April 9, 1968 P. DE LA MOTTE 3,376,773

SCRAP CHOPPER

Filed June 8, 1965 3 Sheets-Sheet 1

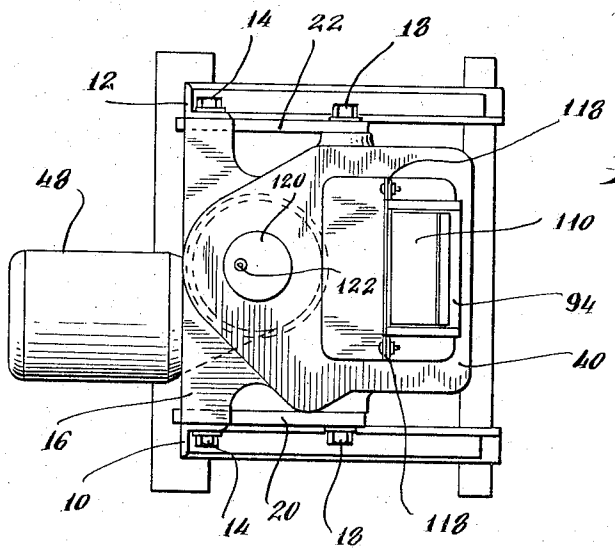


Fig. 1.

Fig. 3.

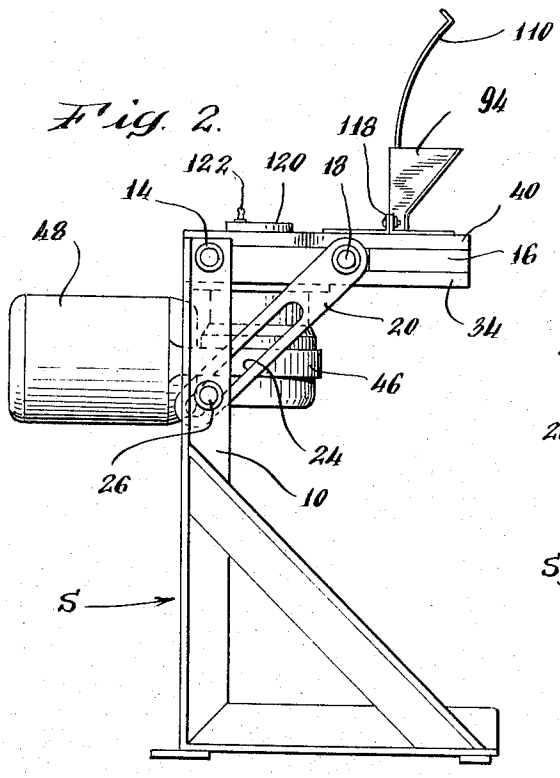
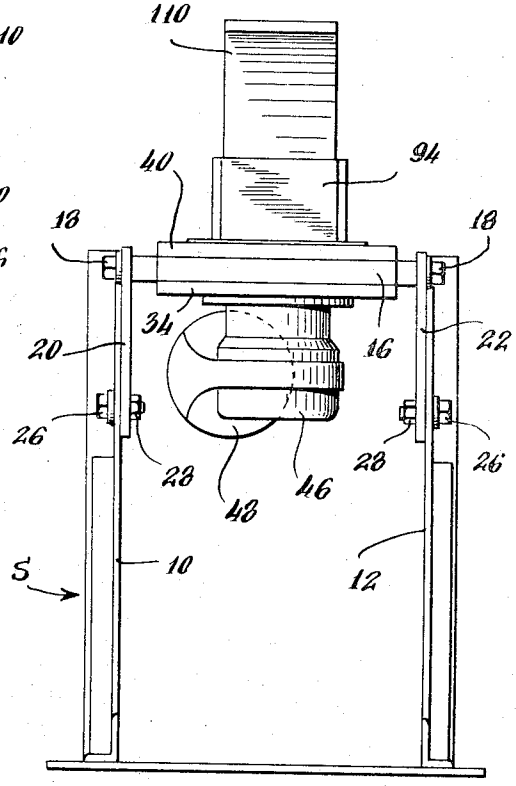


Fig. 2.



