United States Patent

Hahn

[15] 3,638,736

[45] Feb. 1, 1972

[54] CORNER BIT STRUCTURE

[72] Inventor: Frederick C. Hahn, Beaverton, Oreg.

[73] Assignee: Esco Corporation, Portland, Oreg.

[22] Filed: June 25, 1969

[21] Appl. No.: 836,539

[52] U.S. Cl. 172/719, 172/753, 37/141

[51] Int. Cl. A01b 15/00, A01b 35/32

[58] Field of Search 172/719, 753, 749, 271; 37/141

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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Stephen C. Pellegrino
Attorney—Dawson, Tilton, Fallon & Lungmus

[57] ABSTRACT

A corner bit for an earth-working element such as a dozer blade adapted to be mounted forwardly of a tractor or the like, the bit being an essentially triangular plate having flanges providing a mounting groove and releasably secured to the earth-working element by means of a shear block centrally of the plate.

3 Claims, 17 Drawing Figures

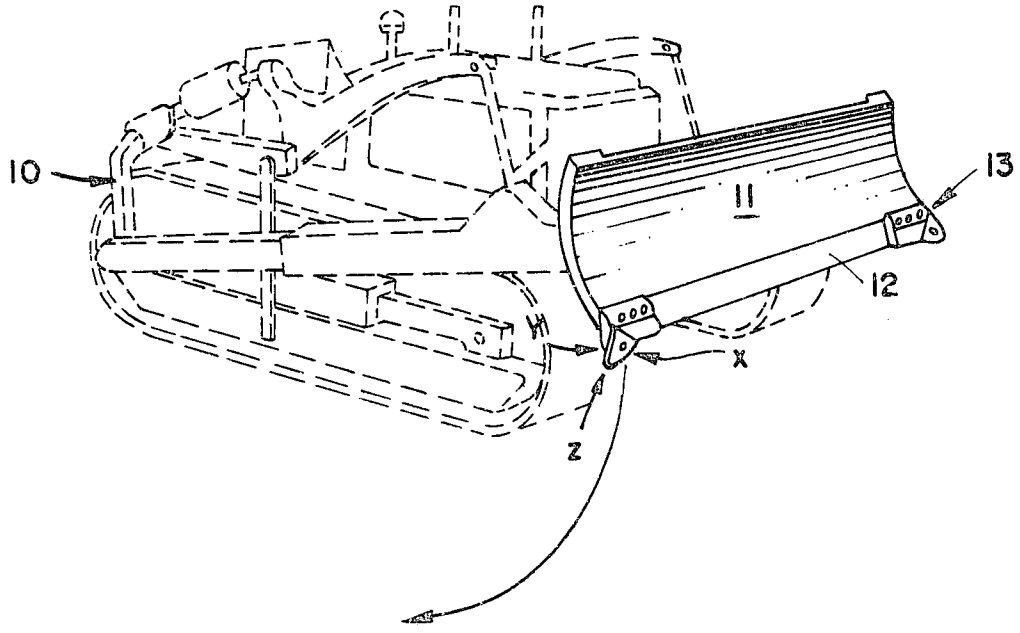


FIG. 1

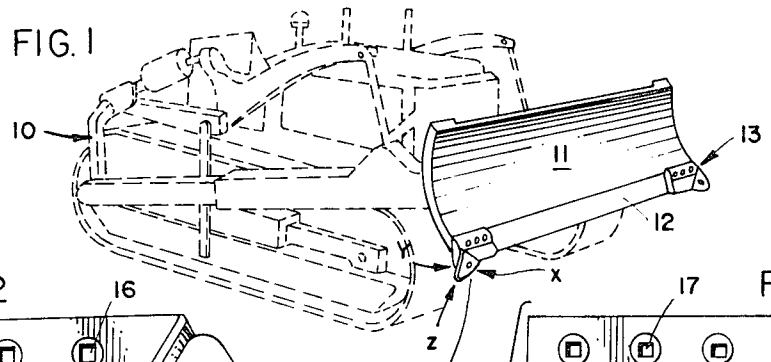


FIG. 2

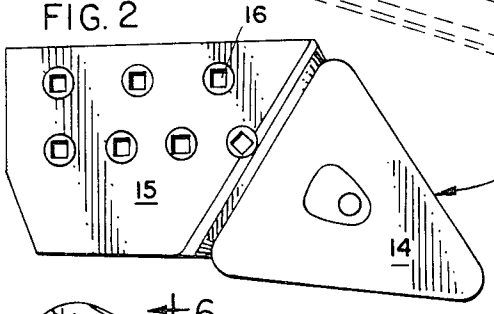


FIG. 3

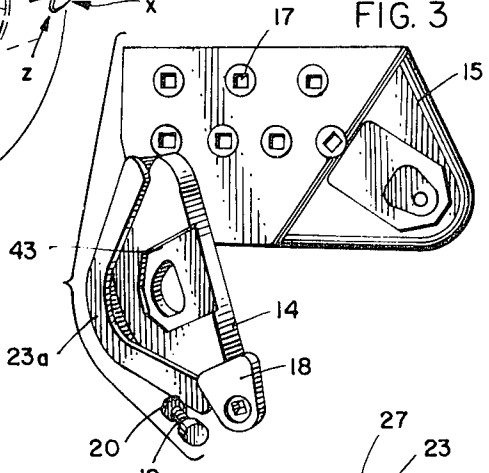


FIG. 4

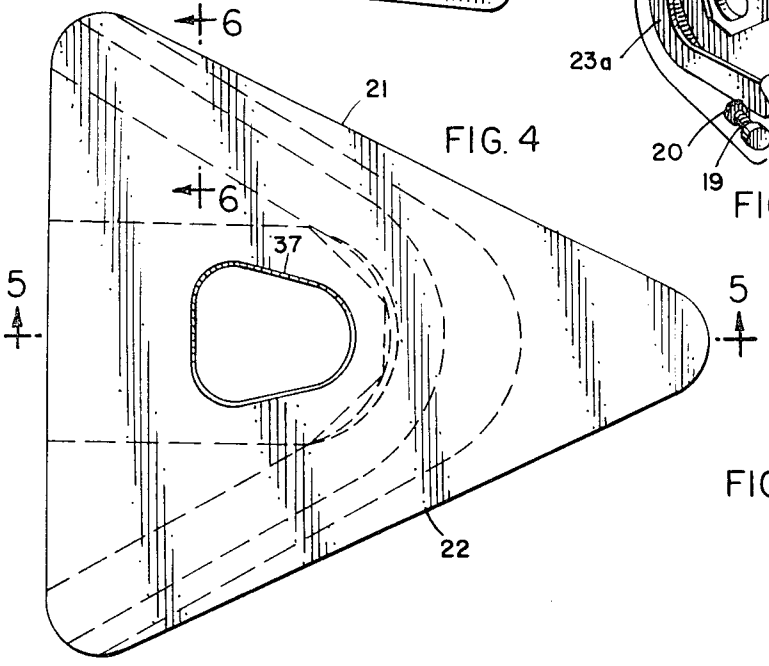


FIG. 6

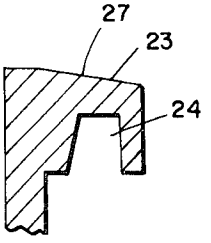


FIG. 7

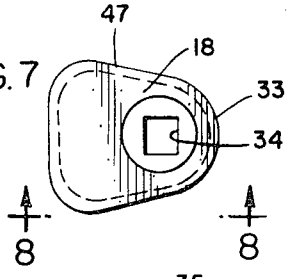


FIG. 5

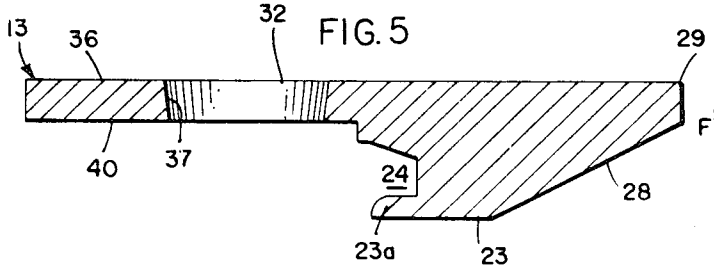
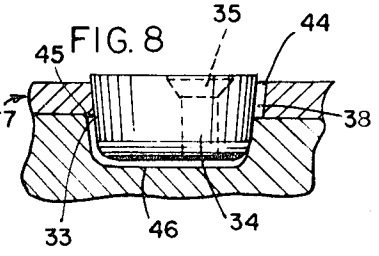


