Jan. 4, 1966

K. W. KAMPERT

3,226,859

MOUNTING ASSEMBLY FOR DOZER BLADE

Filed Feb. 11, 1964

4 Sheets-Sheet 1

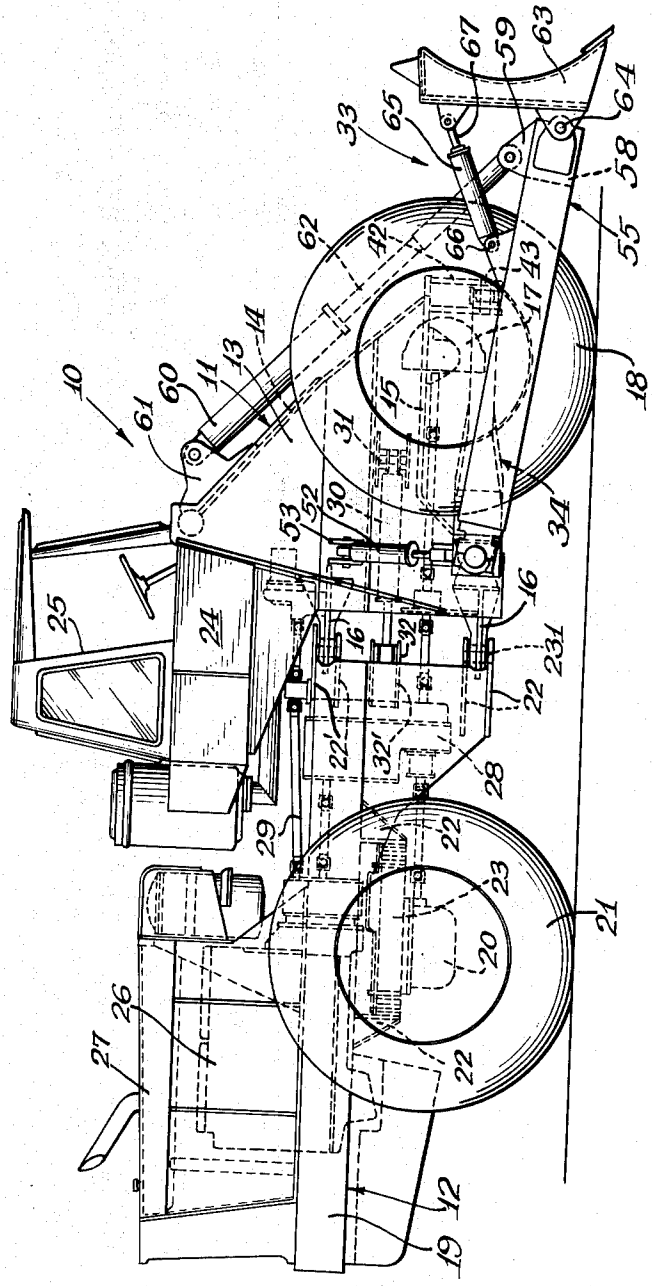


FIG. 1.

Inventor:
Keith W. Kampert
By Ronald C. Kamp
Atty.

