

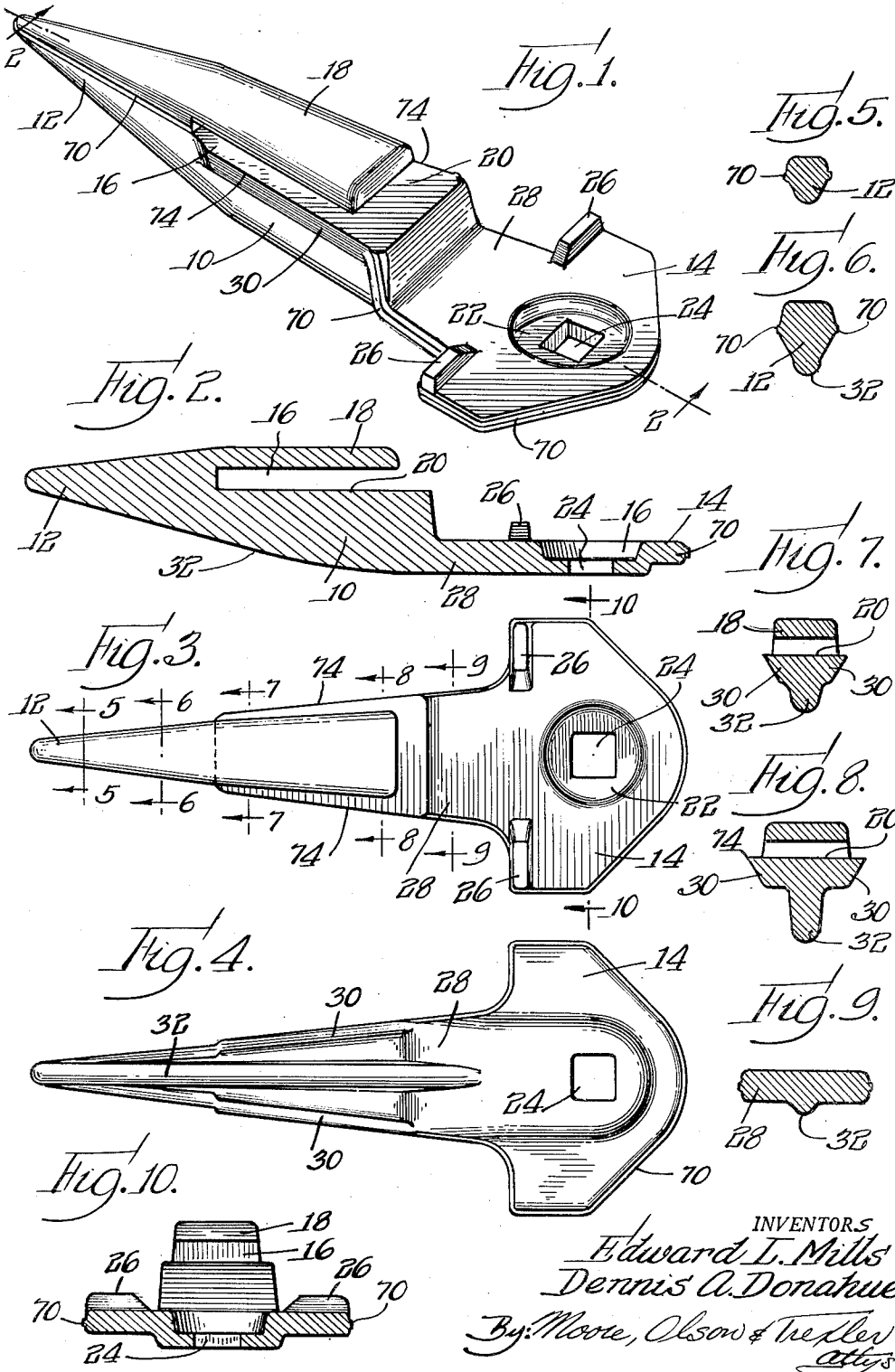
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E. L. MILLS ET AL  
SICKLE GUARD

