July 25, 1967 K. LEDERGERBER 3,332,461

CHIPPER FEED SPOUT

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Fig. 1.

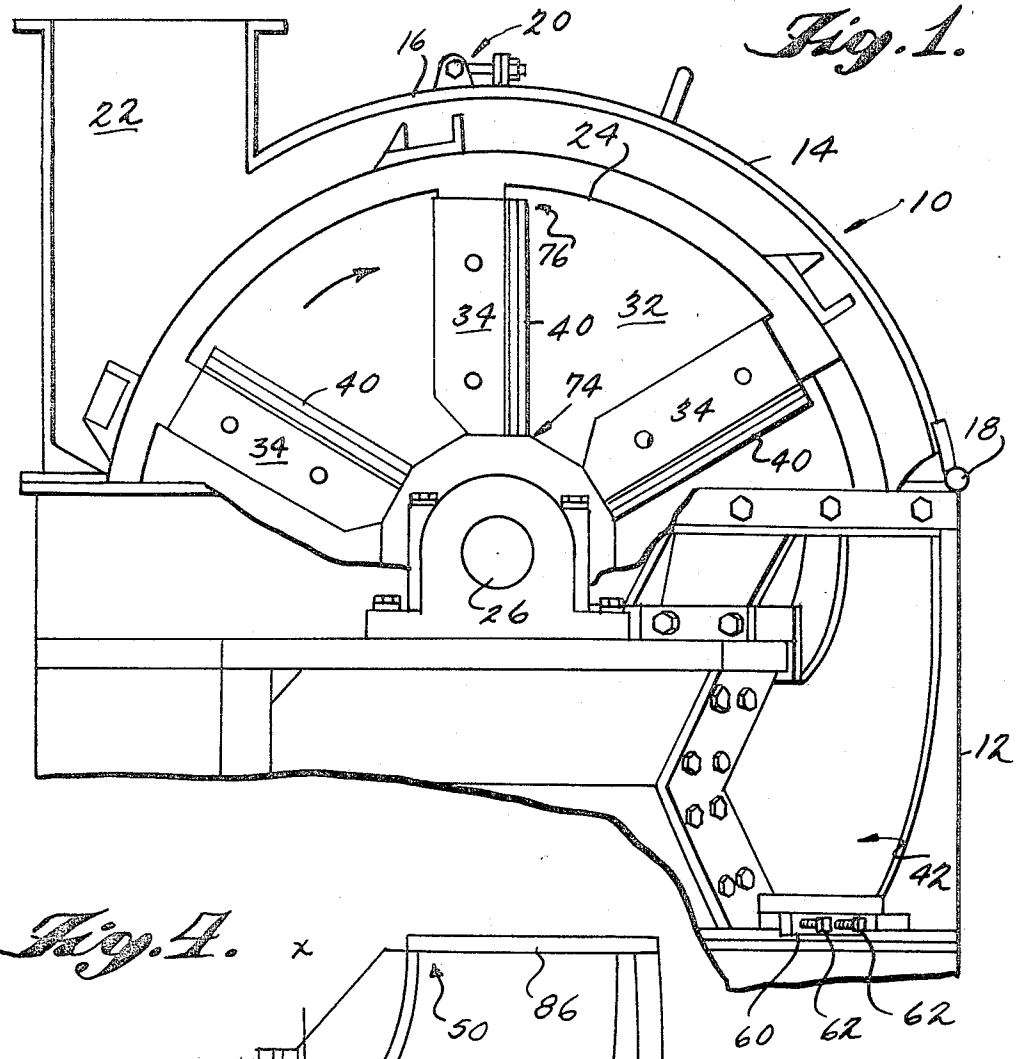
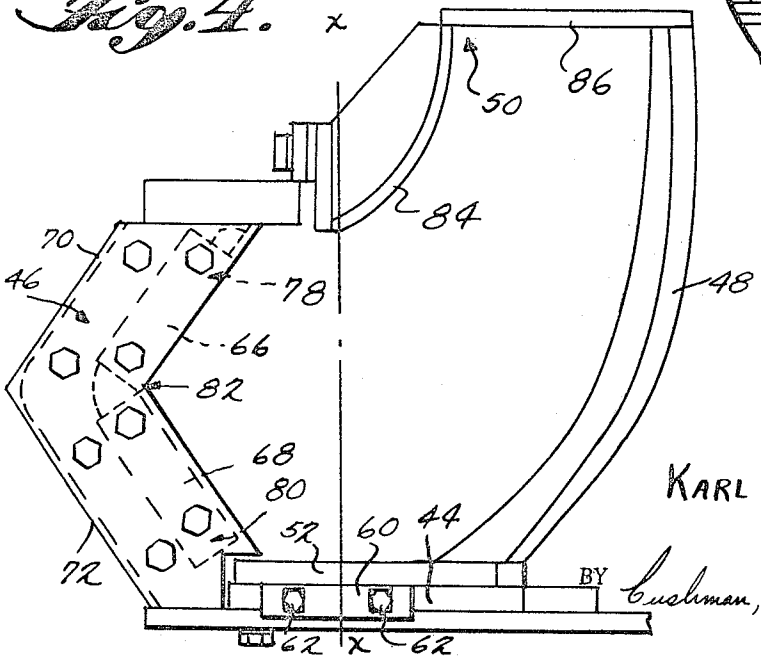