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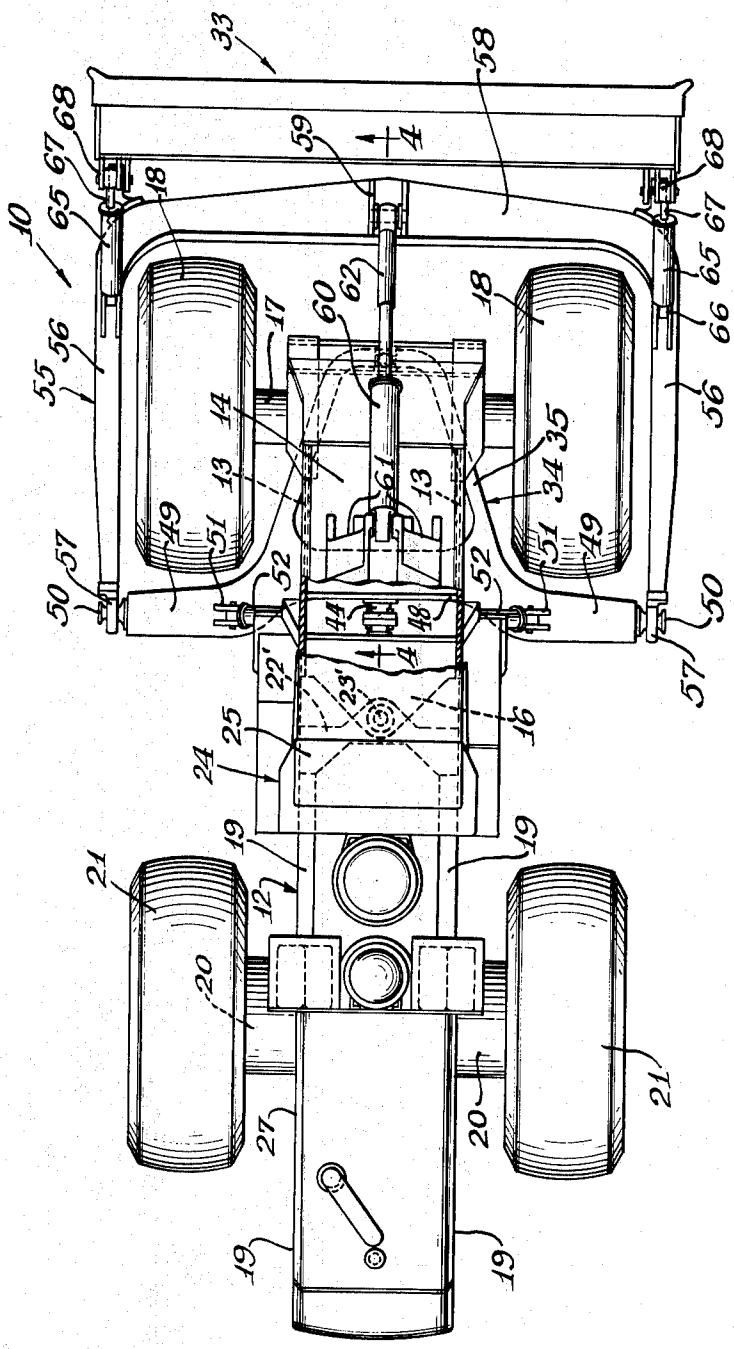


FIG. 2.

Inventor:
Keith W. Kampert