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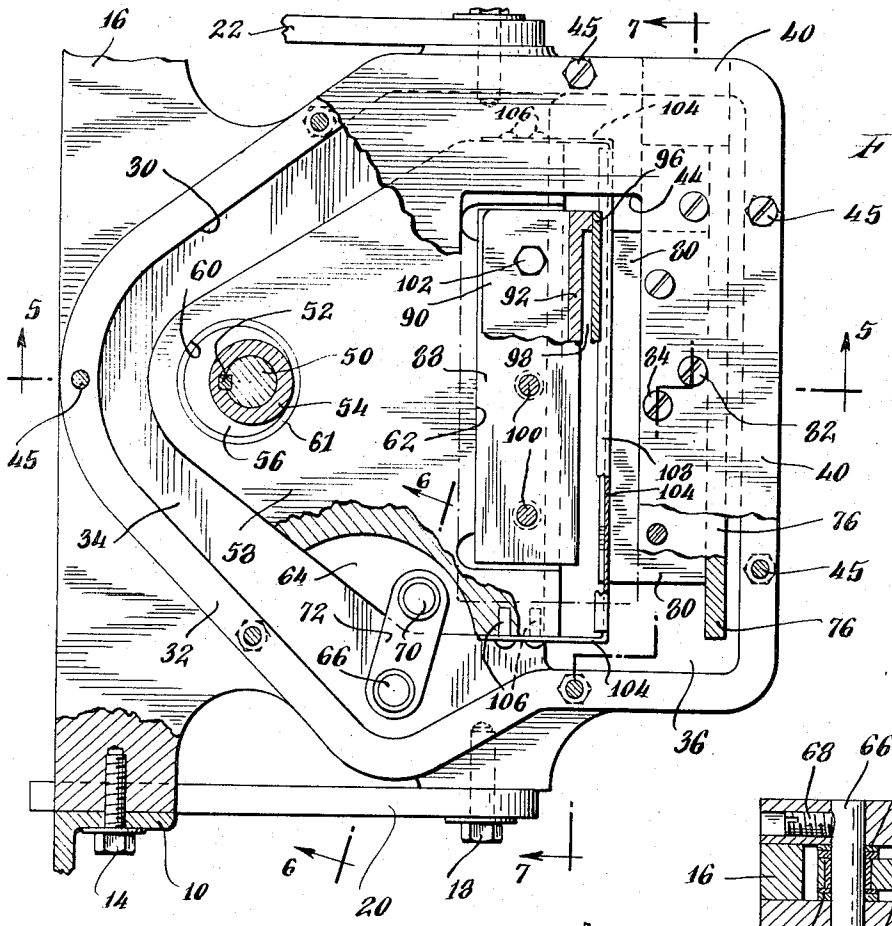


Fig. 4.

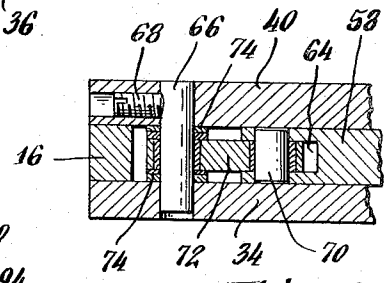


Fig. 6.