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5 Sheets-Sheet 1



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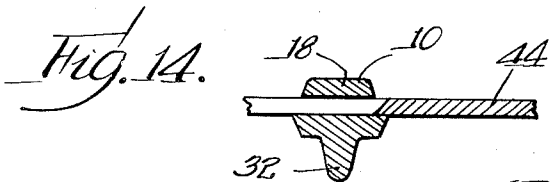
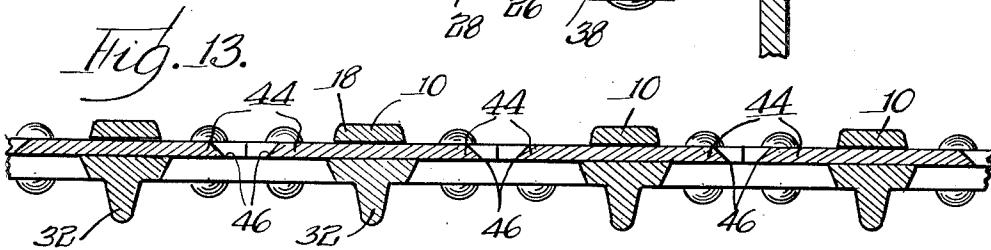
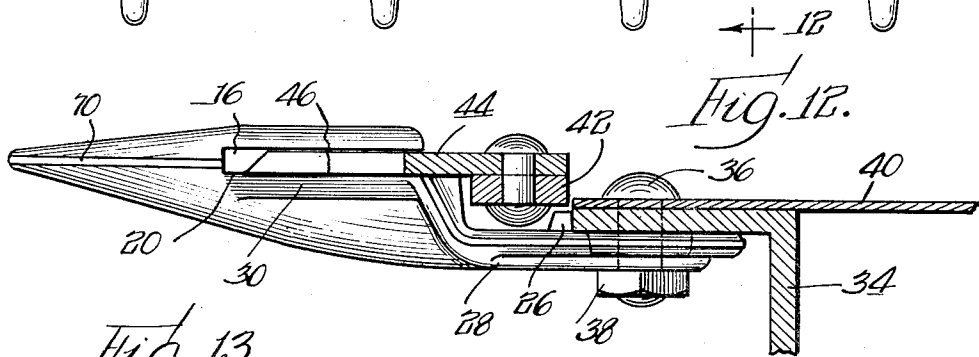
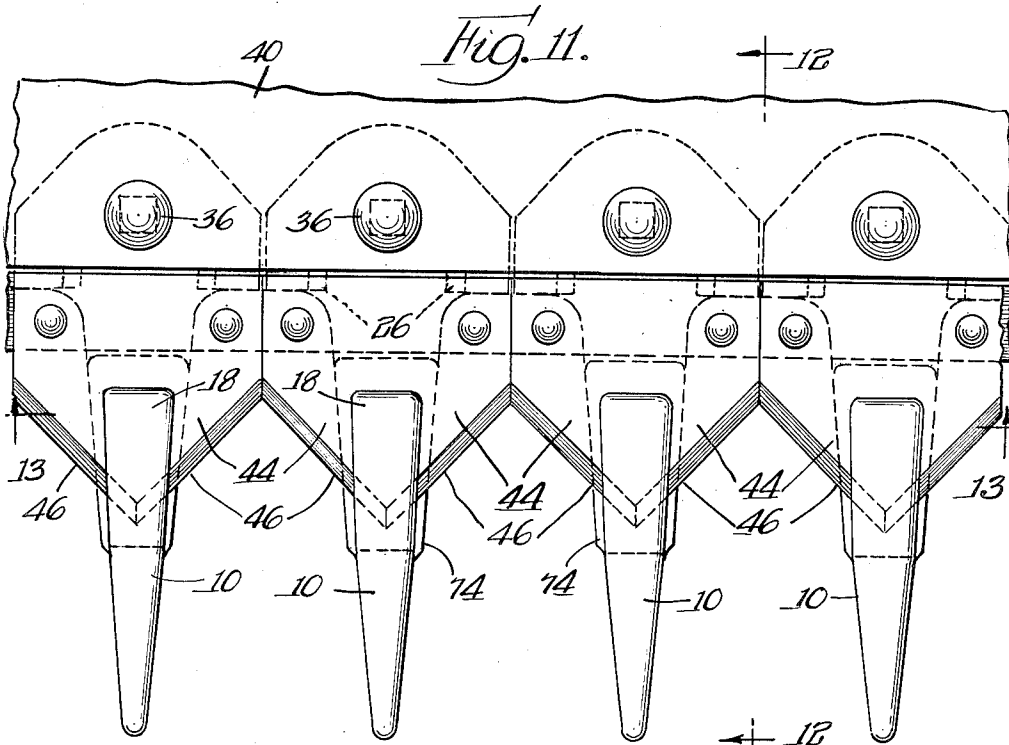