By Arnold C. Lamp
Atty.

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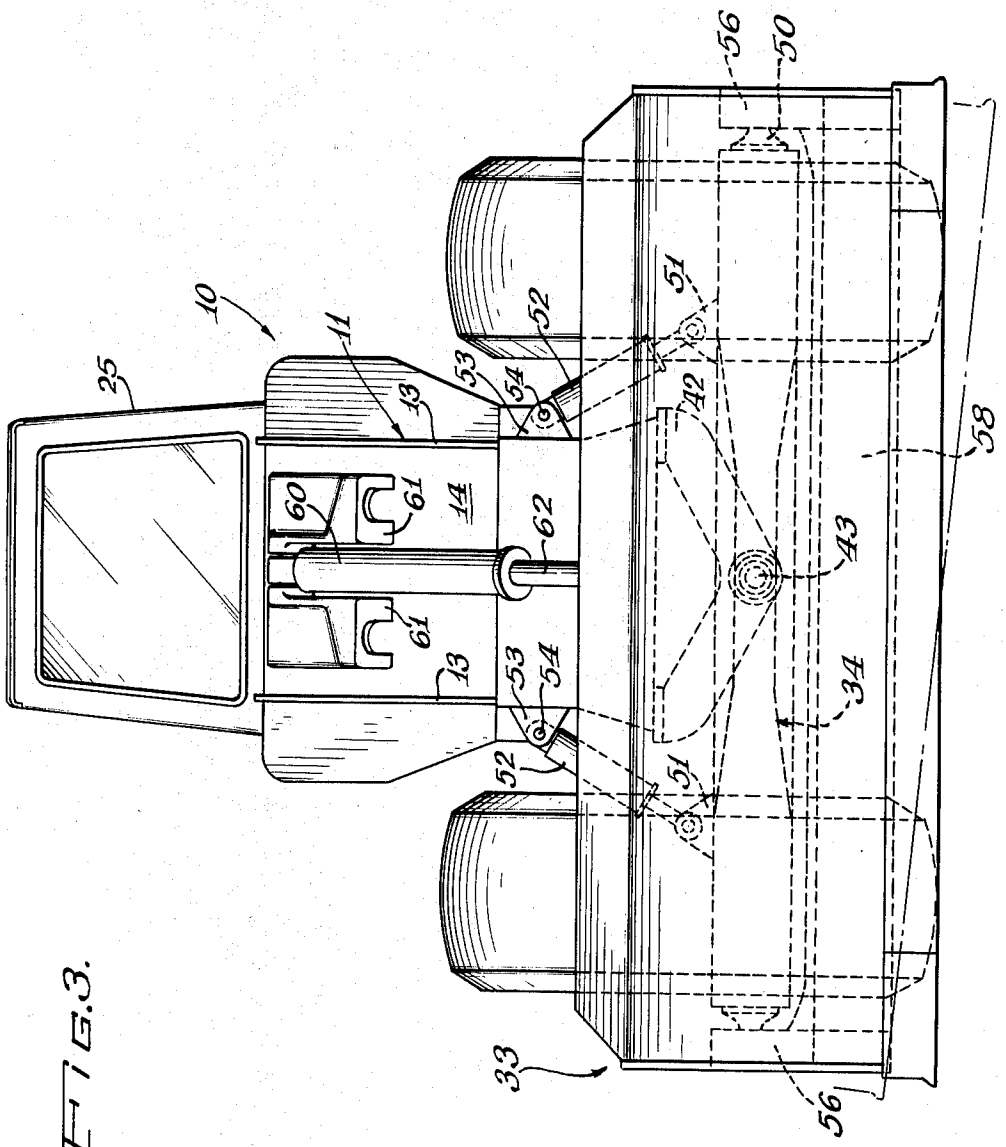


FIG. 3.

Inventor:
Keith W. Kampert
By Ronald C. Kamp
Atty.

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Fig. 4.

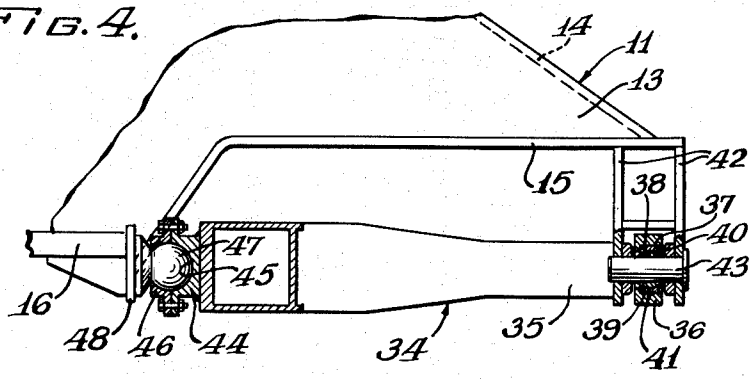


Fig. 5.

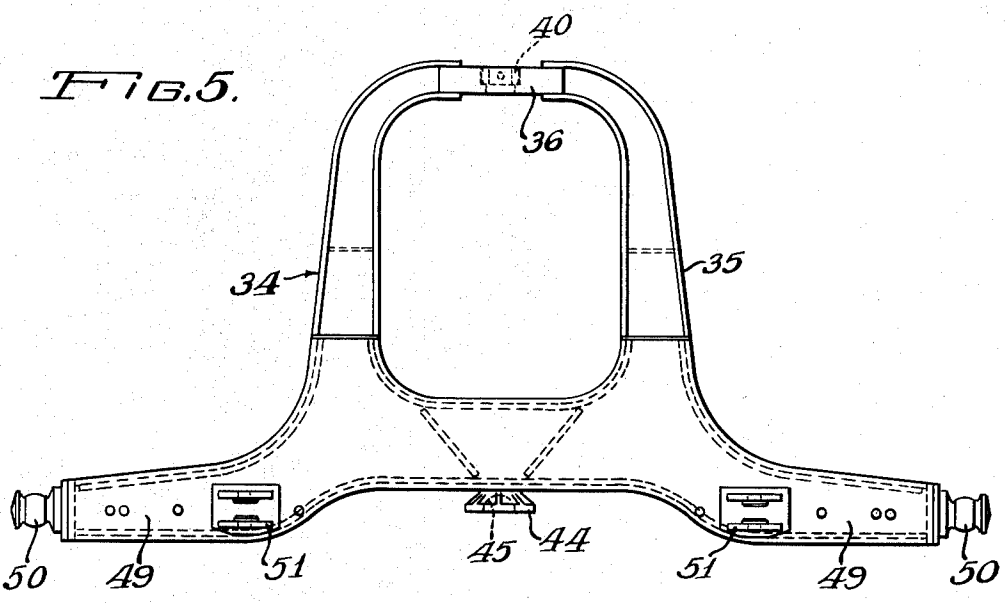
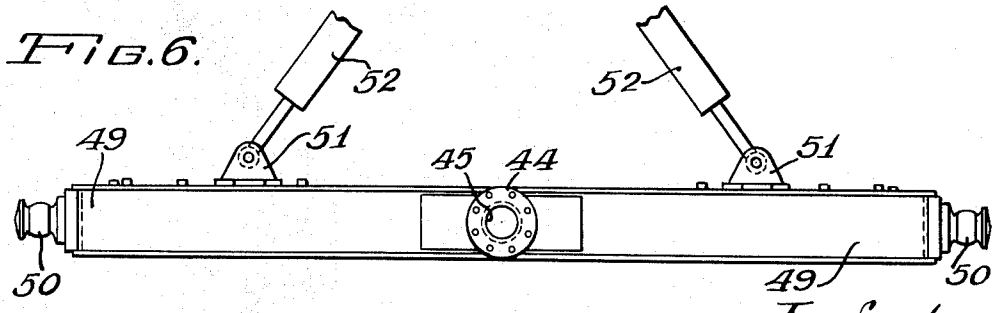


Fig. 6.



Inventor:
Keith W. Kampert

By Ronald C. Kamp

Atty.

United States Patent Office 3,226,859 Patented Jan. 4, 1966

3,226,859

MOUNTING ASSEMBLY FOR DOZER BLADE

Keith W. Kampert, Libertyville, Ill., assignor to The Frank G. Hough Co., a corporation of Illinois

Filed Feb. 11, 1964, Ser. No. 343,992
6 Claims. (Cl. 37—144)

The present invention relates to dozer assemblies in general, and more particularly, to a mounting means for a dozer blade.

In the past, it has been common to attach a dozer blade to a pair of push arms, which are mounted on spherical or ball joints secured to the tractor. The spherical or ball joints were generally positioned upon and affixed to the tractor in a common horizontal plane. With such an arrangement, as the blade is tilted, i.e. one end of the blade raised relative to the other end of the blade, the horizontal distance between the points of attachment of the push arms to the blade decreases. That is, the projection of the distance between the points of attachment of the push arms to the blade onto the horizontal plane containing the ball joints is always less when the blade is in a tilted condition. The push arms are, therefore, bowed in toward the centerline of the tractor, and thereby, impart bending forces to the push arms. Because of these forces, push arms are often broken when a blade in tilt position is subjected to a side thrust or load during operation.

It is, therefore, an object of the present invention to provide an improved mounting for bulldozer blades whereby excessive compressive stresses are avoided and in which no stresses are imparted to the push arms from the tilting operation.

It is another object of the present invention to provide a mounting means for a bulldozer blade which is capable of withstanding large bending moments or side loads on the dozer blade.

It is still another object of the present invention to provide a mounting means for a dozer blade which can be utilized as a side crane.

Further objects and advantages of the present invention and the manner in which it is carried into practice will become apparent in connection with the following specification by reference to the accompanying drawings, wherein:

FIGURE 1 is a side elevational view of a tractor with a bulldozer blade embodying the present invention attached thereto;

FIGURE 2 is a top plan view, with parts broken away, of the tractor shown in FIGURE 1;

FIGURE 3 is a front elevational view of a tractor with a bulldozer blade and showing the mounting structure of the present invention partly in dotted lines;

FIGURE 4 is a view, partly in section, taken along the center line of the tractor and showing the attachment of the cradle to the tractor;

FIGURE 5 is a top elevational view of the cradle; and

FIGURE 6 is a rearward elevational view of the cradle showing the tilt cylinders attached thereto.

Referring now to the drawings, there is shown in FIGURES 1, 2 and 3 a tractor generally indicated at **10** with a bulldozer blade **63** mounted thereon. In the embodiment shown the tractor **10** is a rubber-tired, articulated vehicle having a forward section **11** and a rearward section **12** which are hingedly connected by means of pins **23** and **23'**. The upper pin **23'** extends through a bifurcated bracket **22'** attached to the frame **19** of the rear section **12** and through a bracket **16** attached to the frame **13** of the forward section **11**. Similarly, the lower pin **23** extends through a bifurcated bracket

22 attached to the rear section **12** and through a bracket **16** attached to the forward section **11**. An engine **26** is mounted on the rear section **12** and drives the rear axle **20** and the forward axle **17** through a transmission and transfer case **28**. Rubber-tired wheels **21** are mounted on the rear axle **20** and rubber-tired wheels **18** are mounted on the front axle **17**. An operator's compartment **25** having a cab **25** is mounted on the forward section **11**. Steering is accomplished in a conventional manner by means of a hydraulic cylinder **30** connected to the forward section at **31** to the rearward section at **32**.

The mounting assembly, indicated generally at **33**, comprises a cradle **34** having a generally A-shaped frame **35**, as shown in FIGURE 5. The frame **35** is joined at its forward end by a link **36** and has a pair of outwardly and laterally extending arms **49** secured at its rearward end. A spherical ball **47**, as shown in FIGURE 4, is attached to a bracket **48** mounted on the underside of frame **13**. A mounting bracket **44** is attached to the rearward side of the frame **35** and is provided with a spherical surface **45** complementary to the surface of the ball **47**. A connecting member **46** secures the mounting bracket **44** to the ball **47** and forms therewith a universal connector. Since this is a universal connection, no bending moments can be transmitted or carried by the ball **47**. The link **36** on the forward part of the A-frame **35** is provided with a self-aligning bearing **40** mounted therein. The frame **13** of the forward section **11** has a bifurcated bracket **42** secured thereto and extending downwardly therefrom. A pin **43** extends through a pair of aligned openings in the bifurcated bracket **42** and through the self-aligning bearing **40** to secure the forward end of the cradle **34** to the tractor frame. The self-aligning bearing comprises an annular socket portion **37** with an internal spherical surface, and an annular ball portion **38** with an external spherical surface in complementary relationship to the socket portion. The ball portion **38** is mounted on the pin **43** intermediate the ends thereof. A cylindrical bore **41** is provided in link **36**. An annular shoulder **39** is formed internally of and adjacent to the rear side of link **36**. Socket portion **37** is mounted within bore **41** in abutting relationship to shoulder **39**. If no self-aligning bearing is used, the center of the ball **47** must be in alignment with the centerline of the pin **47**. The self-aligning bearing **40** is utilized to effect an easy assembly of the parts and, in the event the center of the ball **47** does not fall on the centerline of the pin **47**, permits rotation, about an axis through the ball and the pin, without binding. It is apparent that universal connectors could be used at both ends of the cradle **34**. The combination of the spherical connection at the rearward end of the cradle **34** and the pin connection at the forward end of the cradle assures that the spherical connection will resist all of the straight pushing loads imparted to the cradle, and that the pin **43** will resist all bending or side thrust loads applied to the cradle. A pair of bifurcated brackets **51** are secured to the arms **49** of the cradle **34**. A pair of tilt cylinders **52**, as shown in FIGURES 3 and 6, are pinned to the bifurcated brackets **53** attached to the tractor. Suitable and well-known hydraulic means, not shown, are provided for the tilt cylinders **52** so that simultaneous extension of one and retraction of the other will achieve tilting in one direction, and the converse will achieve tilting in the other direction. The outer extremities of the arms **49** are provided with a pair of ball joints **50** to which the C-frame, indicated generally at **55**, is secured. The C-frame is composed of a pair of push arms **56** interconnected by a cross beam **58**, as shown in FIGURE 2.

The rearward ends of the push arms 56 are provided with clamping means 57 to secure the C-frame 55 to the ball joints 50. The dozer blade 63 is pivotally connected to the cross member 58 by means of pins 64. A pair of pitch cylinders 65 are pinned at 66 to the push arms 56 and have their rod ends 67 connected to the back of the dozer blade 63 by means of pins 68. Extension and retraction of the cylinders 65 will control the attitude or pitch of the dozer blade. A lift cylinder 60 is pivotally connected to a bifurcated bracket 61 secured to the forward section 11 of the tractor 10. The rod portion 62 of the cylinder 60 is attached to a bifurcated bracket mounted on the cross member 58. The connection of the rod portion 62 to the bifurcated bracket 59 may be by means of a straight pin, allowing the rotation of the piston within the cylinder 60 to compensate for the rotary motion caused by the tilting action, or a spherical or ball joint connection may be utilized to effect this connection. Extension and retraction of the cylinder 60 controls the elevation of the bulldozer blade.

It is apparent from the foregoing that any forces applied to the dozer blade in a rearward direction will be carried or absorbed by the ball joint connection 47 and that any side thrusts or bending moments will be carried by or resisted by the pin 43. It is also apparent that tilting of the cradle will not create any stresses in the push arms 56.

In addition, it is possible to provide hooks, not shown, on the outer extremities of the arms 49 and by so doing utilize the tilt cylinder 52 and the cradle 34 as a side crane. In this type of application it is possible that the force may be applied to the cradle in such a manner that the forward pivot point for the cradle 34 will carry the main force and the rear bearing will resist the bending moments and side thrusts. It is, therefore, desirable to utilize special connections at both the front and rear.

It will be understood that various changes in the details, materials, steps and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims.

What is claimed is:

1. A mounting assembly for attaching a dozer blade to a tractor comprising:
- a cradle,
- a universal connector securing said cradle at its rearward end to said tractor,
- a pivotal connector securing said cradle at its forward end to said tractor,
- a pair of substantially horizontal arms secured to said cradle, each of the arms extending outwardly beyond a respective side of the tractor,
- a pair of push arms, each of the push arms being pivotally attached to a respective one of said outwardly extending arms and extending forwardly of said tractor,
- a dozer blade carried on said push arms, and
- a tilt cylinder pivotally connected to said tractor and to one of said outward extending arms.

2. A mounting assembly for attaching a dozer blade to a tractor comprising:
- a cradle,
- a first universal connector securing said cradle at its rearward end to the underside of said tractor and having a spherical surface facing in a longitudinal direction,
- a second universal connector securing said cradle at its forward end to said tractor and having a spherical surface facing in a transverse direction, said connectors being positioned in axial alignment with each other, a pair of outwardly and oppositely extending arms attached to said cradle,
- a pair of push arms, each of the push arms being pivotally attached to a respective one of said outwardly extending arms and extending forwardly of said tractor,
- a dozer blade carried on said push arms, and a tilt cylinder pivotally connected to said tractor and to one of said outwardly extending arms.

3. A mounting assembly according to claim 2 wherein said dozer blade is pivotally attached to said push arms, and further comprising a pitch cylinder pivotally connected to one of said push arms and to said dozer blade.

4. A mounting assembly for attaching a dozer blade to a tractor comprising;
- a cradle,
- a pair of universal connectors securing said cradle to the underside of said tractor, said connectors defining a longitudinally extending substantially horizontal axis of rotation, said cradle having a pair of outwardly and oppositely extending arms,
- a pair of push arms, each of the push arms being pivotally connected to a respective one of said outwardly extending arms on each side of said tractor,
- a dozer blade carried on said push arms, and
- a tilt cylinder pivotally connected to said tractor and to one of said outwardly extending arms, whereby extension and retraction of said tilt cylinder will cause tilting of said blade by pivoting said cradle about said axis of rotation.

5. A mounting assembly according to claim 4 and further comprising pivotal connectors for securing said blade to said push arms and a pitch cylinder pivotally attached to said tractor and to one of said push arms whereby extension and retraction of said pitch cylinder will cause pivotal movement of said blade relative to said push arms and the pitch of said blade thereby controlled.

6. A mounting assembly according to claim 4 and further comprising a cross-member secured to the forward ends of said push arms and a lift cylinder pivotally attached to said tractor and to said cross-member for raising and lowering said blade.

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ABRAHAM G. STONE, *Primary Examiner.*

WILLIAM A. SMITH, III, *Examiner.*