

July 5, 1960

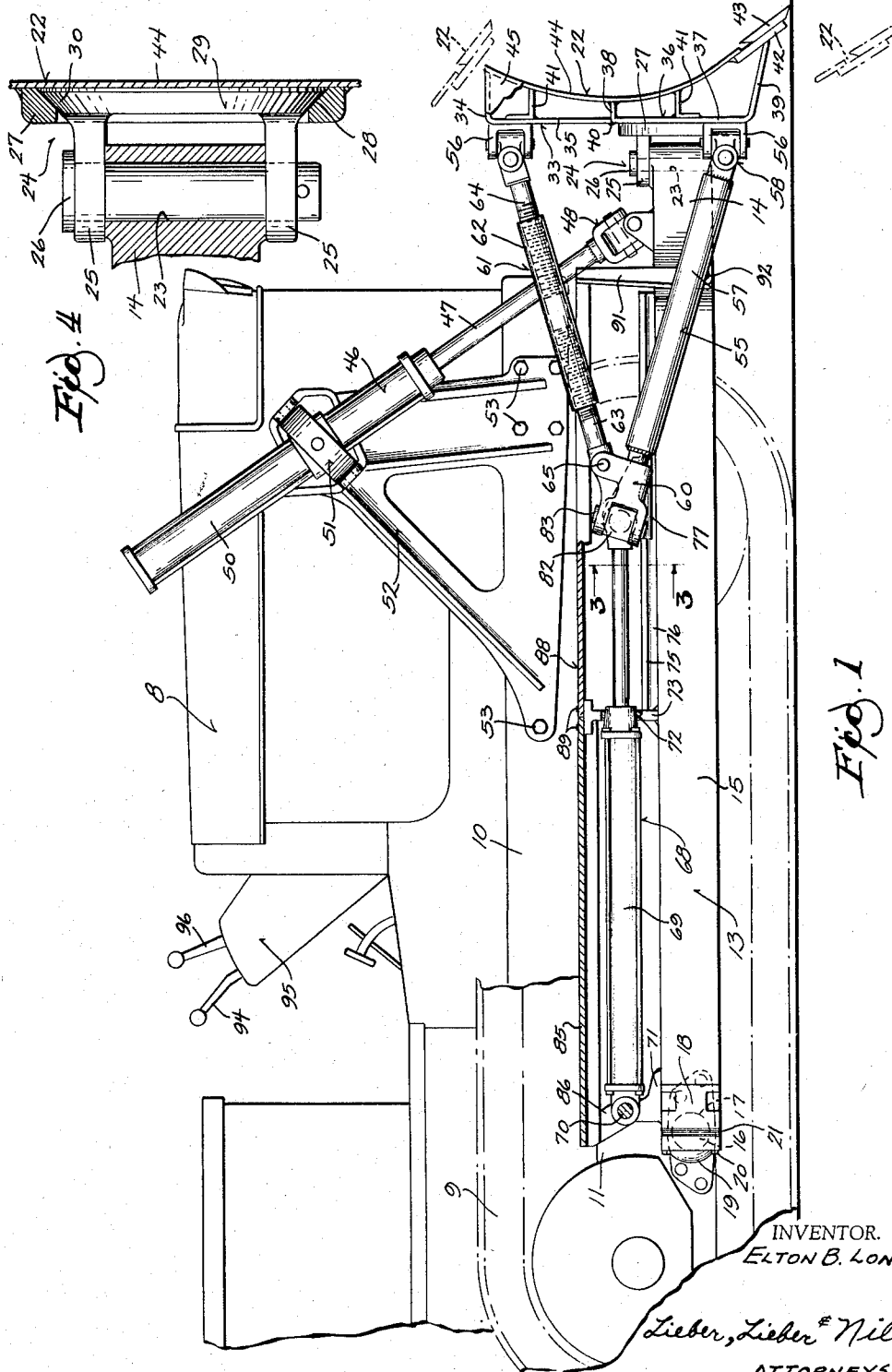
E. B. LONG

2,943,407

BULLDOZER BLADE MOUNTING

Filed Feb. 27, 1958

2 Sheets-Sheet 1



INVENTOR.
ELTON B. LONG