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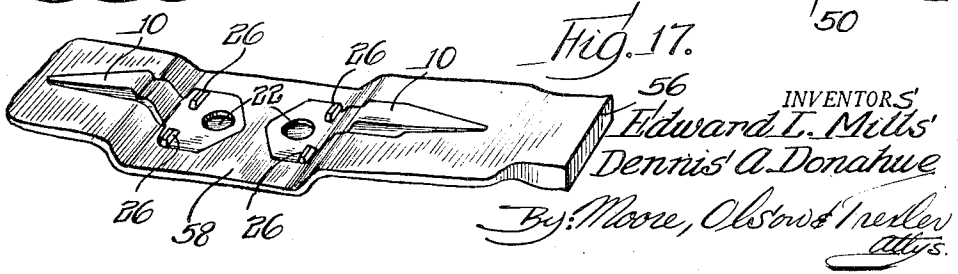
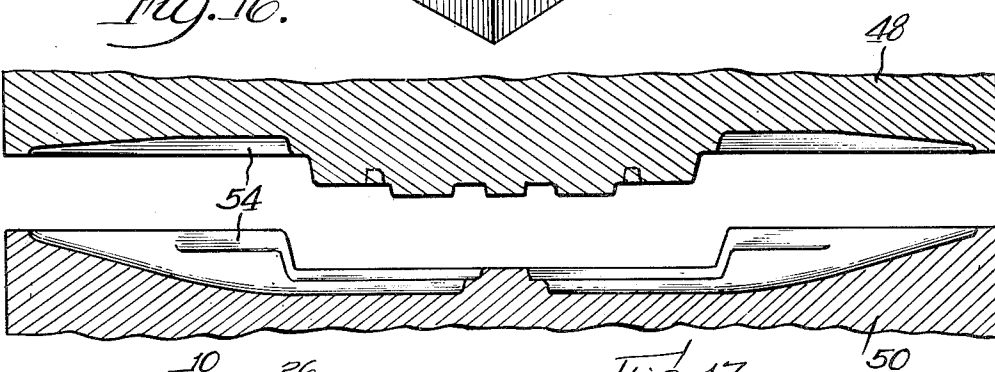
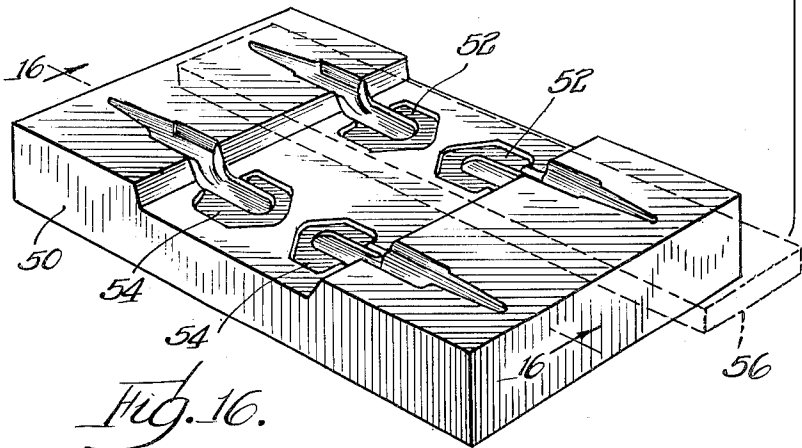
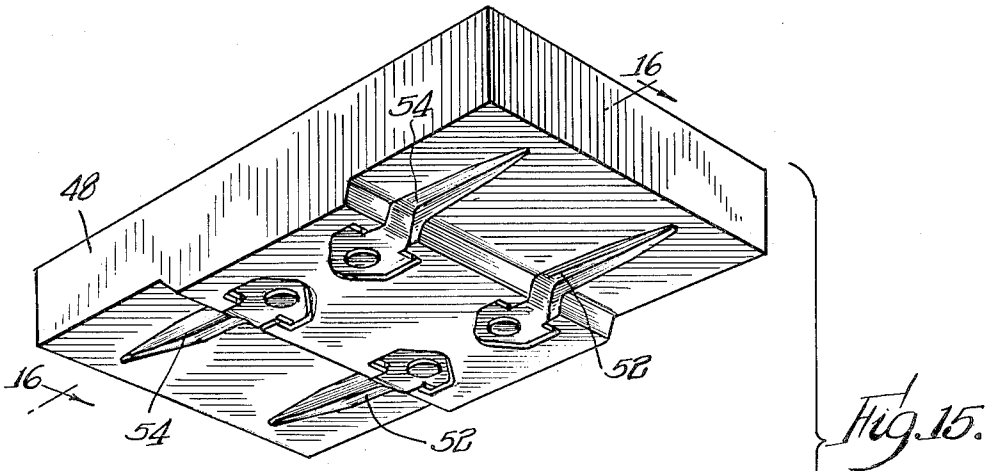
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SICKLE GUARD

