May 21, 1940. H. L. TRAUTMANN 2,201,599

NIBBLER

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Fig. 5

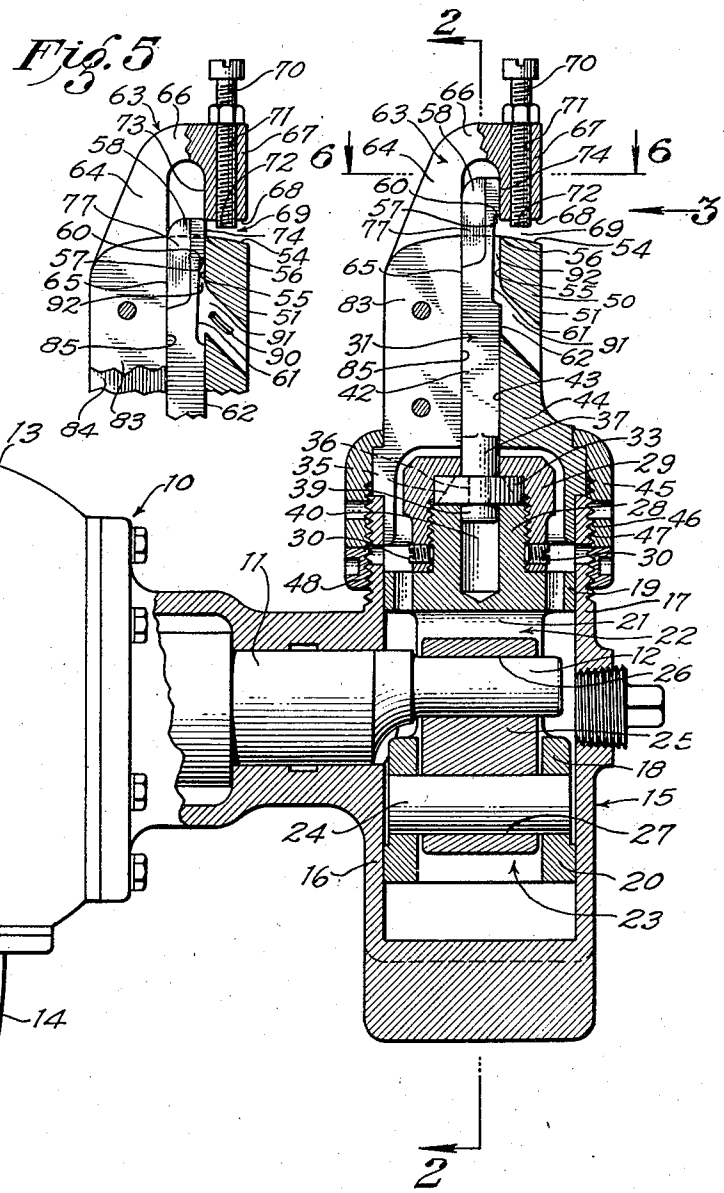

Fig. 1

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Fig. 2

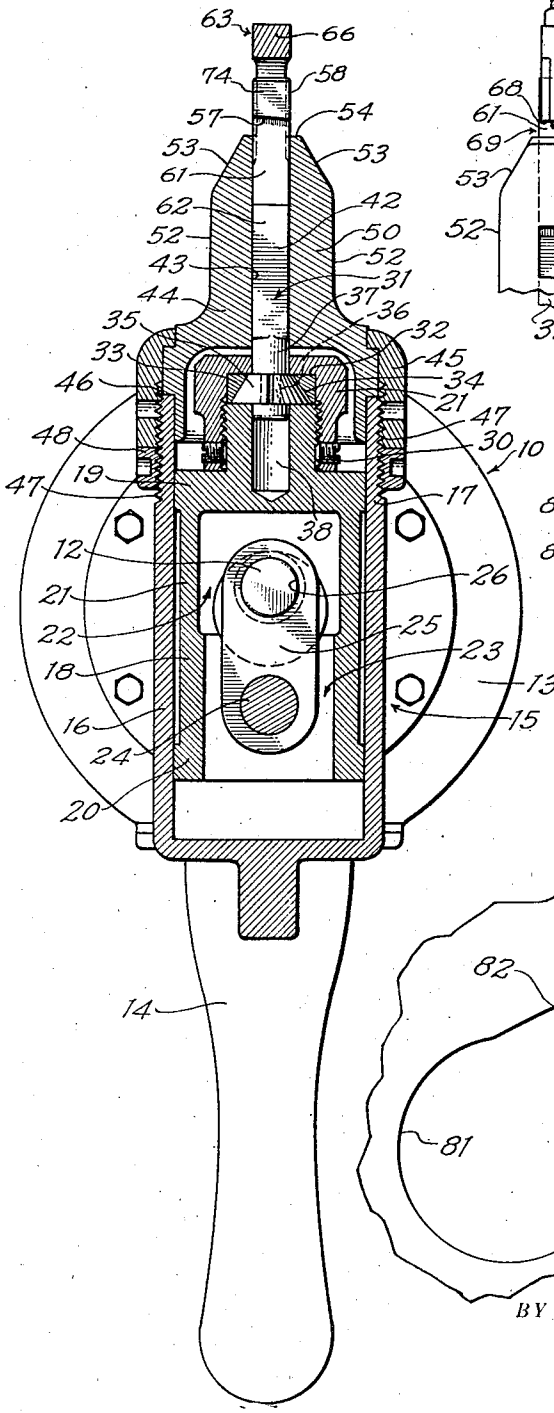


Fig. 3

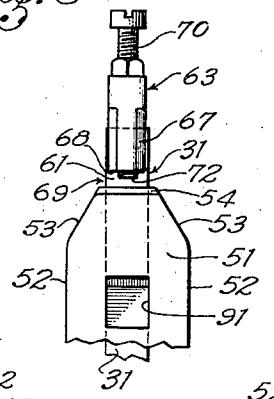


Fig. 4

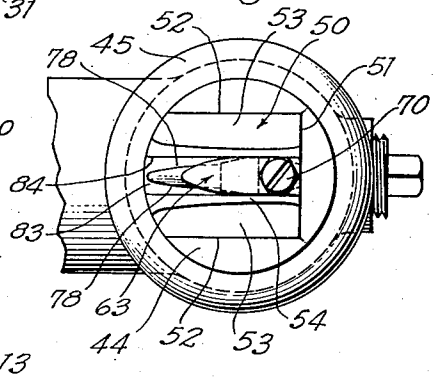
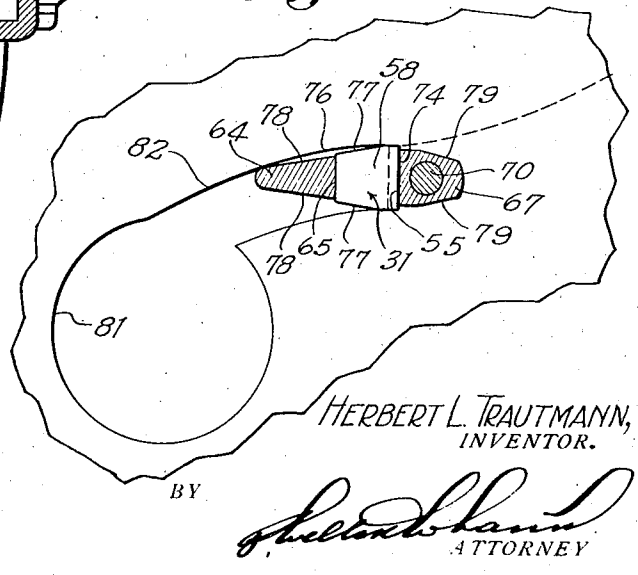


Fig. 6



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Patented May 21, 1940 2,201,599

UNITED STATES PATENT OFFICE

2,201,599

NIBBLER

Herbert L. Trautmann, Los Angeles, Calif., assignor to Douglas Aircraft Company, Inc., Santa Monica, Calif., a corporation of Delaware

Application May 10, 1938, Serial No. 207,047

9 Claims. (Cl. 164—50)

My invention relates in general to nibblers, and relates in particular to a nibbler having certain important features not present in the prior art.

It is common practice in the art to provide a nibbler which cuts metal sheets by a reciprocating cutting member having a movable cutting edge which moves past a fixed cutting edge and forms a slot in the sheet by shearing, such, for example, as is illustrated in the patent to Anderson, No. 2,035,448, issued March 31, 1936.

I have found it necessary, particularly in portable nibblers, to provide a nibbler with a stripper for holding the sheet being cut from being raised or removed from proper position to be operated on by the upward or return stroke of the cutter member.

It is an object of this invention to provide a nibbler having a stripper of simple rugged construction and one which does not interfere with the usual operation of the nibbler.

It is an object of the invention to provide a nibbler having a head with a projecting cutter member and means on its head for guiding or supporting the projecting cutter member and for guiding and holding the sheet which is being cut in working relation to the cutter means of the nibbler.