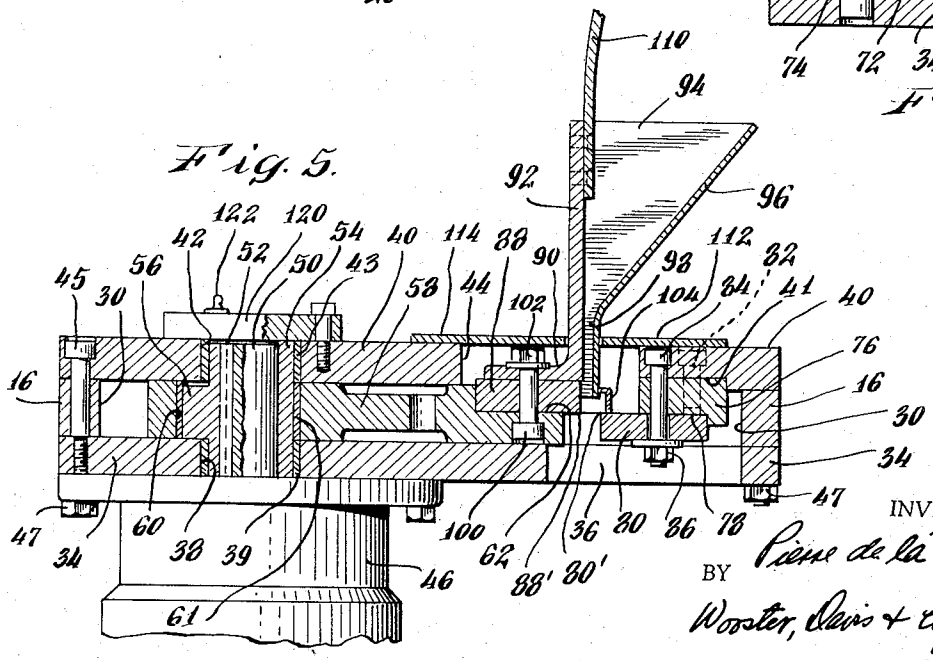


Fig. 5.

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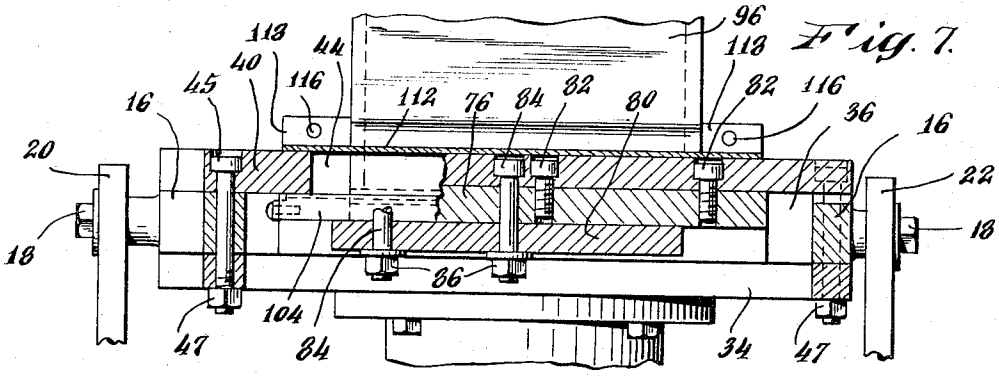


Fig. 7.