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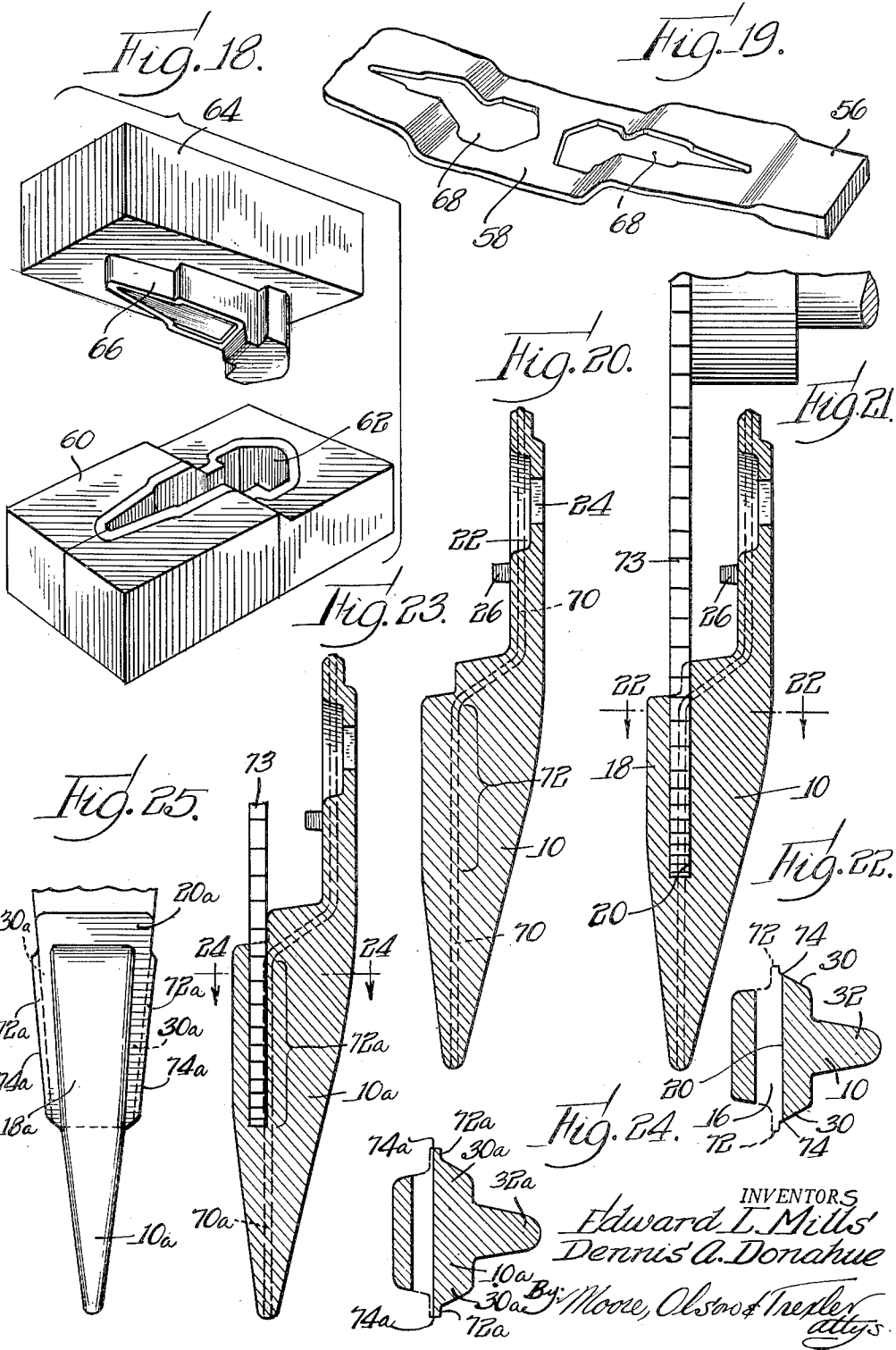
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SICKLE GUARD