Fig. 4.



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Fig. 2.

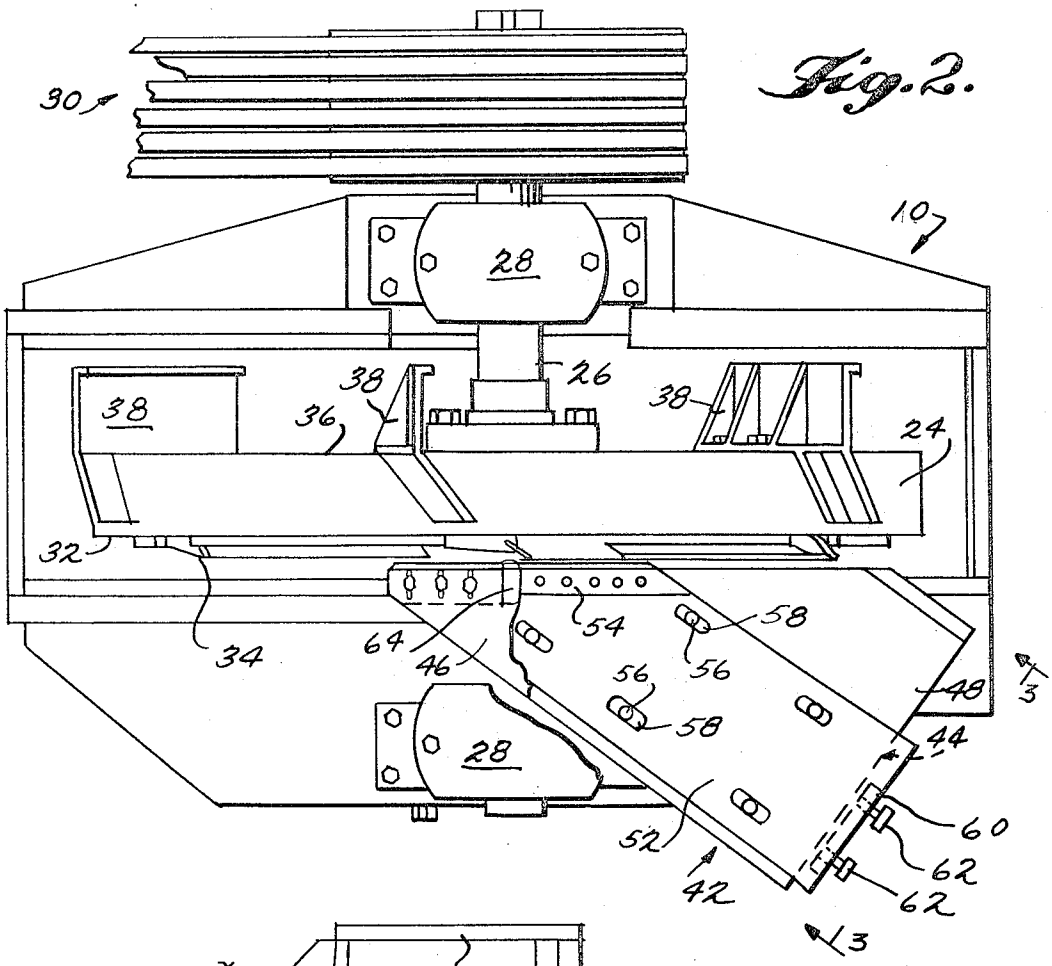
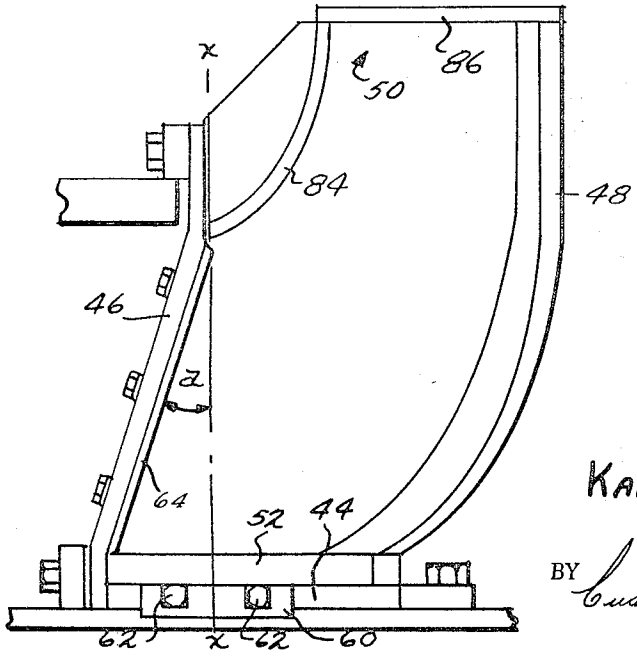


Fig. 3.



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CHIPPER FEED SPOUT

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ABSTRACT OF THE DISCLOSURE

An improved wood chipper feed spout is provided wherein an anvil associated with a side wall of the feed spout is mounted on a non-vertical plane along a central longitudinal axis of the feed spout. The improved mounting of the anvil may include a variety of positions which accomplish the result of causing a scissor-like action between the anvil and cutting knives which are conventionally associated with such devices. The anvil may be made up of one or more segments, and the anvil may be adjustable relative to its spaced position from cutting knives which rotate past the anvil on a rotary disc.

This invention relates to an improvement in rotary disc chippers and is particularly concerned with an improved feed spout for use with rotary disc wood chippers.

In the wood pulp industry it is necessary to reduce wood stock such as logs or slabs of wood to a chip form. It is desirable in producing such chips to obtain a chip product which has certain uniform characteristics of size and quality in order to provide for better cooking characteristics of the chip product. Therefore, it is important that the wood stock be cut cleanly with little bruising or squeezing of the resulting product, and it is important to obtain a uniform product at a maximum rate of production.

It has been the practice in producing such a chip product from wood stock to utilize a rotary disc chipper apparatus of the type shown in U.S. Patents 1,438,943 and 3,047,244. Such apparatus includes a disc mounted for rotation in a vertical plane and having a number of knives positioned on one face of the disc. The knives coact with a stationary bed knife or anvil in such a way that a scissors action results between the rotating knives and the stationary knife. Wood stock in the form of logs or slabs is conveyed to the vicinity of the chipper apparatus, and the wood is then delivered into a feed spout associated with the chipper apparatus. The feed spout communicates with the face of the chipper having the cutting knives and serves to support the wood stock while the stock is being delivered into the cutting face of the rotary disc.

The present invention is directed to an improved feed spout construction for use in apparatus of the type just described, and it has been found that the improved structure of this invention results in better support for the wood stock so that a maximum cutting efficiency is attained and a more uniform chip product is produced.

In accordance with the present invention, the feed spout is constructed to carry one or more stationary anvils or knives. These stationary anvils are related to one another and to the rotating disc knives in a particular way which results in an improved coaction between the rotating disc knives and the stationary anvils. In addition to the improved cutting action accomplished by the feed spout of this invention, there is also produced a capability of handling larger diameter stock material without loss of cutting rate for a given apparatus.

In attempting to increase the capacity of a chipper apparatus to handle larger stock material it would seem apparent that the feed spout should be increased in diameter to handle the larger stock diameters. However, a

mere increase in the cross-sectional diameter of the feed spout as by moving the side walls outwardly in their entirety is unsatisfactory because this decreases the cutting efficiency of the chipper apparatus by overloading the rotating knives. Prior to this invention it has been necessary to make a corresponding increase in capacity of all components of the apparatus, such as the size of the rotating disc and the length of the rotating knives. Now it has been found that a particular construction of the feed spout side wall carrying the stationary anvil(s) will result in an increased capacity of the feed spout while at the same time improving the capability of the existing rotating disc apparatus to efficiently cut up the increased load.

In accordance with the present invention, the feed spout side wall which carries one or more of the stationary anvils diverges outwardly away from a vertical plane and downwardly to at least the horizontal mid-section of the feed spout. This assures an improved placement of the stationary upright anvil as related to the rotating knives on the disc, and also provides a greater mid-section capacity of the feed spout. In one form of the invention, this same side wall may continue downwardly and outwardly from the mid-section plane of the spout down to its junction with the bottom horizontal wall of the feed spout. Such a construction provides a spout having its greatest cross-sectional area at the bottom of the spout, and this construction is adapted for use with stock material in slab form. In another form of construtcion, the side wall converges inwardly toward the center of the spout as it continues past the horizontal mid-section of the feed spout. This latter form of spout is adapted for use with stock material in the form of logs where the greatest cross-sectional diameter is found at the mid-section of the stock material.

In addition to the features and advantages discussed above, the feed spout of this invention is also concerned with providing an opposed side wall construction which co-operates with the above described anvil carrying side wall so as to properly position the stock material for maximum cutting efficiency. The side wall opposed to the anvil carrying side wall is constructed on a curvilinear plane which is so related to the bottom of the feed spout, that stock material is carried downwardly and toward the anvil carrying side wall. Such a construction keeps the stock in a firm position against the anvil carrying wall while it is being cut, thus reducing vibration of the material and improving the characteristics of the chip product.

Other advantages in the improved feed spout of this invention will become apparent in the more detailed discussion which follows.

For a better understanding of the present invention reference is made to the accompanying drawings in which:

FIGURE 1 is a side elevation of the chipper apparatus with portions cut away to show the rotary disc and its relationship to the feed spout;

FIGURE 2 is a top view of the same apparatus;

FIGURE 3 is a section of one form of feed spout taken at line 3—3 of FIGURE 2;

FIGURE 4 is a section of another form of feed spout taken at the same line as FIGURE 3.

As mentioned above the wood chipper apparatus used in conjunction with this invention may be of any conventional construction such as that shown by the two mentioned patents. Such a wood chipper is referred to generally as **10** in the drawings. The chipper apparatus includes a housing having a base portion **12** and a sectional cover portion made up of sections **14** and **16**. The cover section **14** is pivotally hinged to the base portion by means of a hinge **18**, so that the cover section **14** may

swing open for easy access to the interior of the chipper apparatus. When in its closed position, the section **14** may be clamped to its adjoining cover section **16** by any suitable means such as the clamp shown at **20**. The housing further includes a chip removing stack **22** for removing the chip product out of the apparatus.