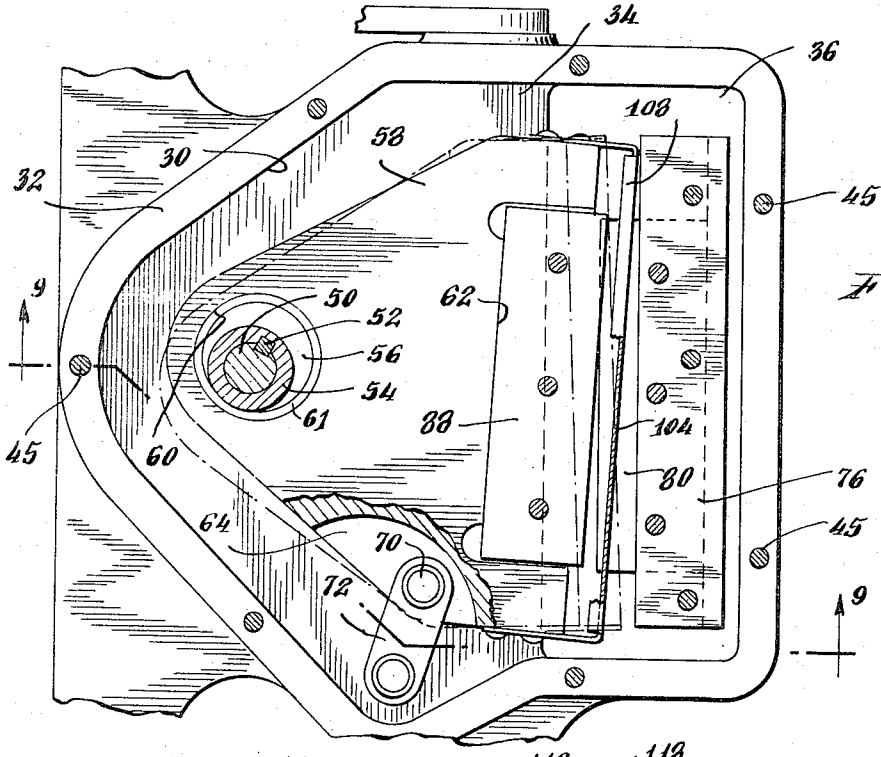


Fig. 8.

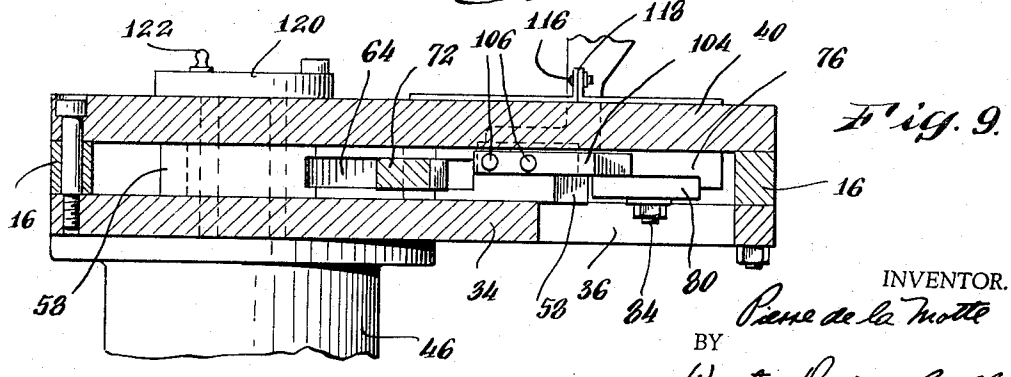


Fig. 9.

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3,376,773

SCRAP CHOPPER

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Filed June 8, 1965, Ser. No. 462,369
4 Claims. (Cl. 83—441)

ABSTRACT OF THE DISCLOSURE

A scrap chopper having a pair of fixed, spaced plates defining aligned feed and discharge openings and a fixed first cutter blade secured thereto. Slidably mounted intermediate the fixed plates is a center plate carrying a second cutter blade and a stock chute. A drive shaft extends through the plates and includes an eccentric cam engaging a first portion of the center plate to impart a circular motion thereto. One end of a tethering link is pivotally secured between the fixed plates, the other end being pivotally secured to a second portion of the center plate. Rotation of the drive shaft imparts a scissoring motion to the second cutter blade.

This invention relates to a chopper for scrap metal.