FIG. 8



INVENTOR:

FREDERICK C. HAHN

BY

Dawson, Tilton, Fallon & Lungmus

ATT'YS

FIG. 9

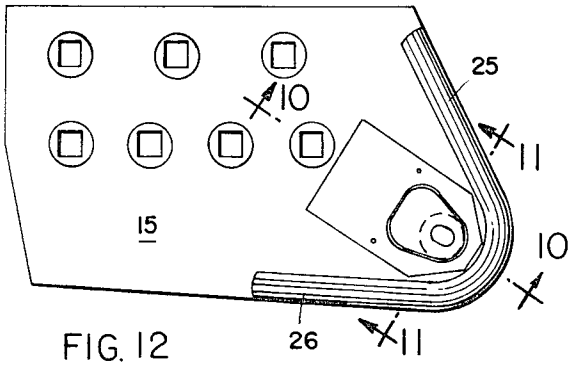


FIG. 11



FIG. 10

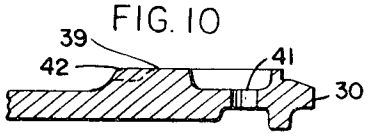


FIG. 12

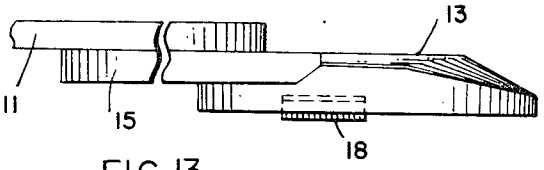


FIG. 15

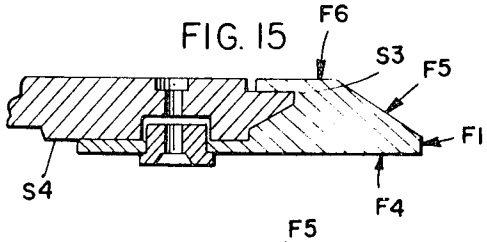


FIG. 13

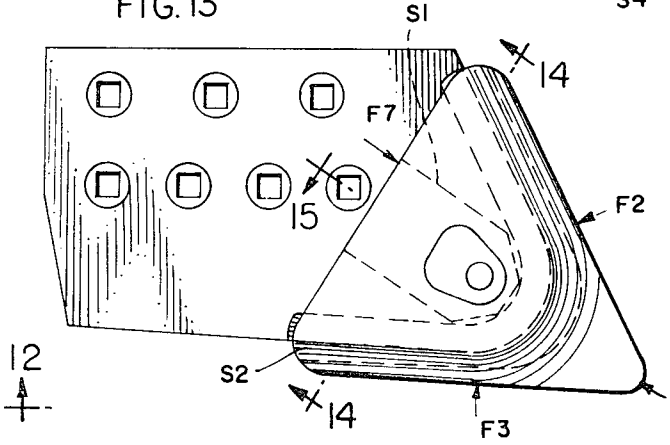


FIG. 14

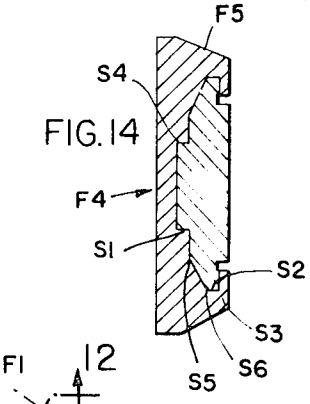


FIG. 16

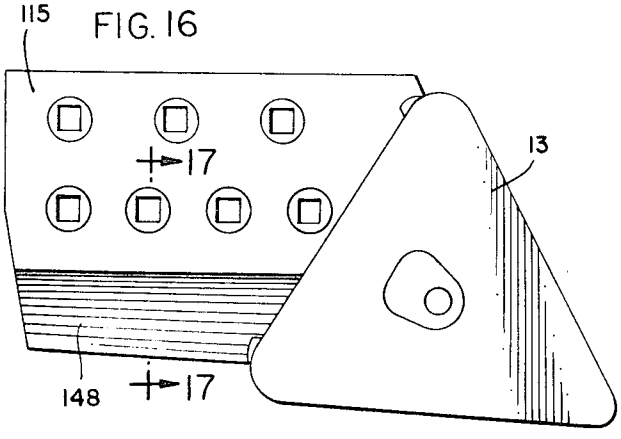
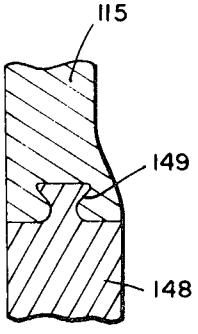