Within the housing, a rotating disc **24** is mounted on a horizontal axis for rotation in a vertical plane. A horizontal axle **26** provides the axis of rotation for the disc, and this axle passes through the center of the disc **24**. Suitable bearing supports **28** are provided near the ends of the axle **26**, and a motor means, not shown, drives the axle and the disc through a drive belt means **30**, as shown in FIG. 2.

The rotating disc **24** has a front face **32** which carries knife elements **34** and a back face **36** which carries blower elements **38** for blowing chips out of the apparatus. The knife elements **34** are bolted or otherwise affixed to the front face **32** of the disc at equally spaced positions which correspond to radii of the rotating disc. As can be seen in FIG. 2, the knife elements are mounted with their cutting edges **40** in the lead as the disc rotates in the direction shown by the arrow.

In addition to the elements just described the chipper apparatus further includes an inlet means for feeding stock material to the cutting face of the rotating disc. This inlet means is in the form of a feed spout **42** which is shown as leading into a side wall of the housing so as to communicate with the lower half of the rotating disc face **32**. In this manner an opening is provided for feeding stock material into the cutting face of the rotating disc.

The feed spout **42** is essentially tubular in form and is arranged to support stock material in a substantially horizontal position while it is being reduced in the chipper apparatus. The feed spout is made up of a horizontal base plate **44**, two opposed side walls **46** and **48** rising upwardly from the base, and a top wall shown generally at **50** which joins the top portions of the two side walls.

With reference to FIG. 2, the horizontal base plate **44** is shown in dotted lines as underlying a base slide **52**. The base slide carries a horizontal anvil **54**, and the slide is mounted on the base plate for adjustable longitudinal movement on said plate. The base slide **52** may be mounted on the base plate in any suitable manner as by threaded bolts **56** which extend through longitudinally arranged slots **58** in the base slide and which secure the slide to the base plate for limited longitudinal adjustment. A downwardly extending flange portion **60** secured to the outer end of the base slide provides for a mounting of adjustment bolts **62** which may be threaded through the flange and abutted against an end wall of the base plate whereby a turning of the adjustment bolts will effect a movement of the slide **52** relative to the base plate. Thus, it will be seen that the horizontal anvil **54** may be easily adjusted in its distance from the vertical plane of the rotating disc face **32**, and this adjustment may be used to control the cutting efficiency.

Looking now to the first side wall **46** of the feed spout, it will be seen that this wall is adapted to carry an upright anvil **64** coextensively with the wall. The anvil extends along substantially the entire height of the wall **46** and is positioned parallel to the cutting face **32** of the rotary disc so that it may coact with the knives **34** on the rotating disc. The upright anvil **64** may be secured to an upright adjustable slide member in a manner similar to the description above for the horizontal slide construction. The upright slide and adjustment bolts have been omitted from the drawings for clarity, but the adjustment of the upright slide member effects an adjustment of the upright anvil toward and away from the vertical plane of the rotating disc face **32**.

It is of particular importance to this invention that the upright anvil **64** be supported in a position which does not overlay the vertical radius of the rotating disc **24**. It will be recalled that the cutting knives **34** are spaced at equal intervals on the radii of the rotating disc face **32**, and it has been found that a faster and cleaner cutting action results when the rotating knives pass the upright stationary anvil in a progressive scissors-like pass with one portion of a single rotating knife reaching the upright anvil before the remainder of that same knife.

This improved cutting action is accomplished by swinging the upright anvil away from a perfectly vertical plane taken at a central longitudinal axis of the feed spout, and two embodiments showing positions for the wall **46**, for carrying the anvil in this manner, are illustrated in FIGURES 3 and 4.

FIGURE 3 shows an upright wall **46** construction which carries the upright anvil **64** downwardly and outwardly away from a vertical plane *x*—*x* taken through a longitudinal axis of the feed spout. It has been found that an angle "*a*" of approximately 26° provides a desirable cutting characteristic when the top point of the upright anvil is substantially in a vertical line with the axis of rotation of the cutter disc **24**. For other positions of the upright anvil as related to the rotating disc **24**, it may be desirable to adjust the angle "*a*" so as to obtain a maximum cutting action with the rotating knives. With the construction of feed spout shown in FIG. 3 as related to the chipper apparatus as shown in FIG. 1, the inner ends of the knives **34** approach the uppermost point of the slanted upright anvil **64** before reaching the lower length of the anvil. Thus, it will be seen, as the rotating disc rotates in the direction shown by the arrow, each knife approaches and passes the upright anvil in a scissors-like action which results in a cleanly cut product of uniform chip size. This scissors action urges the wood stock against the wall **46** carrying the upright anvil **64** and downwardly against the base plate **44** and its anvil **54**. By urging the stock material into a firm position against the upright and horizontal anvils, the stock can be more easily reduced to chip form, and there is less vibrating and shucking of the stock while it is being fed into the chipper apparatus.

FIGURE 4 shows a second embodiment of this invention where the upright wall **46** is angled outwardly down to a midsection of the spout and then inwardly before joining the base plate **44**. This angled wall construction carries an angular upright anvil means coextensively with it as with the FIGURE 3 embodiment. However, because of the angled wall construction in this embodiment, two upright anvils **66** and **68** may be carried by the wall **46** and these two anvils are carried respectively by the outwardly angled upper portion **70** of the wall and inwardly angled lower portion **72** of the wall. As was the case with the FIGURE 3 embodiment, the upright anvils of this embodiment may be mounted for longitudinal adjustment in order to adjust their distances from the cutting face of the rotating disc **24**.

It will be seen that with the upright anvils arranged as just described that a double scissors effect is accomplished as each knife blade on the rotating disc sweeps past the anvils. As viewed in FIGURE 4, the knife blades sweep past the upright anvils from right to left, and the inner and outer ends **74** and **76** of each blade respectively approach the uppermost **78** and lowermost **80** points on the double upright anvils at approximately the same time. As the knife blade continues past the anvils a progressive scissors action continues toward the center of the knife and the center point **82** of the double anvils.

The FIGURE 4 embodiment just described is best adapted for use with stock material in the form of logs or the like, where the broadest part of the material being cut is at the mid-section level of the material. By angling the upright wall **46** outwardly and then inwardly from top to bottom, there is provided a feed spout construction which has its greatest width at approximately its horizontal mid-section. This shape, together with the improved scissors action provided by this construction provides a much greater cutting efficiency for logs than heretofore possible with prior art devices.

Looking now to the upright wall **48** which is opposed to the anvil-carrying wall just discussed, it will be seen that this second upright wall **48** is constructed so as to cooperate with the first wall **46**, and to properly position the wood stock material which is being cut against the anvil of the upright wall **46**.

As seen in the FIGURE 3 feed spout, the upright wall **48** is a curvilinear plate which extends into the housing to a position near the vertical plane of the rotating disc **24** and its knives **32**. The curvilinear shape of the plate **48** assists in positioning slab stock material so that the slab is turned to a nearly upright position against the upright anvil carried by the first wall **46**. By positioning the slabs on end so that its width is abutted against the upright anvil **46**, a better cutting action is accomplished. With the slab on edge and tightly abutted against the upright anvil, there is less vibration of the stock material and less tendency for the slab to turn over while it is being cut by the rotating disc knives.

In the form of feed spout shown in FIG. 4, a similar curvilinear plate is shown for the upright wall **48**. Although this form of feed spout is better adapted for use with logs or similar stock material, the curvilinear plate does assist in holding the curved surface of the log in a firmer position for cutting than would be possible otherwise. Further, the curved wall **48** initially moves the incoming log toward the anvil carrying wall **46** of the feed spout, and thus assures the proper position of the log for the beginning of the cutting action.

As previously discussed, the two upright walls **46** and **48** are joined at their bases by the horizontal base plate **44** carrying the horizontal anvil **54** which extends into the housing of the chipper apparatus.

The top **50** of the feed spout may be formed in any convenient manner and is shown in FIGURES 3 and 4 as comprising two plates **84** and **86**. The one plate **84** is a curved plate which is joined to the anvil carrying upright wall **46** and which curves upwardly to join the second plate **86**. The second plate **86** is mounted horizontally to join the curved top plate **84** and the upright wall **48**. The use of the curved plate in combination with the flat plate, as shown, provides for an irregular-shaped top portion for the feed spout. This shape adapts the feed spout to receive larger slab material and especially slab stock having a large butt end which must be reduced before the remainder of the slab can be shifted to its proper position against the upright anvil carrying wall **46**.

The described improved feed spout is preferably mounted horizontally into a side wall of the type of wood chipper shown, but, of course, other mountings for the feed spout will be apparent for other types of wood chipper devices to those skilled in the art. As shown in FIGURE 2, the feed spout enters the housing wall at an angle so that the supported wood stock will be fed horizontally and obliquely to the vertical cutting face of the rotating disc. In operation, the stock material is fed into the feed spout in any suitable manner while the motor is rotating the vertical disc. The curved upright wall **48** directs the stock material toward the anvil carrying wall **46** of the feed spout, and when the material reaches the interior of the housing, the cutting knives proceed to cut. The stock material is abutted against the anvil carrying wall **46** by the action of the cutting knives moving in the direction shown, and the particular configuration of the anvil carrying wall assures a rapid cutting action and a uniform chip product.

It is further contemplated that the angular positions of the anvils described may be accomplished with other side wall constructions where the side wall is not necessarily coextensive with the anvil. In such constructions the angle of the anvil would be retained for its utility in a better cutting action, but the feed spout walls could be of a different configuration.

Although, two preferred embodiments of the feed spout have been described, other embodiments will occur to those skilled in the art. Many structural changes are possible and are intended to be within the scope of the present invention.

I claim:

1. In a wood chipper of the type having a rotary disc rotating in a vertical plane, said rotary disc having a plurality of cutting knives on one face of the disc, and a feed spout extending into the wood chipper for delivering a length of wood into the face of the rotary disc, the improvement in said feed spout which comprises:

an anvil carried by a side wall of said feed spout, said anvil being parallel to and coacting with the cutting face of said rotary disc;

said side wall diverging downwardly and outwardly away from a vertical plane taken through the central longitudinal axis of the feed spout;

said anvil being carried coextensively with the side wall whereby said anvil coacts with the cutting edges of said knives on a non-vertical plane.

2. In a wood chipper of the type having a rotary disc rotating in a vertical plane, and said disc having a plurality of cutting knives on one face of the disc, the improvement which comprises:

a feed spout extending into the wood chipper for delivering a length of wood into the face of the rotary disc having the cutting knives;

an anvil carried by a side wall of said feed spout, said anvil being parallel to and coacting with the cutting face of said rotary disc;

said side wall diverging downwardly and outwardly away from a vertical plane taken through the central longitudinal axis of the feed spout; and

said side wall and anvil being coextensive whereby said anvil coacts with the cutting knives on a non-vertical plane.

3. A feed spout as defined in claim **2** wherein said side wall and anvil are disposed in a straight plane diverging downwardly and outwardly at an angle of 26°, more or less, from the vertical of said feed spout.

4. A feed spout for use in a wood chipper of the type having a rotary disc rotating in a vertical plane, said rotary disc having a plurality of cutting knives on one face of the disc, where said feed spout comprises a tubular member extending into the wood chipper for delivering a length of wood into the cutting knives of the rotary discs, said tubular member having bottom, side, and top walls, the improvement in said feed spout comprising:

a side wall for carrying an anvil, said anvil being parallel to and coacting with the cutting face on the rotary disc, said side wall diverging downwardly and outwardly away from a vertical plane, and said anvil being carried by the side wall at the same angle; and

adjustment means carried by said side wall and said anvil for adjusting the distance of said coacting anvil from the cutting face of said rotary disc.

5. The improvement as defined in claim **4** wherein said side wall and said anvil are disposed in a straight plane diverging downwardly and outwardly at an angle of 26°, more or less, from the vertical of said feed spout.

6. In a wood chipper of the type having a rotary disc rotating in a vertical plane, said rotary disc having a plurality of cutting knives on one face of the disc, and a feed spout extending into the chipper for delivering a length of wood into the face of the rotary disc, the improvement in the feed spout which comprises:

an angular side wall for said feed spout for carrying an angular anvil coextensively with said side wall;

said angular anvil coacting with the cutting knives of said rotary disc, and being carried parallel to the cutting face of said disc;

said angular side wall having an upper portion which angles downwardly and outwardly away from a vertical plane taken through the central longitudinal axis of the feed spout, and a lower portion which angles

downwardly and inwardly toward the same plane, said upper and lower portions being so joined that the angular side wall formed thereby presents a broadened horizontal mid-section to said feed spout interior.

7. The improvement as defined in claim 6 wherein said angular anvil and said angular side wall include adjustment means for adjusting the distance of said angular anvil from the cutting face of the rotary disc.

8. In a wood chipper of the type having a rotary disc rotating in a vertical plane, and said disc having a plurality of cutting knives on one face of the disc, the improvement which comprises:

a feed spout extending into the wood chipper for delivering a length of wood into the face of the rotary disc having the cutting knives;

an angular anvil carried by a side wall of said feed spout, said anvil coacting with the cutting knives of the rotary disc;

said angular side wall having an upper portion which angles downwardly and outwardly away from a vertical plane, taken through the central longitudinal axis of the feed spout, and a lower portion which angles downwardly and inwardly toward the same plane, said portions being so joined that said angular side wall presents a broadened horizontal mid-section to said feed spout interior; and

said angular side wall and anvil being coextensive whereby said anvil coacts with said cutting knives on two angular planes.

9. The improvement as defined in claim 8 wherein said angular anvil and said angular side wall include adjustment means for adjusting the distance of said angular anvil from the cutting face of the rotary disc.

10. In a wood chipper of the type having a rotary disc rotating in a vertical plane, said rotary disc having a plurality of cutting knives on one face of the disc, and a tubular feed spout extending into the wood chipper for delivering a length of wood into the face of the rotary disc, the improvement in said feed spout which comprises:

an anvil carried by a side wall of said feed spout, said anvil being parallel to and coacting with the cutting face of said rotary disc;

said anvil diverging downwardly and outwardly away from a vertical plane taken through the central longitudinal axis of the feed spout whereby said anvil coacts with the cutting edges of said knives on a non-vertical plane.

11. The apparatus of claim 10 wherein said anvil is disposed in a straight plane diverging downwardly and outwardly at an angle not exceeding 26° from said vertical plane of said feed spout.

12. The apparatus of claim 10 wherein there is included adjustment means associated with said angular anvil, whereby said angular anvil may be adjusted toward and away from the cutting face of the rotary disc.

13. In a wood chipper of the type having a rotary disc rotating in a vertical plane, said rotary disc having a plurality of cutting knives on one face of the disc, and a tubular feed spout extending into the wood chipper for delivering a length of wood into the face of the rotary disc, the improvement in said feed spout which comprises:

an angular anvil carried by a side wall of said feed spout, said angular anvil being parallel to and coacting with the cutting face of said rotary disc;

said angular anvil having an upper part which angles downwardly and outwardly away from a vertical plane taken through the central longitudinal axis of the feed spout, and a lower part which angles downwardly and inwardly toward the same plane, said parts being so joined that said angular anvil presents a broadened horizontal midsection at its position in the feed spout.

14. The improvement as described in claim 13 and including adjustment means associated with said angular anvil, whereby said angular anvil may be adjusted toward and away from the cutting face of the rotary disc.

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