Lieber, Lieber & Nilles
ATTORNEYS

July 5, 1960

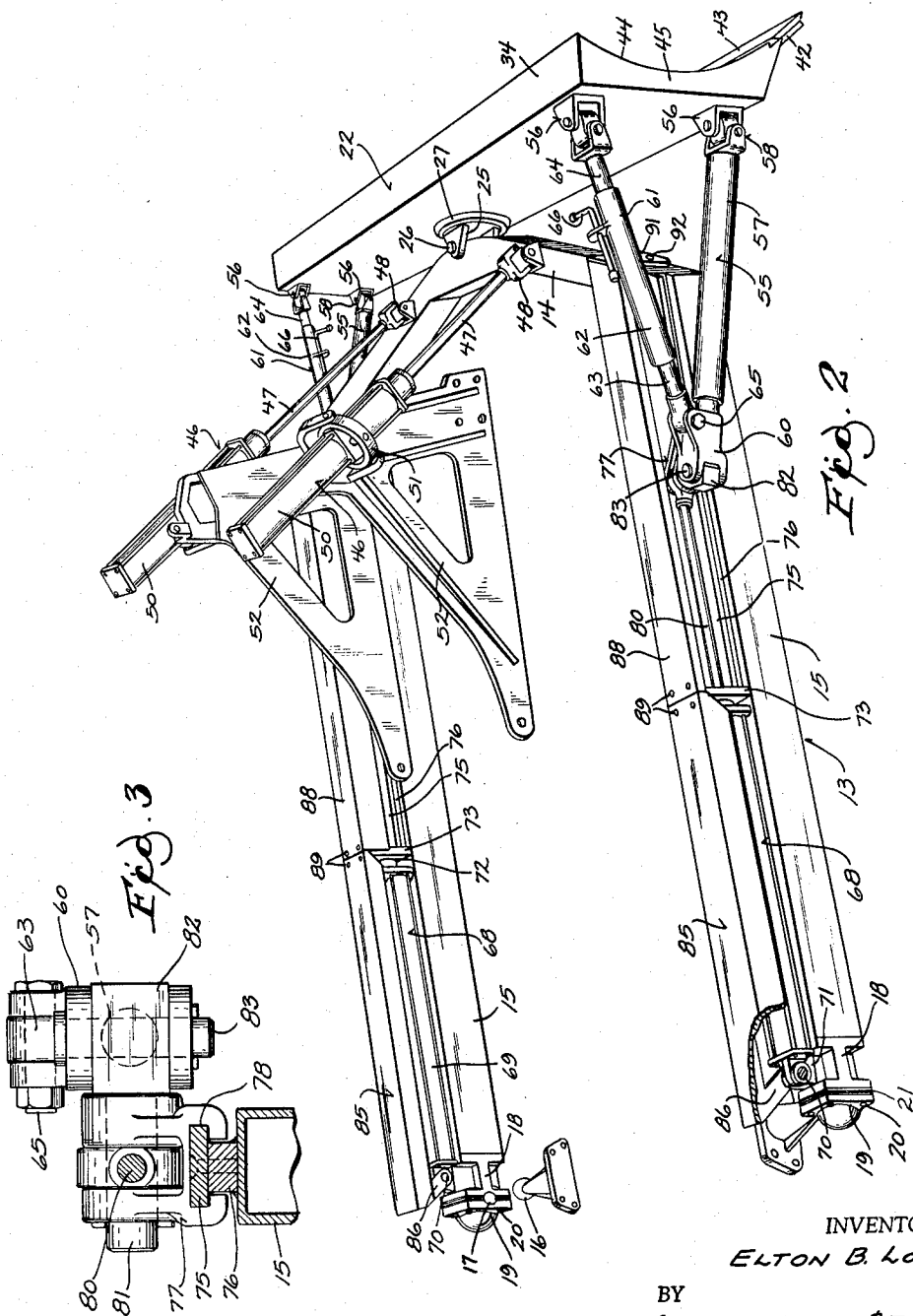
E. B. LONG

2,943,407

BULLDOZER BLADE MOUNTING

Filed Feb. 27, 1958

2 Sheets-Sheet 2



INVENTOR.