FIG. 17



INVENTOR:
FREDERICK C. HAHN
BY
Dawson, Tilton, Fallon & Lungmus
ATT'YS

CORNER BIT STRUCTURE

BACKGROUND AND SUMMARY OF INVENTION

Earth-working elements are subject to tremendous wear and deformation. Many of these are equipped with replaceable edges, but the dozers, graders and the like there has been lacking a satisfactory replacement corner bit, i.e., a member installable at the lower corners of the working element where stress concentrations are often greatest. Through the provision of a uniquely constructed corner bit, I not only make feasible the ready replacement of this wearable part, but also uniquely stabilize the same against the extraordinary forces encountered. No alteration to the existing moldboard, which is a structural part of the digging blade, is required to install this arrangement. Also, since the corner bit is easily replaceable, it provides for a wide variety of quick-change shapes which can be installed to suit particular digging conditions as they are encountered. While the substantially triangular plate shape appears to be the preferred embodiment of the invention, there is also available usages such as those having serrated edges, more rectangular shaped, and the like available.

DETAILED DESCRIPTION OF INVENTION

The invention is described in conjunction with an illustrative embodiment in the accompanying drawing, in which:

FIG. 1 is a perspective view showing an earth-working element equipped with the inventive corner bit and provided as part of a tractor shown in phantom lines;

FIG. 2 is an enlarged front elevational view of the corner bit and associated mounting element;

FIG. 3 is an exploded perspective view of the elements of FIG. 2;

FIG. 4 is an enlarged elevational view of the replaceable corner bit of the invention;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary sectional view taken along the line 6—6 of FIG. 4;

FIG. 7 is an elevational view of the locking member employed in securing the corner bit to the supporting adapter;

FIG. 8 is a side elevational view of the structure of FIG. 7;

FIG. 9 is an elevational view of the adapter portion of the earth-working element which receives the corner bit seen in FIG. 4;

FIG. 10 is a fragmentary sectional view taken along the line 10—10 of FIG. 9;

FIG. 11 is a sectional view taken along the line 11—11 of FIG. 9;

FIG. 12 is a fragmentary side elevational view of the dozer blade of FIG. 1;

FIG. 13 is a view essentially similar to that of FIG. 2 but with different numerals applied to explain the functioning of the invention under certain force conditions;

FIGS. 14 and 15 are sectional views taken along the lines 14—14 and 15—15 as applied to FIG. 13;

FIG. 16 is a fragmentary front elevational view of a portion of a moldboard featuring a modified form of the invention; and

FIG. 17 is an enlarged fragmentary sectional view taken along the line 17—17 applied to FIG. 16.

Referring now to FIG. 1, the numeral 10 designates generally a self-propelled vehicle which, in the illustration given, is seen to be a crawler tractor. The tractor 10 is equipped with a dozer blade 11 at the forward end thereof, the blade 11 having an earth-engaging edge portion as at 12. As indicated previously, corner bits, such as are generally designated 13, are provided on a variety of pieces of excavating equipment. The bit 13 includes a platelike body 14 (see particularly FIGS. 2 and 3) which is secured to an adapter 15 provided as an integral portion of the blade 11. The adapter 15 is secured to the blade 11 proper by means of a plurality of bolts 16 which extend through openings 17. The body 14 constituting the bit 13 is releasably secured to the adapter 15 by

means of a shear block 18 and plow bolt 19 equipped with a suitable nut 20. It will be appreciated that the platelike body 14 is adapted for installation either at the lower right-hand corner or left-hand corner of the blade 11, being symmetrical about a longitudinal centerline, i.e., the line corresponding to the sight line 5—5 of FIG. 4.

Referring now to FIGS. 4–6, it will be noted that the platelike body is generally triangular in shape, and along two sides (as at 21 and 22) is equipped with an L-shaped flange 23 (see particularly FIG. 6). The flange 23 provides a groove 24 which receives corresponding edges 25 and 26 of the adapter 15 (see FIG. 9). The flange 23, in the illustration given, is continuous from the side 21 to the side 22 as can be appreciated from the portion designated 23*a* in FIG. 3. This is also seen in FIG. 5.

The sides 21 and 22 are beveled somewhat in proceeding from front to rear of the platelike body 14. This can be appreciated from the slope 27 designated in FIG. 6, and from the substantially greater beveling in the area designated 28 in FIG. 5. Thus, there is presented a sharp leading corner along the sides 21 and 22 which is relatively thicker at the very apex, as at 29 in FIG. 5. The groove 24 is generally trapezoidal in cross section (compare FIGS. 5 and 6) to receive the peripheral portions 30 and 31 of the adapter 15 (see FIGS. 10 and 11).

The body 14 is apertured as at 32 (see FIG. 5) for the receipt of the shear block 33 seen in FIGS. 7 and 8. The shear block has, itself, a through bore 34 countersunk as at 35 for the receipt of the plow bolt 19. In the illustration given, the bore 34 is inwardly tapered from the front or leading face 36; for example, each of the walls defining the aperture 32 (such as is designated 37) is arranged at about a 5° angle relative to a line perpendicular to the front face 36. The walls of the shear block 33 are correspondingly tapered or beveled as at 38 (see FIG. 8).

The face 39 of the adapter 15, which confronts the inner face 40 (see FIG. 5) of the bit 13, is recessed as at 41 (see FIGS. 10 and 11) for receipt of the innermost portion of the shear block 33. Thus, the bulk of the block 33 itself constitutes a restraint against detachment of the bit 13 from the adapter 15. The confronting face 39 is developed by having a portion of the adapter enthickened as at 42, which portion fits within a conforming recess 43 on the inside face of the adapter 13 (see FIG. 3).

In the operation of the invention, two adapters 15 are provided for each blade, the adapters 15 not being interchangeable right and left hand. These are bolted in place against the basic framework of the blade 11 by means of the bolts 16 extending through the openings 17. Thereafter the bits 13 are installed by a simple sliding action, whereupon the aperture 32 is aligned with the recess 41 for the ready receipt of the tapered shear block 33. This is installed after which the plow bolt 19 is inserted and the assembly thus achieved fixed by the application to the plow bolt 19 of the nut 20.

The end bit, regardless of which side of the tractor it is on, can be subjected to a number of triaxial stresses applied either individually or collectively, depending upon what the end bit encounters in its operating cycle. As an example, and with reference to FIG. 1, a triaxial stress X can be produced from a wide variety of angles as the tractor moves forward. In the event the tractor is slewed sideways or encounters an obstruction during the operating cycle, a triaxial load Z can be applied. Finally, in the event the tractor backs up, a triaxial stress Y could be encountered. There is also a possibility that more than one of these external forces could be encountered at the same instant, depending upon the end bit's relation to the material being moved.

Regardless of the magnitude, direction, or quantity of these triaxial forces, a resolution of them can be made on the corner bit and adapter assembly. The resolved force could exist either as a concentrated or distributed force in the directions and locations shown by the forces F_1–F_7. For example, if the tractor is moving forward concentrated or distributed loads in the direction of forces F_1, F_2, and F_4, or F_3, F_1 and F_4 could occur.

When backing the tractor, resolved loads could be similar to forces F_6, F_5, and F_1 and either F_3, or F_2. There also occasions as when the tractor is being disengaged from the sidewall where it could be locked in a rock that a force F_7 could operate on the assembly.