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5 Sheets-Sheet 4



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FIG. 26.

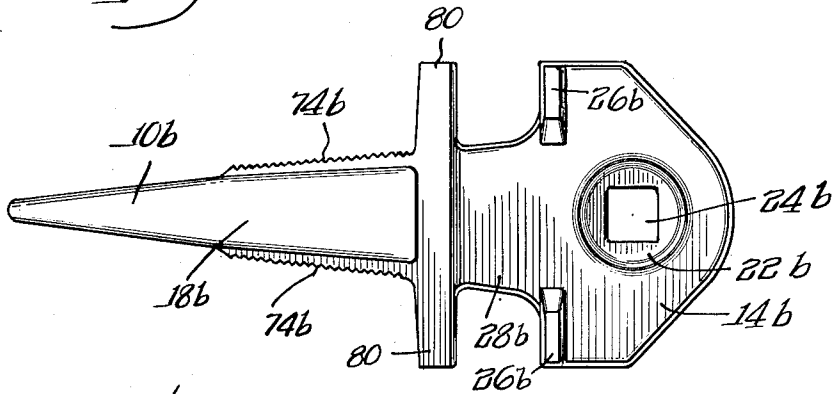


FIG. 27.

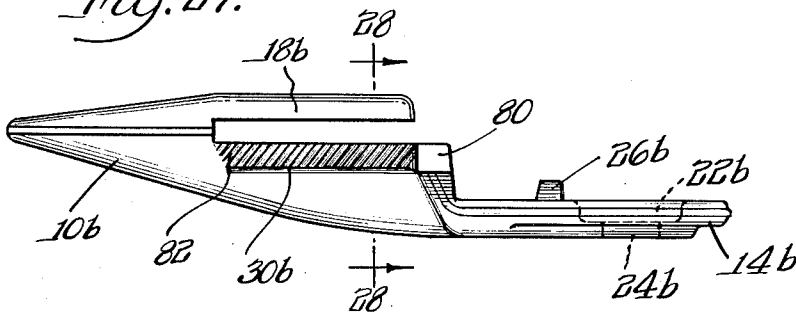
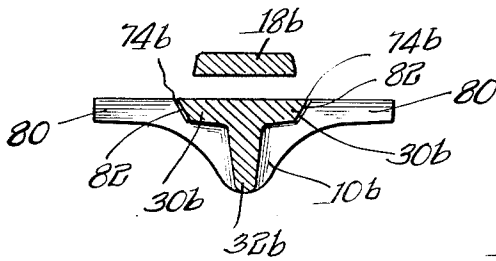


FIG. 28.



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# UNITED STATES PATENT OFFICE

2,654,987

## SICKLE GUARD

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2 Claims. (Cl. 56—310)

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This invention relates to sickle or cutter guards of the type used on harvesting machinery such as mowers and the like.

Cutter guards of the type defined are conventionally formed of cast iron, and are provided with a so-called ledger plate over which the associated cutting knife slides, the grass or other material to be cut being caught between the knife blade and the edge of the ledger plate and thus severed. Such constructions have certain disadvantages among which is the fact that the cast metal of which the cutter guard is formed is brittle so that it is readily broken by rocks or other foreign objects with which it may be inadvertently engaged or struck during operation of the associated harvesting machine. Further, the brittle characteristic of the metal does not permit of its being bent back into shape, for further service, in the event of bending or jamming by engagement with such foreign objects. Still further, the requirement for a ledger plate, as a separate element, to provide a hard surface against which the cutting knife may engage, increases costs and gives rise to various manufacturing difficulties incident to the securing of the ledger plate in position upon the body of the cutter guard.

A forged cutter guard, forged to shape from suitably constituted steel, and case hardened, eliminates the necessity for a separate ledger plate, in that a case hardened surface may be formed upon the cutter guard body to effect the functions of a ledger plate. Furthermore, a properly forged steel guard, while externally case hardened, may be left with a relatively tough and ductile core or interior, so that the guard member is relatively non-brittle, and bendable within limits. The danger of breaking by inadvertent engagement with foreign objects such as rocks, as above mentioned, is thereby minimized; and in the event the guard body should become inadvertently bent it frequently may be restraightened for further service avoiding replacement costs.

While various advantages thus result from the provision of a cutter guard of forged steel, difficulties also arise incident thereto, particularly in providing satisfactory means and methods of fabrication and assembly. Certain of these difficulties arise in and are incident to the provision of cutter guards of the multiple finger type as is set forth in our copending application, Serial No. 693,516, filed August 28, 1946, now Patent No. 2,619,787, wherein a sickle guard of the multiple type, and methods for effecting the manufacturing thereof, are set forth. Other difficulties and

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problems arise in connection with the production of a forged cutter guard of the unit or single body type, which comprises the subject matter of the present case.

It is an object of the present invention to provide a cutter guard, specifically of the single body type, of improved construction and improved operating characteristics.

A further object of the present invention is to provide improved means and methods for effecting the fabrication of sickle or cutter guards of the type set forth.

More specifically stated, one of the objects of the present invention is to provide improved fabricating methods, for guards of the type defined, which may be more rapidly and economically carried out, and which produce a more accurately formed and fabricated structure.

Another object of the invention is to provide in a guard structure of the type stated, an improved cutting ledge, guard lip, and associated parts.

Still another object of the invention is to provide a cutter guard structure, of the type defined, having improved anchorage means for connection of the guard body to the associated harvester machine frame parts.

Various other objects, advantages and features of the invention will be apparent from the following specification, when taken in connection with the accompanying drawings, wherein certain preferred embodiments are set forth for purposes of illustration.

In the drawings wherein like reference numerals refer to like parts throughout:

Fig. 1 is a perspective view of a sickle or cutter guard constructed in accordance with and embodying the principles of the invention, in accordance with one preferred and selected embodiment thereof;

Fig. 2 is a longitudinal sectional view of the structure of Fig. 1 taken as indicated by the line 2—2 thereof;

Fig. 3 is a top view of the structure;

Fig. 4 is a bottom view thereof;

Figs. 5 to 10 inclusive are transverse sectional views taken as indicated by the lines 5—5 to 10—10, respectively, of Fig. 3;

Fig. 11 is an assembly view showing a plurality of the cutter guards assembled in operative position in a harvesting machine, in cooperation with cutting knives and associated parts;

Fig. 12 is an enlarged sectional view through the structure of Fig. 11, taken as indicated by the line 12—12 thereof;

Fig. 13 is a sectional view of the structure of Fig. 11 on the line 13—13;

Fig. 14 is a partial view, similar to Fig. 13, but showing the cutter blade in a different shifted position;

Fig. 15 is an exploded perspective view of the forging die blocks used in fabricating the cutter guard of Fig. 1, in multiple units;

Fig. 16 is an enlarged sectional view through the die cavities, and taken as indicated by the section lines 16—16 of Fig. 15;

Fig. 17 is a perspective view of the forged blank, as fabricated by the die structures of Figs. 15 and 16;

Fig. 18 is an exploded perspective view of a set of blanking and trimming die blocks used in the further fabrication of the cutter guard units;

Fig. 19 is a perspective view of the flash sheet of Fig. 17, after the guard bodies have been severed therefrom;

Fig. 20 is an enlarged longitudinal sectional view of one of the guard bodies, as fabricated by the blanking and trimming dies of Fig. 18;

Fig. 21 is a view similar to Fig. 20, illustrating the manner in which the guard body is sawed to form the knife overlying guard lip thereon;

Fig. 22 is an illustrative sectional view through the structure of Fig. 21, taken as indicated by the line 22—22 thereof;

Fig. 23 is a view similar to Fig. 21, but illustrating a modified embodiment;

Fig. 24 is an illustrative sectional view through the structure of Fig. 23, taken as indicated by the line 24—24 thereof;

Fig. 25 is a partial plan view of the structures of Figs. 23—24; and

Figs. 26, 27 and 28 are plan, side, and transverse sectional views, respectively of a still further modified form of structure, Fig. 28 being taken on the line 28—28 of Fig. 27.

Referring more specifically to the drawings, and first to the structural embodiment of Figs. 1—22 in Figs. 1—10 there is illustrated the structure of the finished guard body, which will be first described.

As shown, the guard comprises a main body 10 having a forward nose or guiding portion 12 and a rear anchorage portion 14. As indicated in Figs. 2 and 3, the nose portion 12 is tapered both laterally and vertically to form a generally pointed forward nose portion for engagement into the grass or other material to be cut.

A slot 16, Fig. 2, is formed horizontally into the body, extending toward the nose 12 so as to form an overhanging lip as indicated at 18 extending rearwardly over the main body a predetermined distance. The recess 16 is arranged to receive the cutting knives, as will presently appear, the lower surface 20 of the recess comprising a ledger surface against which the cutting edges of the knives engage to effect the cutting action.

The rear anchorage portion 14 of the cutter guard more specifically comprises a centrally disposed cup-shaped recess portion 22 aligned with a polygonal opening 24 which is square in cross section in the particular embodiment shown. There is further provided, along the forward edge of the anchorage portion, a pair of upstanding lugs 26 forming ledge means and which cooperate with the opening 24 in securing the cutter guard in position, as will presently appear. The anchorage portion 14 is connected to the main body 10 by means of a relatively flat web 28 lying substantially in the plane of the lower portion of the body 10.

The transverse cross sectional shaping of the structure along its length is shown by the successive sectional views, Figs. 5 to 10 inclusive. It will be seen that the body in the vicinity of the slot 16 is provided with a pair of laterally extending wings 30, Figs. 7 and 8, and with a depending web and stiffening flange 32. The wings 30 provide a relatively wide ledger surface 20, in respect to the size of the structure, and the web 32 imparts a maximum vertical strengthening in reference to over-all weight.