ELTON B. LONG

BY

Lieber, Lieber & Miller

ATTORNEYS

1

2,943,407

BULLDOZER BLADE MOUNTING

Elton B. Long, Haskell, Iowa, assignor to J. I. Case Company, Racine, Wis., a corporation of Wisconsin

Filed Feb. 27, 1958, Ser. No. 717,884

6 Claims. (Cl. 37—144)

This invention relates generally to scrapers, earth moving equipment and the like, in which a blade is adapted to be positionably carried on a tractive vehicle. More specifically, the present invention relates to a blade mounting mechanism by which the blade is adjustably positionable with respect to its tractive vehicle.

It is conventional to provide bulldozers of this general nature with a blade, the angle of which may be changed by means of hydraulic cylinders located on each side of the vehicle. It is also conventional to swivelly mount the central portion of the blade on a U-shaped frame member, which member is then swingable by hydraulic means so as to vertically position the blade.

Machines of this character are subjected to considerable shock loads and wear and must be of extremely rugged construction. When the blade is set to a desired position, as when forming a ditch or crown in a road, it should be capable of maintaining this set position regardless of the hardness or composition of the material being moved, and the heavy thrust loads which the blade mounting must deliver back to the prime mover.

In accordance with the present invention a bulldozer blade and mounting therefor has been provided which meets the above noted requirements.

The invention provides a particularly rugged dozer blade mounting which can accurately and positively be positioned in a wide variety of positions.

These and other objects and advantages of the invention will appear hereinafter as this disclosure progresses, reference being had to the accompanying drawings in which:

Figure 1 is a fragmentary side elevational view of a crawler tractor on which a dozer blade and mounting made in accordance with the invention have been installed, certain parts being removed or broken away for clarity;

Figure 2 is a perspective view of the blade and mounting shown in Figure 1, certain parts omitted or broken away for the sake of clarity;

Figure 3 is a cross sectional view taken on line 3—3 in Figure 1 and showing the slide plate, slide bracket and strut bracket, the view being on an enlarged scale;

Figure 4 is a cross sectional view of the swivel assembly, but on an enlarged scale.

Referring in greater detail to the drawings, the invention has been illustrated as applied to a crawler tractor 8 having an endless driven track 9 at each side and main frame member 10. A track support frame 11 is carried by the main frame for supporting the track suspension system, and if a more complete description of this track system is deemed necessary or desirable, reference may be had to the co-pending U.S. patent application Serial Number 618,138, filed October 24, 1956.

The main frame 13 of the blade mounting structure is generally of U-shaped configuration and has a bight portion 14 adapted to extend across the front end of the tractor and also has a thrust arm 15 extending rearwardly

2

along each side of the tractor. This main frame is fabricated from high-strength steel channel and has a generally square cross-sectional shape. The rear ends of the arms 15 are universally connected to the track frame 11, which connection eliminates all twisting strains on the track frames. This universal connection is formed by the steel ball unit 16 which is bolted to the track frame, and its complementary socket 17 carried on the arm 15. The socket is defined by the half-socket member 18, welded on the end of the arm 15, and the half-socket member 19 secured thereto by bolt means 20. Shims 21 are provided between the socket members in order that they accurately and positively engage the ball and hold it captive within the socket.

The blade 22 is swivelly mounted to the frame 13 for complete adjustability relative thereto, as follows.

A vertically disposed bore 23 is provided in the central bight portion of the frame 13. A swivel joint assembly 24 of the blade has a bifurcated bracket 25 which embraces the bight portion and is pivotally attached thereto by the pin 26 extending through bracket apertures that register with bore 23. Thus the blade is pivotable about a vertical axis with respect to the tractor.

The swivel assembly 24 includes a ring 27 welded to the back side of the blade and which has a flared opening 28 diverging in a forward direction. The bifurcated bracket 25 has an integral plate 29 with a beveled edge 30 that complements the opening 28 and is rotatably mounted therein. In this manner the blade is tiltable in a transverse direction in respect to the tractor. The bracket plate 29 presents a large and solid thrust bearing surface to the blade which contributes to a rugged design.

The blade 22 is of box-like section and fabricated of an upper sheet steel member 33 bent to form top and rear sides 34, 35, respectively, and a lower sheet steel member 36 bent to form a rear side 37, central brace member 38 and the bottom 39. Members 33 and 36 are welded together along their length as at 40 and present forwardly extending top, intermediate and bottom flanges. Angle irons 41 extend along the length of the blade and are welded to the front side of members 33 and 36. A blade mounting plate 42 is welded along the front edge of member 36 and to which the hardened and reversible cutting blade 43 is detachably secured. The curved moldboard 44 is welded to members 33, 36, and to angles 41 and plate 42. End plates 45 are welded to the ends of the blade and the entire blade forms a particularly strong and rigid, multiple box-section weldment capable of withstanding the twisting forces and thrust loads to which it is subjected.

The swingable frame 13 and its blade 22 are vertically positionable by a pair of large double acting hydraulic cylinder assemblies 46, one of which is located at each side of the tractor and disposed normally in a generally downwardly and forwardly direction. These lift cylinders provide full "down-pressure" to a depth considerably below the level of the ground and also lift the blade to a considerable height for knocking down trees, building stockpiles and similar operations. These lower and upper positions of the cutting edge have been indicated by dotted lines in Figure 1.

The free ends of the pistons 47 have universal connections 48 with the bight portion of frame 13. The cylinders 50 are pivotally mounted in trunnions 51 carried at the upper ends of the cylinder mounting frames 52. Frames 52 are in turn secured by bolt means 53 to the main frame 10 of the tractor.

By mounting the cylinder assemblies 46 directly between the blade frame 13 and the tractor, and positioned in a generally forward and downward direction, the ne-

cessity of intermediate connecting levers, bell-cranks and the like has been eliminated. Positive and accurate control of the blade, as well as good operator "feel" is thereby enhanced.

Means are provided for adjustably connecting each end of the blade to the frame 13 so as to provide for manual tilting of the blade and thus insuring further versatility of the dozer. Such a tilt adjustment, that is, dropping either end of the blade, is utilized for ditching, road-crowning or breaking-out hard ground. This tilt adjustment is incorporated in the strut assembly 55 which connects the blade ends to the frame 13 and is constructed as follows.

Rearwardly facing bifurcated brackets 56 are welded to the back side of the blade adjacent each corner. A fixed length strut 57 has a universal joint connection 58 with bracket 56 and is threadably engaged at its rear end in the strut bracket 60. A turnbuckle strut 61 is adjustable in length by rotating sleeve 62 on its threadably connected ends 63, 64. End 64 is universally connected to upper bracket 56 and end 63 is connected by pin 65 to the strut bracket 60. An adjusting lever 66 is carried on the strut for manually turning sleeve 62 when it is desired to change the length of strut 61.

The tilt adjustment of the blade is made by lengthening the strut 61 on one side of the tractor and shortening the strut 61 on the opposite side, or vice versa. For example, if it is desired to tilt the left end of the blade (as viewed in Figure 2) downwardly, the strut 61 on the right side would be lengthened and the opposite strut 61 on the left side would be shortened, thus rotating the blade on its swivel point 24. This manual tilt adjustment can conveniently be made and by incorporating this feature into the strut assembly a simple, economical and highly practical structure results.

Provision is also made for changing the angle of the blade to the right or left side. The means for accomplishing this consists of a large two-way hydraulic cylinder assembly 68 mounted at each side of the tractor and connected at its forward end to a strut assembly 55. The rear end of each cylinder 69 is connected by a pin 70 to a bracket 71 welded adjacent the rear end of arm 15. The front end of cylinder 69 is mounted in an aperture 72 in brace 73 which in turn is welded to arm 15. The cylinder is thus rigidly held on its arm 15 but is quickly detachable therefrom for repair or maintenance by removing pin 70 and withdrawing the cylinder from brace 73.

The cylinder assembly 68 is connected to the strut assembly bracket 60 by means which accurately guides the strut assembly along its intended path of travel and positively holds the parts in their proper relationship to one another so as to enable them to absorb any thrusts or shock loads without undue stressing of the structure.

This guiding means comprises a T-shaped guide track in the form of a slide plate 75 and its narrower mounting plate 76 which are secured to the upper side of arm 15. A slide bracket 77 has a T-shaped slot 78 which complements the guide track and is slidably engaged thereon. With these particularly shaped inter-engaging members, engagement therebetween is assured for any position of the blade and yet frictional resistance to relative movement between the parts will be minimized. In addition, a guide track of this shape is economical to produce. The bracket is bifurcated on its top side to receive the yoke end of the piston rod 80 which is held captive therein by pin 81. Pin 81 has an apertured end portion 82 to which the bifurcated rear end of strut bracket 60 is attached by pin 83.

The arrangement is such that, as the piston 80 is moved, the bracket 60 is guidingly held on its track and maintains the piston and rear end of the strut assembly in alignment to prevent any buckling action therebetween. In other words, the parts are guided and accu-

rately held in place regardless of the amount of piston extension or vertical position of the blade.

A single lever 94 on the dashboard 95 controls both cylinders 68 through suitable hydraulic valves and conduits, not shown. Such hydraulic equipment is conventional and it is believed sufficient to say that one cylinder 68 is extended while the other is contracted, and vice versa, so as to angle the blade in either direction. For example, movement of the lever in one direction angles the blade to the right, while lever movement in the other direction angles the blade to the left.

A second hydraulic lever 96 is located closely adjacent lever 94 and through suitable hydraulic circuitry controls the lift cylinders 50 to raise and lower the blade. The blade can thereby be adjusted as to height and angle simultaneously and with one hand.

Means are provided for protecting the cylinder assembly against damage, preventing debris from accumulating on the guide track and which also serves as a convenient catwalk alongside the machine for the operator and maintenance crews.

This protective cover means takes the form of an inverted channel shaped member 85 having a pair of apertured lugs 86 depending from its rear end and which, together with the cylinder 68, are held by pin 70 on bracket 71. Another generally channel shaped member 88, together with channel 85, is secured by bolt means 89 threaded into the flat upper portion 90 of brace 73. The front end of member 88 has a lug 91 which is held by bolt means 92 threadably engaged in frame 13.

With this construction the cylinder assembly 68 is protected from contact by rocks or other debris and the guide track is kept relatively free of foreign matter, which tends to build up adjacent the endless tracks and suspension system. At the same time a sturdy access walk is provided alongside the tractor. Furthermore, although the cylinder assembly 68 is protected, it can readily be removed for repair or maintenance by simply removing pins 70 and 81.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In a bulldozer, the combination comprising a frame adapted to extend along each side of a tractor and be swingably attached thereto, a blade pivoted to said frame for angular adjustment relative thereto, a hydraulic cylinder assembly carried by said frame at each side of said tractor and connected with said blade for angling thereof, a first bracket secured adjacent the rear end of said frame, said assembly having attaching means registerable with said bracket, a second bracket secured to said frame and spaced from said first bracket, said assembly adapted to be inserted into said second bracket and be held captive therein, a generally channel-shaped elongated cover extending over said assembly, means for securing said cover to said second bracket, said cover having an attaching means registerable with said first bracket, and removable means engageable with said first bracket, said assembly attaching means and said cover attaching means when in registry with one another for detachably securing said cover and said assembly to said frame.

2. In a bulldozer of the type having a frame adapted to extend along each side of a tractor and be swingably attached thereto, a blade pivoted to said frame for angular adjustment relative thereto, and a hydraulic cylinder assembly carried by said frame at each side of said tractor and connected with said blade for angling thereof, the improvement residing in, a first attaching bracket secured adjacent the rear end of said frame and having an aperture therein, said assembly having an aperture adapted to register with said bracket aperture, a second bracket secured to said frame and spaced from said first bracket and having an opening therethrough, said assem-

bly being adapted to be slipped into said opening and held captive in said second bracket, a generally channel-shaped elongated cover extending over said assembly, means for securing said cover to said second bracket, said cover having an aperture registerable with said first bracket aperture, and removable means insertable through said first bracket aperture, said assembly aperture and said cover aperture when in alignment with one another for detachably securing said cover and said assembly to said frame.