In many instances it is necessary or advantageous to start the cut within the boundaries of the sheet to be cut rather than at the edge thereof. Also it is frequently necessary or advantageous to perform a cutting operation with the sheet or part in place where it is impossible to start the cut from the edge of the part. Also, it is often necessary or advantageous to terminate the cut within the boundaries of the part being cut.

It is an object of my invention to provide a nibbler having a stripper which is so constructed and arranged that it will pass through a starting opening formed in the work and may be withdrawn transversely through the cut which is formed by the cutting member of the nibbler. In using a nibbler incorporating the features of my invention it is unnecessary to start the cut from or terminate the cut at the edges or boundaries of the sheet or part being cut, and furthermore it is not necessary to move the nibbler backwardly along the slot which is cut to the edge of the sheet or to the starting hole for removal of the nibbler. The portion of the nibbler which is extended through the work usually includes only the end of the cutting member and the stripper, and the stripper of my invention is preferably not quite as wide as the cutting member, and therefore not quite as wide as the slot which has been cut. This permits free removal of the nibbler transversely.

It is a further object of my invention to provide a nibbler having a stripper wall positioned directly ahead of the cutting edges, this wall being formed on a stripper which is arranged substantially parallel to or symmetric to the path or line of cut made by the nibbler.

It is also an object of my invention to provide a nibbler including a stripper which is so constructed and arranged to give full vision to the cutting member, and particularly the cutting edge thereof, so that no difficulty will be had in following a guide line or other guide indicia along which the cut is to be made.

A further object of the invention is to provide a nibbler which will readily follow an arc and may be used on sheet stock other than flat stock, and which nibbler has a mouth leading to the cutting members, which mouth is provided with means for varying the height thereof so that different thicknesses of stock may be cut.

A further object of the invention is to provide a nibbler assembled from simple parts capable of being readily machined to provide proper working alignment of these working parts, and wherein the upward extension of the cutting head of the device is minimized by the use of a novel cross-head, eccentric and linkage combination.

Further objects and advantages of the invention will be brought out in the following part of the specification.

Referring to the drawings which are for illustrative purposes only:

Fig. 1 is a partly sectioned elevational view of a preferred embodiment of the invention.

Fig. 2 is a section taken on a plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary face view looking toward the cutting head, as indicated by the arrow 3 of Fig. 2.

Fig. 4 is a fragmentary plan view looking down on the cutting head.

Fig. 5 is a fragmentary sectional view similar to the upper part of Fig. 1 showing the cutter member in lowered position.

Fig. 6 is a section taken on a plane indicated by the line 6—6 of Fig. 1, and showing a portion of a plate in the process of being cut by the nibbler.

As shown in Figs. 1 and 2 of the drawings, the preferred embodiment of the invention includes a body 10 having therein a power means for driving a rotatable shaft 11 with a crank, or eccentric

12, formed thereon. The power means of the device may be of any type capable of rotating the shaft 11; for example, it may obtain its motivating force from a flexible shaft connected with a motor, but preferably the power means consists of an electric motor disposed in the shell 13 which forms a part of the body 10 and which has a handle 14 projecting downwardly therefrom for manual engagement whereby the nibbler may be moved relative to the sheet or member which is to be cut, or whereby the nibbler may be supported on a bench, as by the gripping of the handle 14 in a vise.

The body 10 includes a cylindrical casing 15 disposed with its axis transverse to the axis of rotation of the shaft 11 and in such position that the lower cylindrical wall 16 thereof will lie below the eccentric 12 and the upper cylindrical wall 17 thereof will lie above the eccentric 12. A cross-head 18 is disposed in the casing 16, this cross-head having upper and lower cylindrical portions 19 and 20 lying respectively above and below the eccentric 12 and being connected together by spaced vertical walls 21 defining an opening 22 in the cross-head in which the eccentric 12 revolves. An axial opening 23 extends downwardly from the opening 22 within the lower part of the cross-head 18 and across this opening 23 pivot means in the form of a transverse pin 24 is placed. A connecting link 25 is provided which has an upper opening 26 to receive the eccentric 12 and a lower opening 27 to receive the pivot pin 24. This link 25 lies in the openings 22 and 23 and projects downwardly from the eccentric 12. By use of the construction shown, it is possible to use a relatively long cross-head and to properly support the same without undue upward projection of the casing 15 by which the cross-head is supported.

The upper end of the cross-head 18 has an externally threaded projection 28 to receive a cap 29, which, when it is screwed down tightly in place, is locked in position by use of set screws 30. A cutter member 31 is removably secured to the upper end of the cross-head by means of the cap 29 which has a coaxial recess 32 to receive a ring 33 having an upwardly converging inner face 34 to engage cooperating conical segments 35 which engage a channel 36 in the lower cylindrical end portion 37 of the cutter member 31. When the cap 29 is screwed into place, the ring 33 holds the segment 35 against the outer end face of the threaded extension 28. The lower extremity 39 of the cutter member 31 projects into an axial opening 40 in the extension 28 of the cross-head 18. The cutter member 31, above its lower end portion 37, comprises a square bar 42 which extends through a square opening 43 in a cutter head 44 which is secured to the upper end of the cylindrical wall 17 by means of a collar 45 having internal threads 46 to engage external threads 47 formed on the upper portion of the cylindrical wall 17, a locking ring 48 being provided to lock the collar 45 in place. The opening 43 is preferably formed by milling a slot 84 inward from the back of the member 44 and subsequently filling a portion of the slot with a plate 83.

As shown in Fig. 4, the cutter head 44 has an upwardly projecting extension 50, which is substantially rectangular in cross-section, having a front face 51 and side faces 52, which, as shown in Fig. 2, join with inwardly converging faces 53 which meet the top or outer end face 54 of the head. This end face 54 is convexly arched from front to rear, and a portion of this end face 54 cooperates with a portion of the wall 55 of the opening 43 to form a fixed cutting edge 56. To cooperate with the cutting edge 56, the cutter member 31 is provided with a downwardly faced cutting edge 57 formed in the projecting upper end 58 of the cutter member 31 in such position that when the cutter member is raised, as shown in Fig. 1, the cutting edge 57 will be above the cutting edge 56, and will be below the cutting edge 56 when the cutter member 31 is in lowered position, as shown in Fig. 5. The cutting edge 57 is given a slight slope, as shown in Fig. 2, and is formed by a wall 60 which defines the upper end of a recess 61 formed in the front face 62 of the cutter member 31.

A guide or stripper 63 for the projecting end 58 of the cutter member 31 is provided in the form of a goose-neck, as clearly shown in Figs. 1 and 5, this goose-neck comprising a rear part 64 which projects outward from the head 44 adjacent the rear face 65 of the cutter member 31 and in guiding relation thereto, an outer part 66 which extends forwardly from the upper end of the back part 64 and passes across the outer end of the projecting end 58 in a position to give ample clearance above the end 58, as shown in Fig. 1, and a front part 67 which extends inwardly from the outer part 66 toward the end face 54 of the head 44, the lower end face 68 of the front part 67 forming the outer wall of a mouth 69 which is directly ahead of and leads to the cutting edges 56 and 57. To vary the effective height of the mouth 69, adjustable means in the form of a screw 70 is provided, this screw 70 being threaded through an opening 71 in the front part 67 of the goose-neck in such position that its inner end 72 will project into the mouth 69. Either the lower end 72 of the screw or the end face 68 of the part 67 will serve as a stripper wall or stop for limiting the upward movement of a plate or part to be cut which is inserted into the mouth. The inner face 73 of the front part 67, as shown in Fig. 5, lies in a position to guide the front face portion 74 of the projecting end 58, this face portion 74 being a continuation or a portion of the front face 62 of the cutting member 31.

The part 63 which not only acts as a stripper but which, in the form of my invention disclosed herein, also acts as a guide means for the projecting end 58 of the cutter member 31 is formed at the outer end of the plate 83 which is received in the slot 84 extending from top to bottom of the head 44, such slot 84, as hereinbefore indicated, being preferably the same width as the opening 43 in which the cutter member 31 operates. Accordingly, the inner face 85 of the member 83 may form the back face or wall of the opening 43.

So that the nibbler will cut on an arc or curved line, such as the line 76 of Fig. 6, the end 58 of the cutter member 31 is provided with side faces 77 which converge rearwardly to meet the back face 65 of the cutter member 31, the result being that the back face 65 is narrower than the front face 62. The back part 64 of the guide means 63 is likewise provided with side faces 78 which converge rearwardly, as shown in Fig. 6. The lower portion of the front part 67 of the goose-neck 63 may be provided, if desired, with side faces 79 which converge forwardly. Fig. 6 shows a portion of a plate 80 having an opening 81 therein. The guide means or goose-neck 63 may be passed through this opening 81 and a slot 82 may be cut leading from the opening 81. This opening 81 need not be greater than one inch in

diameter where the nibbler is provided with a cutter member of a quarter inch width, or substantially half the size of the cutter member disclosed in Fig. 6. Due to the compactness and lightness of the nibbler, it may be readily applied to the sheet to be cut and may be easily guided to follow curved lines. Owing to the fact that the upper or outer end face 54 of the head 44 is relatively narrow and is convexly arched from front to rear, the nibbler may be employed to cut sheets or walls having a material curvature.

In order that the stripper and projecting end of the cutting member may be inserted into operating position through a starting opening, such as 81 in Fig. 6, or through the slot which is cut, or be removed from operating position transversely through the slot, the part 63 is arranged on a plane substantially parallel to or substantially symmetric to the line or path of the cut made by the stripper. Also, the part 63 and the back portion, front portion, and the outer portion thereof are no wider than the projecting end of the cutting member, and preferably are slightly narrower, as illustrated particularly in Fig. 6. By this arrangement a stripper essential to satisfactory operation of the nibbler is provided without depriving the nibbler of the ability to cut along a curved line and without depriving the nibbler of the highly important feature and advantage of being insertable or removable transversely through the slot which is cut. In addition to this, the particular shape of the goose-neck which has the rear, front, and outer parts but no side parts does not cover or impair visual access to the cutting edges on either side, with the result that a guide line or guide indicia on the work may be very accurately followed.

On each downward stroke of the cutter member 31 the cutting edge 57 acts in shearing relation to the cutting edge 56 and will cut from a metal plate, which is passed into proper position through the mouth 69, a small piece of such plate, such as the cutting 90 shown in Fig. 5. This cutting is formed in the recess 61 and drops downwardly therein, to be carried to the exterior of the head 44 through a space or opening 91 which leads downwardly and outwardly from the opening 43 in such position that it will connect the face or passage 92 formed by the recess 61 with the exterior of the head 44, whereby to discharge the cuttings at a point below the mouth 69 and below the sheet which is being cut, so that there can be no accumulation of cuttings on the upper face of the sheet to interfere with the proper following of a line.

I claim as my invention:

1. In a nibbling device of the character described, the combination of: a head having an opening leading inwardly from its outer end face, one side portion of said opening cooperating with a portion of the outer end face of said head to form a fixed cutting edge; a movable cutter member disposed in said opening, said cutter member having an end which projects from said opening and has a cutting edge to cooperate with said fixed cutting edge; a stripper for preventing displacement of the material being cut comprising a goose-neck extending from the outer end of said head adjacent the rear face of said end, then bending forwardly beyond the extremity of said end and turning inwardly across the front face of said end and stopping in spaced relation to said end face of said head so as to leave a mouth leading to said fixed cutting edge, said goose-neck being shaped to pass transversely through a slot formed by the nibbling device; and means carried by said head in a position inward of said outer end face thereof operative to reciprocate said cutter member in said opening so as to produce a shearing movement of said cutting edge relative to said fixed cutting edge.

2. In a nibbling device of the character described, the combination of: a head having an opening leading inwardly from its outer end face, one side portion of said opening corresponding with a portion of the outer end face of said head to form a fixed cutting edge; a movable cutter member disposed in said opening, said cutter member having an end which projects from said opening and has a cutting edge to cooperate with said fixed cutting edge; a stripper for preventing displacement of the material being cut comprising a goose-neck extending from the outer end of said head adjacent the rear face of said end, then bending forwardly beyond the extremity of said end and turning inwardly across the front face of said end and stopping in spaced relation to said end face of said head so as to leave a mouth leading to said fixed cutting edge, and stripper adjusting means supported by the front portion of said goose-neck and adjustable to vary the height of said mouth; and means carried by said head in a position inward of said outer end face thereof operative to reciprocate said cutter member in said opening so as to produce a shearing movement of said cutting edge relative to said fixed cutting edge.

3. In a nibbling device of the character described, the combination of: a head having an opening leading inwardly from its outer end face, one side portion of said opening cooperating with a portion of the outer end face of said head to form a fixed cutting edge; a movable cutter member disposed in said opening, said cutter member having a recess in the front side thereof facing toward said fixed cutting edge, there being a wall on said cutter member at the outer end of said recess forming a cutting edge cooperating with said fixed cutting edge, said recess being of such size with relation to said side wall portion of said opening as to form a passage for cuttings, and there being a space in said head leading from the exterior thereof to said opening in such position as to receive said cuttings from said passage and deliver same to the exterior; and means carried by said head in a position inward of said outer end face thereof operative in said opening so as to produce a shearing movement of said cutting edge relative to said fixed cutting edge.

4. In a nibbling device of the character described, the combination of: a head having an opening leading inwardly from its outer end face, one side wall portion of said opening cooperative with a portion of the outer end face of said head to form a fixed cutting edge; a movable cutter member disposed in said opening, said cutter member having an end projecting from the front end of said opening provided on its front face with a moving cutting edge to cooperate with said fixed cutting edge, said cutter member having a front transverse face and side faces which converge rearwardly to the back face thereof so that the rearward portion of said projecting end will be narrower than the front face thereof to enable said nibbling device to cut on a radius; and a guide extending from said head adjacent said back face of said projecting end and in guiding relation thereto, said guide being like-

wise tapered rearwardly and not extending beyond the side walls of said projecting end.

5. In a nibbling device of the character described, the combination of: a head having an opening leading inwardly from its outer end face, one side wall portion of said opening cooperative with a portion of the outer end face of said head to form a fixed cutting edge; and a movable cutter member disposed in said opening, said cutter member having an end projecting from the front end of said opening provided on its front face with a moving cutting edge to cooperate with said fixed cutting edge, said cutter member having side faces which converge rearwardly to the back face thereof so that the rearward portion of said projecting end will be narrower than the front face thereof to enable said nibbling device to cut on a radius, and a goose-neck extending from said head, said goose-neck consisting only of a rearwardly tapering back part extending from said head adjacent said back face of said projecting end, an outer part extending across the outer end of said projecting end, and a front part extending inward from said outer part across the front face of said projecting end and defining a mouth leading to said cutting edges.

6. In a nibbling device of the character described, the combination of: a body formed so as to be manually gripped and so as to be moved relative to a sheet which is to be cut, said body having a head extending upwardly therefrom, said head having an opening leading inwardly from its outer end face; a reciprocating cutter member extending through said opening; power means carried by said body, said power means having a rotating eccentric disposed below the inner end of said cutter member; a cross-head extending from the inner end of said cutter member and extending to a point below said eccentric; a pivot carried by said cross-head below said eccentric; and a downwardly extending link connecting the eccentric to said pivot.

7. In a nibbling device of the character described, the combination of: a head having an opening leading inwardly from its upper end face, one side portion of said opening cooperating with a portion of the upper end face to form a fixed cutting edge; a movable cutter member disposed in said opening, said cutter member having a recess in the front side thereof facing toward said fixed cutting edge, there being a wall on said cutter member at the outer end of said recess forming an inwardly faced cutting edge cooperating with said fixed cutting edge, said recess being of such size with relation to said side wall portion of said opening as to form a passage to receive cuttings, and there being a space in said head leading outwardly from said opening, in such position as to carry off cuttings from said passage; a portable body connected to said head at a point below the upper end thereof, said body being formed so as to be manually gripped and so that the nibbling device may be moved relative to a sheet which is to be cut; power means carried by said body and having a rotating eccentric below the inner end of said cutter member; a cross-head extending from said inner end of said cutter member and extending to a point below said eccentric; a pivot carried by said cross-head below said eccentric; and a downwardly extending link connecting said eccentric to said pivot.

8. In a nibbler, the combination including: a head having an outer end face, an opening connected to said end face, and a fixed cutting edge; a movable cutter in said opening having an end portion which projects outwardly from said end face and has a movable cutting edge; a stripper for said end portion, said stripper being in the form of a gooseneck secured to said head and being substantially perpendicular to said outer end face, and being positioned along the path of cutting, said gooseneck being no wider than said movable cutter and leaving the sides thereof exposed; and means for reciprocating said movable cutter to bring said movable cutting edge into shearing relation to said fixed cutting edge.

9. In a nibbler, the combination including: a head having an outer end face, an opening connected to said end face, and a fixed cutting edge; a movable cutter in said opening having an end portion which projects outwardly from said end face and has a movable cutting edge; a stripper for said end portion, said stripper consisting of a rear part extending from said head along the back of said end portion, an outer part extending forwardly from said rear part beyond the end of said end portion, and a front part extending inwardly from said outer part along the front of said outer portion and terminating in spaced relation to said end face to form a mouth leading to said fixed cutting edge, said stripper being shaped to pass transversely through a slot formed by the nibbler; and means for reciprocating said movable cutter to bring said movable cutting edge into shearing relation to said fixed cutting edge.

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