A plurality of cutter guards in assembled position in respect to a harvesting machine frame structure, and associated cutting knives, are shown in Figs. 11—14. As indicated in Fig. 12, each guard member is arranged to be secured to the harvester machine frame structure 34 by means of a bolt 36 extending through the squared opening 24, previously described, and secured in position by suitable means such as the nut 38. In the particular arrangement shown, bolts 36 not only secure the individual guards 10 in position, but also may be employed to connect a frame apron 40 to the frame structure 34, as shown.

A knife support bar 42 overlies the webs 28 of the cutter guards, said knife bar being suitably supported upon the harvester machine frame for reciprocating movement in respect to the cutter guards, in the usual manner. The bar 42 carries knives 44 in abutting relation, the knives lying within the guard member slots 16, and each knife being provided with a cutting edge 46 co-operable with and slidable over the ledger surface 20 of the associated guard member.

The method of making the cutter guards, in accordance with the present invention, is illustrated in Figs. 15—22. A pair of cooperable forging dies is provided as indicated at 48 and 50, Fig. 15, both dies being provided with two sets of impressions, or cavities as indicated, respectively, at 52 and 54. The impressions 52, in the particular embodiment shown, are for effecting the rough forging operations, and the impressions 54 are for effecting the finished forging.

In operation, a steel billet 56 of suitable size and constituency for case hardening is laid onto the lower die block 50, as indicated in dotted lines in Fig. 15, so that upon closing of the dies in a suitable drop hammer mechanism a pair of oppositely extending cutter guards will be fabricated from a single billet. After rough forging by the impressions or cavities 52, the billet is transferred to the cooperative finish cavities 54 wherein the finished forging operations are effected. The completed billet comprising the pair of oppositely extending cutter guards 10, and the associated forging flash sheet 58 to which the cutter guards are secured, are illustrated in Fig. 17, in the condition in which they emerged from the finishing forging dies. It will be seen that the recess or depression 22 in the cutter guard anchorage portion, and the lugs 26 thereof, are formed as an incident to the forging operations.

Referring to Fig. 18, a blanking and trimming die set is shown comprising a lower die block 60 having a die cavity 62, and an upper die block 64 having a die 66; the die cavity 62 and die 66 being cooperatively shaped so that upon actuation within a suitable punch press or the like the cutter guards may be individually severed from the flash sheet. The flash, with the cutter guards severed therefrom, is illustrated in Fig. 19, the openings from which the cutter guards have been severed being indicated by the reference numerals 68. After blanking, the squared

opening 24 may be cut through the recessed portion 22, or such openings may be cut through the anchorage portion of the cutter guards prior to severance from the flash sheet 58.

The guard member 10, in the condition in which it emerges from the blanking and trimming dies, and with the opening 24 cut there-through, is shown in Fig. 20. It will be seen that a parting line as indicated at 70 extends along the length of the guard body. The rough edges of this parting line are removed by the blanking dies 62-66 except along the length represented by the numeral 72 in Fig. 20, along which area a portion of the forging flash at the parting line may be permitted to remain for a purpose as will presently appear. To form the knife slot 20 and the associated lip 18, in each cutter guard, as previously described, a rotary saw 73, Fig. 21, suitably mounted in a sawing machine, is employed. In the preferred embodiment illustrated in Figs. 1-22, the saw cut is positioned so as to remove the forging flash 72, in the vicinity of the cut, which results from the forging and blanking operations as described.

More particularly, referring to Fig. 22, the aforementioned flash portions 72 are indicated in dotted lines, and it will be seen that the saw cut is so disposed as to effect the removal of the flash, thereby adding to the finish of the product, and facilitating the formation of a proper cutting edge 74 at the point of juncture between each wing 30 and the ledger surface 20. The arrangement is further illustrated in Fig. 1 wherein it will be seen that the parting line 70 and saw slot 16 are substantially coplanar so that the flash portion 72 has been removed. As will be understood, in effecting the sawing operation to form the slot 16, the work piece is held in a suitable fixture in reference to the rotating saw blade, and the saw blade then moved downwardly as seen in Fig. 21 to effect a suitable penetration into the work, and a removal of the stock to be cut.

After the sawing operation, the work piece is case hardened, particularly in the vicinity of the ledger surface 20 and the cutting edges 74, to provide a hardened surface for engagement by and cooperation with the knife blades 44. Preferably the inner core of the guard body is maintained untreated, for toughness and ductility.

