** and the angular placement of this cage determines the orientation of the stream of abrasive particles issuing through the open bottom of the housing. The structure described to this point is conventional.

A plurality of blades as shown at **37** and **38** in FIG. **1** are evenly spaced about the axis of rotation of the rotor. Machines of this type will normally have **4, 6,** or **8** of these blades. The supporting arrangement for the blades is the same, and is illustrated best in FIGS. **2** and **3.** The bracket **39** is angular in cross-section, providing the mounting flange **40** and the blade-support flange **41.** A shoulder as indicated at **42** is preferably provided on the flange **41** to assure the proper alignment for the locking clip **43.** The blade **37** is provided with a cast-in insert stud **44** providing a groove **45** normally interengaged with the slot **46** of the clip **43.** The flange **41** has an aperture of a diameter to receive the stud **44,** and the interengagement of the clip as shown in FIG. **2** locks the blade against disengagement from the supporting bracket. The clip **43** should be inserted from a position adjacent the axis of rotation, so that the effect of centrifugal force will be to maintain the position of the clip. The resilient fingers **47** and **48** of the clip provide a biasing action tending to hold the blade **37** firmly against the supporting surface **49** provided by the flange **41.** The back of the blade indicated at **50** thus rests firmly against this surface so that the throwing face **51** of the blade is accurately positioned. The bracket **39** is held in position on the rotor plate **25** by screws as shown at **52–54.**

The blade **37** has a shielding skirt **55** extending transversely from the back surface **50** to intercept abrasive particles that might otherwise impinge on the inner end of the flange **41,** or work their way in between this flange and the blade **37.** Referring to FIG. **9,** abrasive particles moving in the space between the impellor **34** and the control case **36** will move around in a counterclockwise direction until they arrive at the discharge port **56** of the cage. At this point, the particles will either move tangentially, or will be reflected from the wall defining the left side of the port **56.** This wall may be inclined in a tangential direction, if desired, to minimize wear at this point. The emerging particles, once beyond the discharge port **56,** become subject to the influence of the rapidly-moving blades. Particles engaging the throwing face **51** will proceed rapidly outward, and correspondingly develop a very high degree of accelleration and velocity. The particles continue to emerge from the discharge port **56** after the passage of the throwing face of the blade, and thus are capable of impinging on the juncture of the back of the blade and its supporting bracket. Ultimately, most of these particles will be picked up by the succeeding blade, but there is sufficient random movement of the particles to cause a continued presence of particles at the junction of the blade and the radially inner extremity of the supporting brackets, unless provision is made to eliminate this condition. The presence of the shielding skirt **55** defines one boundary of a shelter sector that will intercept particles tending to move radially outward along a path that would cause impingement on the inner end of the supporting bracket, and on the junction between the bracket and the back surface **50** of the blade. If the particles can be kept out of this area, substantial erosion of the flange **41** and intrusion of the particles between the blade and the bracket can be prevented. Preferably, the extent of the skirt **55** from the back surface **50** of the blade should be such as to intercept most of the particles produced by the random path of movement established by the proportions and design of the particular machine involved. Since the orientation of the throwing face **51** should be determined as a separate consideration, the presence of the skirt **55** makes the illustrated blade-support system much more impervious to the effects of blade-shifting, without having to compromise in the optimum position of the blades.

In the arrangement shown in FIG. **10,** the shielding effect is accomplished by a placement of a standard blade at a sufficient angle to a radius of rotation such that the blade itself (without the skirt) defines a shelter sector that includes the support flange of the bracket. The boundary at the trailing side of this shelter sector is indicated in dotted lines in both FIG. **9** and FIG. **10.** The extent to which this shelter sector should trail behind the supporting flange **41** to fully protect it against non-radially moving particles should be determined from experience with an existing machine. The angle of release from the discharge port **56,** as well as rebound of the particles from the throwing face of the blades will influence the density of the random particle movement, and will correspondingly dictate the extent of the shelter required in a given machine.

Referring to FIG. **7,** the blade **37** may be cast by admitting the metal at the radially outer extremity of the blade, producing a gate **57** which is broken off and ground smooth after the metal has hardened. The blade can also be gated at the radially inner extremity as shown at **58** in FIG. **8.** The position of the gate will somewhat influence the chill rate of the metal, and thus control the point of minimum porosity. Depositing the metal into a relatively cold sand mold, with the blade gated in the FIG. **7** configuration, will produce the maximum chill rate at the radially inner extremity. The opposite is true with the FIG. **8** arrangement. Where it is desired to provide a skirt **55** of a relatively large extension, the gating of the metal at this point may be somewhat more likely to assure a complete filling of the cavity. In any event, the hardness of the resulting castings is determined by subsequent heat treatment.

We claim:

1. A blade for a blasting machine, said blade having means on a portion of the back surface thereof adapted to interengage with supporting means, wherein the improvement comprises:

an offset shielding portion extending transversely to said back surface along the inner portion of said blade normally inward of said support means.

2. A blasting machine having a rotor including at least one blade normally secured at the back thereof in a substantially radial position to bracket means mounted on a rotor frame, said blade terminating at the inner extremity thereof radially outward from the axis of rotation of said rotor, said machine also having feeding means adapted to deposit particulate abrasive material in the space defined by the path of rotary movement of the radially inner end of said blade, wherein the improvement comprises:

an offset shielding portion on said blade normally disposed radially inward from the portion of said bracket means providing a supporting surface for said blade, said shielding portion extending transversely from the back of said blade to form an abutment opposite the inner extremity of the junction of said blade and bracket means.

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