In many manufacturing operations a band of metal stock is fed continuously from a coil through a punch press. The press repetitively removes portions of the metal stock which may constitute the final form of the manufactured object or may serve as blanks for further operations. There remains from this procedure a skeleton of scrap stock which must be disposed of. As the skeleton is difficult to handle, it is common practice to chop it into smaller pieces shortly after it leaves the press. This is accomplished by feeding the skeleton into a motorized scrap chopper. Such a chopper customarily includes a fixed cutting blade and a motor driven reciprocating cutting blade. The chopper is placed near the press and the skeleton is fed through a chute and between the moving and fixed blades, the severed pieces falling into a suitable receptacle. The motion of the moving blade is usually along a line perpendicular to the fixed blade. However, an "orbital" action has also been employed wherein each point on the moving blade describes a circle relative to the fixed blade—the cutting edges of the blades remaining parallel at all times.

Prior art choppers have certain disadvantages which it would be desirable to overcome. For example, the fact that the cutting blades remain parallel to one another unduly limits the thickness of the material that can be chopped. The life of the blades is relatively short. Also, prior art units employ a motor positioned on top of the chopper, making it difficult to feed scrap into the stock-receiving chute.

Accordingly, it is the primary object of this invention to provide an improved scrap chopper. Other objects are to provide such a chopper having: improved cutting action; longer lasting cutter blades; and a more easily accessible stock receiving chute. The manner in which these objects are achieved will be more apparent from the following description, the appended claims, and the figures of the attached drawings wherein:

FIG. 1 is a plan view of a scrap chopper constructed in accordance with this invention;

FIG. 2 is a side view of the chopper of FIG. 1;

FIG. 3 is a front view of the chopper of FIG. 1;

FIG. 4 is an enlarged top view of a portion of the chopper of FIG. 1, portions thereof being cut away to illustrate its internal construction;

FIG. 5 is a cross section taken along the line 5—5 of FIG. 4;

FIG. 6 is a cross section taken along the line 6—6 of FIG. 4;

FIG. 7 is a cross section taken along the line 7—7 of FIG. 4;

FIG. 8 is a view similar to FIG. 4 showing the moving chopper blade in a different orientation; and

FIG. 9 is a cross section taken along the line 9—9 of FIG. 8.

With particular reference to FIGS. 1, 2 and 3 there is illustrated a scrap chopper including a floor stand S having a pair of spaced upright members **10**, **12** formed of angle irons. Mounted between the upper ends of upright members **10**, **12**, by means of screws **14**, is a spacer plate **16**. The spacer plate **16** is further supported by screws **18** which extend through the upper ends of a pair of angled support straps **20**, **22**. Each of the support straps defines an elongated adjusting opening **24** and is secured to its corresponding upright member **10**, **12** by means of a bolt **26** and a nut **28**. As illustrated, the spacer plate **16** is shown in the horizontal position. However, it will be apparent that it may be tilted about the screws **14** by merely loosening nuts **28** and sliding the support straps **20**, **22** to a more convenient position.

The construction of the spacer plate is most clearly illustrated in FIG. 4 wherein it will be seen that the spacer plate **16** defines a large central opening **30** surrounded by a flange **32** having flat upper and lower surfaces. Mounted against the bottom surface of flange **32** of spacer plate **16** is a lower plate **34**. The lower plate **34** has approximately the same external dimensions as the flange **32** and defines a generally rectangular discharge opening **36** and a circular motor shaft opening **38** having a bearing liner **39**.

Secured to the top surface of flange **32** of the spacer plate **16**, and having a shape similar to that of the lower plate, is an upper plate **40**. The upper and lower plates are secured to the flange **32** by means of the bolts **45** and nuts **47**. Upper plate **40** includes motor shaft opening **42** having a bearing liner **43** aligned with the similar opening **38** in the lower plate and also defines a rectangular feed opening **44** which, however, is spaced rearwardly from discharge opening **36** so as to overlap it approximately halfway, as shown in FIG. 5. The lower surface of upper plate **40** is cut away adjacent the feed opening **44** to form a recess **41**. Mounted against the lower surface of lower plate **34** is the head end **46** of a geared head motor **48**. The shaft **50** of the motor extends upwardly through the shaft openings **38**, **42** and is secured by means of a key **52** to a cylindrical sleeve **54** having a centrally positioned circular eccentric cam **56**. The cam is positioned between the upper and lower plates as shown in FIG. 5.