It will be seen that in accordance with the method set forth, means are provided for effecting the rapid and economical fabrication of single sickle or cutter guards by means of drop forging operations, whereby to produce a forged cutter guard structure which avoids the necessity for a separate ledger plate, and which is also highly resistive to breakage from shock or impact in service. The arrangement by which the cutter guards are drop forged by closed dies, in multiple units in back to back relationship enables the forging operations to be rapidly and accurately effected, each cutter body lending stability and accuracy to the positioning of the other whereby to facilitate the proper forging of both. Both rough and finished forging operations are effected in this same relationship. The blanking and trimming dies 62-66 perform the dual function of removing the cutter guard bodies from the foregoing flash sheet 58, and also serve as means for trimming the guard bodies around the parting line of the flash so as to provide a finished work piece. In accordance with the embodiment previously described, a portion of the part-

ing line flash as indicated at 72, is removed by the sawing operation, which constitutes a simplified means for thus further finishing the work piece and simultaneously producing the knife blade receiving slot structure.

The lugs 26 and squared opening 24, which are produced in the anchorage portion of the cutter guard, as heretofore described, provide a simplified means for securing single cutter guard members to the harvester machine frame structure, as indicated in Fig. 11, in aligned relationship. It will be seen that a single securing bolt 36, in combination with the lugs 26, provides a firm yet shallow anchorage for the cutter guards which is strongly resistant to forces tending to twist the guards in respect to their mountings.

The relatively wide ledger surface 20, produced by the outwardly projecting wings 30, extends beyond and is wider than the lip 18 so that a ledger surface of desired size is maintained even after repeated sharpenings. The increased width of the ledger surface in respect to that of the lip minimizes the jamming of the grass or other cut material, as does the parallel disposition and positioning of the slot 16. The wings 30 also provide increased width to the body 10 in the vicinity of the slot 16, the slot being substantially commensurate in length with the wings, whereby the slot does not unduly weaken the body structure for rugged service conditions. The parting line 70, which is stepped downwardly so to speak from the main body 10 to the anchorage portion 14, enables the entire structure to be fabricated for forging, in the manner previously described.

In certain instances it may be desirable to leave a portion of the flash 72, so as to provide additional width to the ledger surface, and also to provide a relatively thin cutting edge which may be readily ground for resharpening. Such a structure may be readily produced, in accordance with the present invention, merely by shifting the position of the saw cut. Thus, as illustrated in the modified embodiment of Figs. 23-25, by shifting the saw cut slightly upwardly of the cutter body as indicated at 10a, it will be seen that the portions of the flash 72a remain unsevered, so that the cutting edges 74a are formed in this instance at the outer edge of the flash. The relatively narrow flash structure, at the parting line, can be readily reground for sharpening operations.

In Figs. 26-28 a further modified embodiment is illustrated wherein the cutter body as indicated at 10b has spacing projections 80 oppositely extending at the rear of the ledger surface. These extensions have a combined length equal to or slightly greater than the width of the anchorage portion 14b so that they may be brought into abutting relation when the guards are assembled in operative position on the harvesting machine, thus lending stability to the assembled unit. Also, the ledger surface forming wings, indicated at 30b, are in this instance serrated or roughened along their outer surfaces at 82 whereby to provide serrated cutting edges 74b as in certain instances may be desired to facilitate the cutting action of the knives.

It is obvious that various changes may be made in the specific embodiments set forth without departing from the spirit of the invention. The invention is accordingly not to be limited to the specific embodiment shown and described, but only as indicated in the following claims.



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The invention is hereby claimed as follows:  
 1. A cutter guard for use in a mowing machine and formed of forged steel and including an elongated body portion having a ledger surface and a lip overlying the same, and further including a relatively shallow anchorage portion offset downwardly from said ledger surface and having formed thereon as the result of the forging operation a bolt recess and upstanding lugs spaced on opposite sides thereof and adjacent the peripheral edge of said anchorage portion, said guard body portion being provided on opposite sides thereof and along said ledger surface with cutting edges, said guard body portion and said anchorage portion having, respectively, a first parting line region and an offset parting line region both resulting from the forging operation and joined by an intermediate parting line, said first parting line region approximating the position of said cutting edges, and said offset parting line region extending along the periphery of said anchorage portion with the bolt recess and upstanding lugs disposed close to the said offset parting line region.

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2. A cutter guard as claimed in claim 1, wherein the ledger surface includes wing portions extending laterally beyond the adjacent body surfaces and having beveled edges intersecting the ledger surfaces for providing sharp edges cooperate with a cutter plate.

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