Resisting these external forces and their direction of application are the stabilizing junctures between the corner bit and the adapter shown in FIGS. 13–15 as surfaces S_1–S_6. Surface S_7 is provided to streamline the bit to make a more effective penetrating and digging tool. Surface S_6 is sloped to provide more wear metal in the high wearing areas but still can accept loads. Basically, a clearance can be built in the surface joint as at S_4 to insure the other bearing areas line up properly—all within the limitations of dealing with unmachined parts. At any rate, these surfaces can act individually or collectively to offset the external force applications. Even though 100 percent bearing may not be attained initially, it should be appreciated that when these loads are applied, bearing will wear in these stabilizing surfaces which produce internal resistive forces to keep the system in equilibrium. Even though the bit may get loose on the adapter, the external forces will cause translation of the bit on the adapter until the stabilized surfaces come in contact and create the resistance necessary to offset the loads. In actual operation, to resist distributed or concentrated forces in the direction of F_4, the surfaces S_5 and S_6 and ultimately S_4 resist this loading. Force F_1 is resisted by surfaces S_1, S_2 and S_6. Force F_6 is resisted by surface S_3. Forces F_2 or F_3 are counterbalanced by surfaces S_1, S_2 and partially by S_6. Force F_5, which can be resolved into added forces F_6 and F_1 is resisted by the same surfaces as those forces. Force F_7 tends to "wipe off," the bit from the adapter. Resistance for this is provided by the locking device assembly.

Insofar as the locking device **18** is concerned, in use, there are clearances at the front leading area as at **44** (see FIG. **8**) rear and bottom mating areas of the adapter as at **45** and **46** which are provided for takeup to force the bit to the rear to make it come in contact with all the bearing surfaces and leave additional clearance on the bottom for takeup as wear occurs. Clearance can be provided along the side **47** (see FIG. **6**) without losing the basic advantage of the locking device. Side forces are reacted on stabilized areas and, therefore, need not be carried by the shear block. Force F_7 (see FIG. **8**) is resisted by the shear block bit and adapter assembly. It is also important to note that the plow bolt **19** is only a safety device and is not necessarily required. In actual operation, the assembly will work in unison without coming apart, even when the bolt is removed. In practice, there is an upsetting of the mating surfaces which tends to hold them tightly together. The plow bolt hole does offer a recess in the rear face of the adapter which tends to hold them tightly together. The plow bolt hole does offer recess in the rear face of the adapter which allows the shear block to be driven out by a drift pin to assist the quick change feature. While the shear block is working quite satisfactorily, it is not necessarily the only locking device that could be applied and still make the two piece corner bit assembly operational. A wide variety of locking devices which provide the takeup bearing requirements, force resistance, and removal features can be employed.

In FIGS. **16** and **17** a replaceable wear edge **148** is provided on the adapter **115** and held in place by the replaceable bit **13**. Advantageously, some form of dovetail interconnection as at **149** may be employed.

I claim:

1. A corner bit structure comprising an adapter equipped with an aperture arranged to be attached to an excavating element, and a platelike bit equipped with an aperture releasably connected to said adapter in generally overlying relation thereto and having an exposed face and a face in confronting relation to said adapter, said bit having a generally triangular shape with integral generally L-shaped flanges on two sides installed in overlapping relation relative to said adapter, and lock means extending through said adapter and bit apertures generally centrally of said bit to releasably connect said bit to said adapter, said lock means including a shear block, said adapter being recessed about the aperture thereof to receive a portion of said block with said block being mainly received in said bit aperture, said lock means extending through said block to anchor the same to said adapter.

2. A corner bit structure comprising an adapter equipped with an aperture arranged to be attached to an excavating element, and a platelike bit equipped with an aperture releasably connected to said adapter in generally overlying relation thereto and having an exposed face and a face in confronting relation to said adapter, said bit having a generally triangular shape with integral generally L-shaped flanges on two sides installed in overlapping relation relative to said adapter, and lock means extending through said adapter and bit apertures generally centrally of said bit to releasably connect said bit to said adapter, said lock means including a shear block with said shear block being tapered in a direction generally perpendicular of the exposed face of said bit.

3. A corner bit structure comprising an adapter equipped with an aperture arranged to be attached to an excavating element, and a platelike bit equipped with an aperture releasably connected to said adapter in generally overlying relation thereto and having an exposed face and a face in confronting relation to said adapter, said bit having a generally triangular shape with integral generally L-shaped flanges on two sides installed in overlapping relation relative to said adapter, and lock means extending through said adapter and bit apertures generally centrally of said bit to releasably connect said bit to said adapter, said bit being equipped with a recess about the aperture thereof in the face confronting said adapter and with said adapter being enthickened to provide an integral portion in the face thereof confronting said bit, said integral portion mating with said bit recess.

* * * * *