Slidably mounted between the upper plate **40** and lower plate **34** and within the opening defined by spacer plate **16** is a center plate **58**. The center plate **58** is essentially triangular in shape, as illustrated in FIGS. 4 and 8, and its narrow end defines a circular opening **60** having a bearing liner **61** encircling the eccentric cam **56**. The wide end of center plate **58** is cut away to form a rectangular recess **62** as illustrated in FIGS. 4 and 5. In addition, one side of the center plate is provided with an arcuate recess **64**.

A hinge pin **66** extends between the top plate **40** and lower plate **34** at a distance from the center plate **58** and is secured by means of a set screw **68**. A link pin **70** is mounted in the center plate and extends across the recess **64**. The hinge pin **66** and link pin **70** are joined by means of a link **72** which is pivotally secured to both pins. Spacers **74** serve to keep the hinge pin end of the link centered relative to the hinge pin.

Mounted within the recess **41** of the upper plate **40** and

extending downwardly into the opening 30 of spacer plate 16 is a rectangular spacer bar 76. The spacer bar 76 also defines a recess 78 on its lower surface into which is mounted a fixed cutter blade 80 of rectangular cross section having a cutting edge 80'. The spacer bar 76 is secured to the upper plate 40 by means of countersunk screws 82 and the cutter blade 80 is secured to both the upper plate and the spacer bar by means of countersunk bolts 84 and nuts 86. It will be noted that the cutter blade 80 extends inwardly beyond the spacer bar 76 and that its upper surface is even with the surface of the recess 62.

Mounted within the recess 62 is a movable cutter blade 88 which is also rectangular in cross section and has a cutting edge 88'. On the top surface of cutter blade 88 is positioned a rearwardly extending foot 90 projecting from the back 92 of a stock chute 94. The stock chute includes a sloping front wall 96 which is shaped so that its lower portion forms a narrow throat 98 which terminates adjacent the front edge of cutter blade 88. Secured to the back 92 of the stock chute and extending upwardly therefrom is a curved stock guide 110. The assembly of center plate 58, cutter blade 88, and stock chute 94 is secured together by means of the countersunk bolts 100 and nuts 102. A U-shaped wiper blade 104 is secured to the ends of the cutter blade 88 by means of screws 106. The main portion of the wiper blade is spaced from, and parallel to, blade 88 and rests on the upper surface of the fixed cutter blade 80. The wiper 104 includes a portion 108 which is bent inwardly to contact the lower edge of front wall 96 of stock chute 94.

In order to protect the operator, there is also provided a front safety cover 112 and a rear safety cover 114. These are plates which are slidably mounted on the upper surface of the upper plate 40 over the feed opening 44. The safety covers are notched to fit around the throat portion of the stock chute 94 and they are secured to one another by means of bolts 116 (FIG. 9) extending through vertical tabs 118 formed on each cover at the side of the stock chute. These covers are shown as removed on several of the figures to reveal the underlying elements. A circular grease cover 120 is mounted on the upper plate 40 over the shaft opening 42 and is provided with a simple grease fitting 122.