3. A bulldozer construction for a tractor comprising, a U-shaped frame adapted to extend across the front end of said tractor and having a pair of side arms each extending along one side of said tractor for pivotal attachment thereto, a blade swivelly mounted intermediate its ends to said frame, a pair of strut assemblies each connected at one end to one end of said blade and having a thrust member of adjustable length for providing end to end tilt of said blade, a pair of slide brackets each universally secured to the other end of its respective strut assembly and having a T-shaped guide slot extending longitudinally therethrough, a pair of hydraulic cylinder assemblies, each connected at one end to one of said arms, and a T-shaped guide rail on each of said arms and embraceable by its slide bracket slot, said cylinder assemblies being connected at their other ends to their respective brackets for forcibly and simultaneously sliding said brackets along their respective rails in opposite directions to thereby angle said blade with respect to said tractor.

4. A bulldozer construction for a tractor comprising, a U-shaped frame adapted to extend across the front end of said tractor, said frame having a thrust plate pivotally attached thereto about a vertical axis and directly in front of said tractor, said frame also having a pair of side arms each extending along one side of said tractor for pivotal attachment thereto, a blade having a ring secured thereto for mounting said blade intermediate its ends to said plate, a pair of strut assemblies each connected at one end to one end of said blade and having a thrust member of adjustable length for providing end to end tilt of said blade about said plate, a pair of slide brackets each universally secured to the other end of its respective strut assembly and having a T-shaped guide slot extending longitudinally therethrough, a pair of hydraulic cylinder assemblies, each connected at one end to one of said arms, and a T-shaped guide rail on each of said arms and embraceable by its slide bracket slot, said cylinder assemblies being connected at their other ends to their respective brackets for forcibly and simultaneously sliding said brackets along their respective rails in opposite directions to thereby angle said blade with respect to said tractor about said vertical axis.

5. A bulldozer construction for a tractor comprising,

a U-shaped frame adapted to extend across the front end of said tractor and having a pair of side arms, each extending along one side of said tractor for universal attachment thereto, a blade swivelly mounted intermediate its ends to said frame, a pair of strut assemblies each connected at one end to one end of said blade and having a thrust member of adjustable length for providing end to end tilt of said blade, a pair of slide brackets each universally secured to the other end of its respective strut assembly and having a guide opening extending longitudinally therethrough, a pair of hydraulic cylinder assemblies, each connected at one end to one of said arms, and a pair of guide rails, each on one of said arms and each rail embraceable by the slide bracket guide opening of the respective strut assembly, said guide opening and rail being complementary and generally T-shaped in cross section and interengaging with one another, said cylinder assemblies being connected at their other ends to their respective brackets for forcibly and simultaneously sliding said brackets along their respective rails in opposite directions to thereby angle said blade with respect to said tractor.

6. In a bulldozer, the combination comprising a frame adapted to extend along each side of a tractor and be swingably attached thereto, a blade pivoted to said frame for angular adjustment relative thereto, a hydraulic cylinder assembly carried by said frame at each side of said tractor and connected with said blade for angling thereof, a first bracket secured adjacent the rear end of said frame, said assembly having attaching means registerable with said bracket, a second bracket secured to said frame and spaced from said first bracket, a generally channel-shaped elongated cover extending over said assembly, means for securing said cover to said second bracket, said cover having an attaching means registerable with said first bracket, and removable means engageable with said first bracket, said assembly attaching means and said cover attaching means when in registry with one another for detachably securing said cover and said assembly to said frame.

References Cited in the file of this patent

UNITED STATES PATENTS

2,075,482	Thorpe	Mar. 30, 1937
2,243,716	Monroe	May 27, 1941
2,636,289	Pryor	Apr. 28, 1953
2,687,586	Dickinson	Aug. 31, 1954
2,749,630	Nave	June 12, 1956
2,766,536	Perkins	Oct. 16, 1956
2,777,222	Allin	Jan. 15, 1957

FOREIGN PATENTS

127,976	Australia	June 9, 1948
157,288	Australia	June 28, 1954