In the operation of this invention, the scrap chopper is positioned near the device producing the scrap in such a location that the skeleton will feed into the stock chute 94, aided by the guide 110. The motor is started, causing the shaft 50 to turn. As shaft 50 turns, the eccentric cam 56 rotating within the opening 60 of the center plate 58 will cause the narrow end of the center plate to describe a circular orbit around the center line of the motor shaft. However, it will be noted, referring to FIG. 4, that the side of the center plate is "tethered" by means of the pivotally mounted link 72 to the upper and lower plates. This link restricts the movement of the center plate. The result of the combined actions of the eccentric cam and the link is to cause the center plate 58, and the movable cutter blade which is secured thereto, to execute a unique scissoring action. This is illustrated in FIG. 8 wherein the broken lines illustrate the position of the elements as shown in FIG. 4, while the solid lines illustrate their positions after shaft 50 has rotated 120° clockwise. The cutting edge 88' of the movable cutter blade 88 is thus caused to execute a repetitive scissoring action against the cutting edge 80' of the fixed cutter blade 80. The frequency of the scissoring action is a function of the speed of the motor shaft. The skeleton which is being fed into the stock chute 94 passes between the blades when they are in their open position and is sheared into convenient sizes by the scissoring action. The wiper 104 continuously wipes the upper surface of cutter blade 80 so as to return any small pieces of scrap which may lodge thereon into the discharge opening 36. The chopped scrap falls through the discharge opening 36 into any suitable container (not shown). As the stock chute 94 is fixed to the moving blade, it will vibrate with the moving element, thus preventing any hangup of the skeleton within the chute.

It will also be noted from the above description that the motor 48 is mounted below the unit. This is a great improvement over top mounted motors of the prior art in which the presence of the motor often restricted access to the stock chute. It is also important to notice that the cutter blades are completely symmetrical so that each blade provides four cutting edges. As each edge becomes dull, the blade may be repositioned to utilize another edge so that resharpening is not required until all four edges are dull.

It is believed that, by the present invention, all of the objects set forth above have been achieved. Furthermore, it will be apparent to those skilled in the art to which the invention pertains that various modifications may be made therein without departing from its spirit and scope. Accordingly, the foregoing description is to be construed as illustrative only, rather than limiting. This invention is limited only by the scope of the following claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A scrap chopper which comprises: a stand; upper plate means secured to said stand and defining a feed therethrough; lower plate means secured to said stand in spaced parallel relationship to said upper plate means and defining a discharge opening therethrough, said feed and discharge openings being at least partially aligned; a first blade, having a first cutting edge thereon, fixedly mounted relative to said upper and lower plate means; center plate means slidably mounted intermediate said upper and lower plate means; a second blade, having a second cutting edge thereon, fixedly mounted relative to said center plate means for shearing engagement with said first blade intermediate the aligned portions of said feed and discharge openings; drive means in engagement with said center plate means to impart a circular motion to a first portion thereof; and tethering link means having a first end pivotally secured between said upper and lower plate means and a second end pivotally connected to a second portion of said center plate means to prevent circular motion of said second portion, the second cutting edge being thereby given a scissoring motion against said first cutting edge.

2. The chopper of claim 1 wherein said drive means comprises: a drive shaft extending through all of said lower, center, and upper plate means; and eccentric cam means on said drive shaft rotatably engaging said center plate means.

3. A scrap chopper which comprises: a stand; upper plate means secured to said stand and defining a feed opening therethrough; lower plate means secured to said stand in spaced parallel relationship to said upper plate means and defining a discharge opening therethrough, said feed and discharge openings being at least partially aligned; a first blade, having a first cutting edge thereon, fixedly mounted relative to said upper and lower plate means; center plate means slidably mounted intermediate said upper and lower plate means; a second blade, having a second cutting edge thereon, fixedly mounted relative to said center plate means for shearing engagement with said first blade intermediate the aligned portions of said feed and discharge openings; drive means in engagement with said center plate means to impart a circular motion to a first portion thereof; tethering means connected to a second portion of said center plate means to prevent circular motion of said second portion, the second cutting edge being thereby given a scissoring motion against said first cutting edge; and a stock chute mounted on said center plate means and positioned to feed scrap stock between said first and second cutting edges.

4. The chopper of claim 1 wherein each of said blades is substantially in the form of an elongated parallelepiped

having each of its four long edges selectively separately positionable as a cutting edge.

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JAMES M. MEISTER, *Primary Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,376,773 April 9, 1968

Pierre de la Motte

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 24, after "feed" insert -- opening --.

Signed and sealed this 19th day of August 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents