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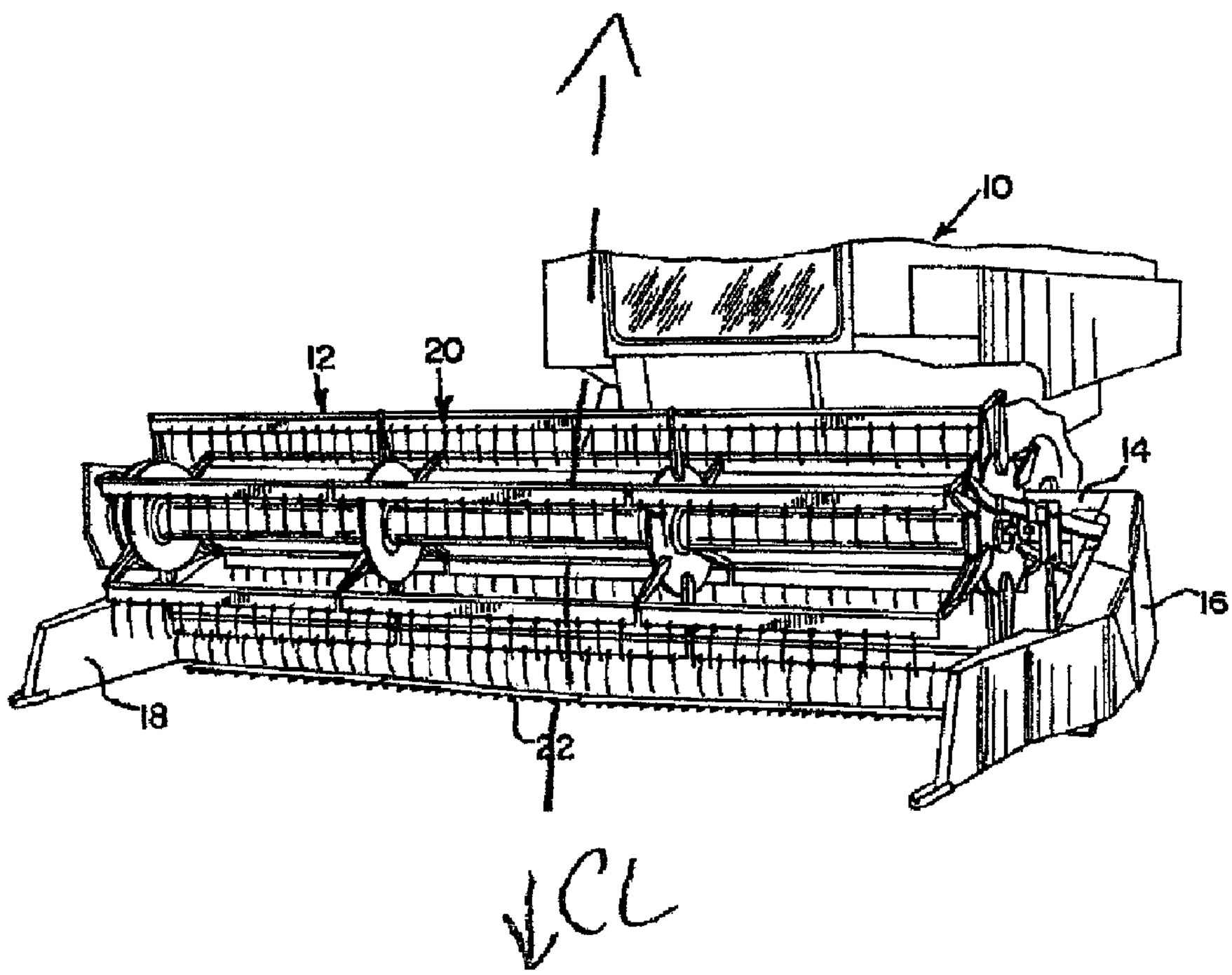
(54) **Titre : MECANISME D'ENTRAINEMENT DE COUTEAU DE TETE D'ABATTEUSE-EBRANCHEUSE**
(54) **Title: HARVESTING HEADER KNIFE DRIVE ASSEMBY**



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(57) **Abrégé(suite)/Abstract(continued):**
translated tor application to two cutter blades in the cutter bar at the front of the cutter table. Movement of the two knives with this apparatus is fully synchronized and 180 degrees out of phase, to maximize effectiveness and minimize vibration of the header. The complete drive assembly is replaceable as a single component, allowing for rapid repair and manufacture, and the size and weight of the unitary assembly represents a significant weight and balance advantage over the prior art.

HARVESTING HEADER KNIFE DRIVE ASSEMBLY

Honey et al.

Abstract

A knife drive assembly for use in a harvesting header reel. The knife drive is mounted near the center line of the cutting table of the header. Mechanical power from the power unit behind the header (typically the combine power output shaft) is directly and shortly translated for application to two cutter blades in the cutter bar at the front of the cutter table. Movement of the two knives with this apparatus is fully synchronized and 180 degrees out of phase, to maximize effectiveness and minimize vibration of the header. The complete drive assembly is replaceable as a single component, allowing for rapid repair and manufacture, and the size and weight of the unitary assembly represents a significant weight and balance advantage over the prior art.

HARVESTING HEADER KNIFE DRIVE ASSEMBLY

Honey et al.

This invention is in the field of harvesting equipment, and in particular related to the drive assemblies which are used to actuate the cutter bars on crop material harvesting or cutting headers.

BACKGROUND:

It is known in the field of crop harvesting equipment to employ harvesting headers to cut crops for various purposes, such as for windrowing or swathing, or for the feeding of a combine harvester.

At the front of a combine harvester or a swather is the portion referred to as the header. A typical header is equipped with a cutter bar, and a conveyor deck or surface behind the cutter bar onto which cut crop material will fall for direction to a windrow discharge or into the

combine. The header also typically includes a bat reel, which is typically a reel shaft mounted between 2 rotational mounts at either end of the header with a rotational power drive attached thereto, to gather standing crop material into the cutter bar and onto the table.

As headers of increasing width are manufactured, there are a number of manufacturing parameters or limitations with respect to the reel bats which limit the ability to extend the length or harvesting width of the header. One of these is the weight and complexity of the mechanical power system used to actuate the cutter knife as width is increased. In prior art headers, the knife is typically driven by either a hydraulic or mechanical drive which translates power from the center of the header to an outer end of the header, at which point reciprocating motion is applied to cause the cutter knife to move back and forth in its guide and cut crop material encountered. One of the issues with this approach is that, whether hydraulics or mechanical power are used to drive the knife, the addition of an reciprocating drive mechanism at an end of the header results in the addition of significant outboard weight to the header, causing balance issues. As well, beyond balance, the necessary components to these drives add

significant weight to the header as well. Finding a way to minimize the weight of the knife drive components in a harvesting header reel as much as possible would be desirable.

Translating rotational power from the combine or other power unit, or even providing hydraulic power, to a knife drive which is located at one or both ends of header table, results in significant mechanical complexity in the construction and maintenance of the knife power drive. Beyond the sheer number of parts which can be involved in the construction and maintenance of such a drive, it can be difficult to perform in field service on this type of the unit given the sheer number of parts that can be required and even potentially the complexity created by the number of tools needed to fit it or repair it. If there was a way to come up with an approach to the drive of the nice on a harvesting header which minimize the number of parts, for repair purposes or otherwise, it is believed that this would be well received in the industry as a means of streamlining repair and maximizing header and harvesting uptime in the field.

Another limitation of the efficacy of the knife drives used in harvesting header designs in the prior art is the issue of vibration as the header is operated. Particularly in a knife drive that drives the knife along the entire width of the header from a single drive point at the end of the header, there can be significant vibration of the header and through the entire combiner harvesting unit as that knife operates. If there were a way to minimize vibration of the header that would maximize the efficiency of the unit as well as the operator comfort or desire to use this type of a header and knife drive design. Even in other center drive solutions which have been tried in the prior art, with the drive components mounted closer to the centerline of the harvesting header, vibration has been an issue.

One of the other issues that are associated with different types of knife drives tried in the field to date has been the issue of the interruption or interference with an otherwise streamlined or low profile at the cutter bar on the header, which impedes the efficacy of the header overall and can interfere with crop flow. Typical Center Drive solutions for the cutter bars and knives in a harvesting header are either flush on the bottom of the cutter bar and the drive components

protrude on top, or they are flush in the top of the cutter bar with drive components protruding out the bottom. Both of these possibilities create a compromising performance as well as in the mechanical design of a header table. If there were a way to design a knife drive for use on a harvesting header table which resulted in a sufficiently low profile at the cutter bar to allow for normal or low skid plate profiles under the cutter bar, this would allow for the knife to be positioned as low as possible to perform near the ground. Any nonconformity or significant height in the area of the draper deck and the cutting bar will act as a barrier to crop flow. Other center knife drives featuring gearbox that is wide and deep, resulting in addition to impact on crop flow and performance, in a restriction on the ability to allow other cutter bar features. For example some other harvesting headers including those manufactured by the applicant have on occasion included rock traps another similar features and the ability to include these features near the cutter bar on a harvesting header where a conventional center knife drive is used is limited, due to the space consumed by the drive components.

SUMMARY OF THE INVENTION:

The present invention deals with a number of limitations in the prior art around center knife drives on harvesting headers. It results in a unitary knife drive assembly which can be easily installed or replaced on a harvesting header, minimizing maintenance requirements and time, as well as having significant performance advantages for the header.

The unitary knife drive assembly of the present invention is a knife drive which is mounted near the centerline harvesting header and translates rotary drive power from an input shaft to reciprocating motion to be applied to two bifurcated knife sections along the cutter bar at the front of the header. A drive paddle is provided which extends beneath the draper table of the header, and the drive arm extends pivotably upward from the rearward end of the paddle towards the drive pulley which can be attached to the rotational power source. A left and right eccentric are attached through a bearing and about a shaft along with a driven pulley near the rearward end of the drive paddle. Rotational force is provided from the drive pulley to the driven pulley by a drive belt.

The left and right eccentrics are configured such that a left and right push rod attached to them provides equal and opposite pushing motion to the left and right push rods. The left or right push rods extend forward along the drive paddle to the knife eand area of the drive, where they will exert their pushing and pulling force upon left and right bell cranks, contigured to provide back-and-forth motion when attached to the bifurcated knife sections. Movement of the majority of the components of this knife drive assembly to the rear of the header reduces the way, cutter bar as well as allows for a minimized low-profile of the cutter bar, allowing for the cutter bar to operate as close as possible to the ground and for crop material to flow over the cutter onto the draper.

By use of the unitary construction such as described herein, the manufacturer as well as installation of the knife drive assembly is simplified. A relatively small amount of hardware is required to mount this knife drive assembly, attach it to the respective bifurcated knife sections and engage the input rotation source.

In addition to a knife drive assembly for a harvesting header, there is also disclosed harvesting header including the

unitary knife drive assembly in accordance with the remainder of the present invention. Using the knife drive assembly of the present invention which is mounted near the centerline header, in conjunction with the bifurcated knife described herein, results in a harvesting header that has undesirable low profile along the cutter bar, minimized weight at the outside edges of the header, and minimize vibration in operation by virtue of the fact that the two bifurcated blade sections move equally opposite directions at the same time.

BRIEF DESCRIPTION OF THE DRAWINGS:

While the invention is claimed in the concluding portions hereof, preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labeled with like numerals, and where:

Figure 1 is a perspective view of a harvesting header from a prior art patent, for the purpose of demonstrating the general area of installation of prior art knife drives versus that of the present invention;

Figure 2 is a prior art embodiment of an end knife drive in a harvesting header, extracted from US Patent 7836671 for demonstrative purposes;

Figure 3 is a schematic view from the top of a harvesting header deploying a knife drive in accordance with one embodiment of the present invention;

Figure 4 is a perspective view of one embodiment of the present invention;

Figure 5 is a top perspective view of the embodiment of Figure 4; and

Figure 6 is a simplified side view of the embodiment of Figure 4.

DETAILED DESCRIPTION OF THE INVENTION:

The following discussion provides many example embodiments of the inventive subject matter. Although each embodiment represents a single combination of inventive elements, the

inventive subject matter is considered to include all possible combinations of the disclosed elements.

Harvesting headers, as outlined elsewhere herein and understood to those skilled in the art of crop harvesting technology are the cutting face attachment which is typically used with a combine harvester or the like. The header typically includes a reel rotatably mounted approximately perpendicular to the working direction of travel of the implement, which will when rotated feed crop material from the field into a cutter bar mounted along the front of the header, and once it passes over the cutter bar and is cut, deposit that cut crop material into an auger or onto a draper conveyor which will feed it either to a discharge in the case of the swather or windrowing machine, or into the throat of a combine harvester etc. Figure 1 is a prior art figure from a prior patent, included for the purpose of demonstrating where the center line of the header, as a relational term and concept is found. In that Figure, center line CL is shown.

Figure 2 demonstrates a prior art end drive for a knife in a header - this is included simply to demonstrate the mechanical complexity of many of the prior art drives which will be

overcome by the simplicity and mechanical advantage of the present invention.

General inventive concept:

One of the key elements of the present invention is the fact that the knife drive assembly of the present invention can be installed on the harvesting header as a unitary component. Manufacture of a unitary component knife drive, in addition to the other technical benefits outlined herein, will allow for significant advantages in terms of the efficiency of repair of the header in the field if there is ever a failure or problem with the knife drive. The knife drive can be removed and replaced with a minimum amount of tools and time, and replaced with another unitary knife drive assembly, and subsequently repaired for another "hot swap" replacement operation into a header if required.

By virtue of the fact that the knife drive assembly of the present invention is a single assembly, it provides for ease of manufacture, set up and rigidity of the design. This is not typical in current units in the industry. Normally and in the prior art, components of the knife driver located on

varying in different parts of the table and are connected by various power transmission devices [hydraulic or mechanical] to the power source on the combine feet house - typically an output shaft. Our new unified design minimizes weight, minimizes complexity and reduces power losses due to distributed power transmission area we conceive connecting our unified mechanical element directly to the combine output shaft which will result in significant manufacturing improvements and simplification as well as significantly reducing the possibility of distributed power transmission loss.

Center mounted drive:

The unitary knife drive assembly of the present invention is intended for mounting near the centerline of a harvesting header, such that it can be directly connected to available rotational power from the combine power unit with a minimum of additional mechanical components. This new design minimizes the overall weight of the header by minimizing additional mechanical components and the connection of the knife drive, minimizes the complexity of the knife drive itself as well as reduces power losses on the overall unit

due to distributed power transmission issues. Mounting of the knife drive of the present invention in proximity to the centerline of the harvesting header, resulting in weight minimization and minimized distributed power loss, is one of the first major benefits of the present design.

By locating the knife drive in close proximity to the combine power output shaft, we eliminate or minimize the need for additional mechanical drivetrain to drive the knife on the header. This allows the knife to be directly driven from the combine output shaft, with no other additional power transmission elements which minimizes friction losses and power loss on the combine.

Central mounting of the knife drive assembly also moves the drive assembly itself which can be somewhat weighty or heavy closer to the center of the table and the combine which provides for enhanced performance and less negative kinetic mass impact on the table. Many of the prior art systems have the knife drive mounted at the left or right extremities of the table in line with the cutter bar at the furthest forward position. The heavy mass of these knife drives combined with those extreme distal locations results in a negative impact on the mobility of the table and adds unnecessary stresses to

the frame of the header which must be reinforced further to carry this mass. Overall this results in adding to the total weight of the header in the table - weight is minimized with the knife drive being centrally located. There is even an indirect benefit in minimizing the weight of the knife drive assembly, insofar as by decreasing the overall weight of the header as well as the distal weights at the ends of the table, the decreased weight allows for additional gross weight allowance to be used in potentially even manufacturing a wider header.

Figure 3 is a schematic view of a harvesting header 3, with a bifurcated knife blade shown in two halves 1, 2 at the front edge of the table thereof. The direction and stroke of travel of the two knives 1, 2 is shown at A and B. The center line of the header is shown at CL.

The general components of the knife drive assembly 4 of the present invention which are shown include a drive paddle 11 which extends beneath the draper table of the header, and a drive arm 10 which extends upward pivotally from the end of the paddle 11, towards a drive pulley 5 which can be attached to the rotational power source on the combine. There are shown a left and right eccentric, 6 and 7, which are in turn

connected to a left and a right push rod 8 and 9. The left and right eccentrics 6 and 7 are connected via the left and right push rods 8 and 9 to left and right ball joints and bell cranks at the front end of the paddle 11, such that they will exert reciprocating horizontal movement on the two knives 1 and 2. The left and right push rods 8 and 9 will be pivotally connected to the eccentrics 6 and 7 such that they are 180° out of phase, and when the eccentrics on their shaft are rotated, by virtue of the connection point of each of the push rods to their respective eccentric, reciprocating movement in opposite direction, fully synchronized, will be provided. For example, knife 1 will reciprocally move towards the outer end of the header at the same time that knife 2 moves towards the opposite end of the header. Ensuring that the knives traveling equal and opposite directions at all times is one of the key technical benefits of the present invention.

The embodiment shown in Figure 3 is presented in such a way in the drawing that it would be connected to the left-hand side of the combine power unit, facing forward from the combine operator position. This is shown for demonstrative purposes - it is as likely that in most cases the knife drive assembly would be connected to the right-hand side of the

combine power unit but it will be understood that reflective manufacture of the knife drive assembly of the present invention for attachment to either the right-hander left-hand side of the combine or other power unit is within the scope of the present invention will be understood by those skilled in the art of mechanical production.

Dual knives:

One of the key prior art issues which was desired to be addressed by the creation of the present drive assembly was to minimize vibration caused by the reciprocal movement of the knife on a harvesting header. The present invention accomplishes the minimizing addition of vibration by providing two fully synchronized reciprocal drives for connection to two knives extending in either direction from the point of drive attachment near the centerline of the harvesting header out their respective ends of the header table. By providing two fully synchronized reciprocal drives which are 180° out of phase, vibration of the knives from their reciprocal movement is reduced to a minimum. The cooperation of a dual synchronized reciprocal drive with a bifurcated knife, whereby each half of the bifurcated knife

will move reciprocally in synchronized, out of phase, movement as it is driven is explicitly contemplated to comprise an aspect of the present invention. Beyond just the unitary knife drive mechanism of the present invention, the overall concept of a dual synchronized reciprocal drive with bifurcated knife halves, which is directly mechanically driven by a mechanical drive in accordance with the remainder of the present invention is explicitly contemplated within the scope of the present invention.

The knife on a harvesting header may not be divided perfectly in half, since it is explicitly contemplated that the knife drive assembly of the present invention would be mounted in proximity but to one side of the centerline of the header, extending forward from the rear of the header approximately parallel to the centerline and approximately perpendicular to the orientation and direction of travel of the header. However, by bifurcating the knife near the centerline of the header such that it is divided approximately in half even if not perfectly in half, provision of two bifurcated knives of generally the same size will still result in the desired vibration minimization. Minimizing the vibration of the device and the knife is accomplished by ensuring that the two knives travel in equal and opposite directions at all times.

Unified mechanical element:

One of the primary benefits which is contemplated with respect to the present invention, in addition to the enhanced knife behavior which is achieved from the bifurcated knife blade operating in conjunction with the knife drive assembly, is the fact that the knife drive assembly of the present invention can be manufactured in a reasonably streamlined and unitary component form which can be easily installed or swapped on the device. As is stressed and outlined throughout this application, the fact that the knife drive system of the present invention is manufactured in a reasonably compact and easily installed single component array, represents a significant mechanical enhancement over prior art designs.

Referring to Figures 4, 5 and 6 there is shown one embodiment of the knife drive assembly 4 of the present invention. There is shown a drive paddle 11 which comprises the front half of the drive structure and ensures a consistent geometry of the drive package from the rotational power input to the knife head. In a flex table application, the drive paddle 11 will be pivoting structure underneath the draper deck and the

connection point for the floating cutter bar. The drive paddle 11 can be manufactured in different lengths to fit different header tables, but as the drive paddle 11 is modified in length, the left and right push rods 8, 9 will also need to be modified in length.

The drive paddle 11 is connected to a drive arm 10. The drive arm 10 is mounted to a bearing block for the eccentrics at the rear of the drive paddle 11 and has a pivot point 12 and a locking pin 13. The pivot point 12 and the locking pin 13 allow for adjustment during installation of the unitary knife drive assembly 4, to move the drive arm 10 in the various positions as dictated by the location of the host combine output shaft. Attached at the rear end 15 of the drive arm 10 is a drive pulley 5, and belt tensioner 16 which will allow for the tensioning of the drive belt 17 once the overall drive assembly 4 is mounted and appropriately positioned.

The drive pulley 5 is coupled to the combine output shaft - typically the right-hand output shaft in the embodiments shown. The drive pulley 5 is sized in diameter as required to achieve the correct knife speed in comparison or ratio to the combine input shaft speed. The drive pulley 5 engages, by way of a drive belt 17, a driven pulley 18 which is mounted with

the left and right hand eccentrics described below and results, when rotational forces applied by the input shaft, in translation of rotational force from the drive pulley 5 through the belt 17 to the driven pulley 18.

Near the pivoting point of attachment of the drive arm number 10 to the drive paddle 11 is mounted a bearing through which the eccentrics and the driven pulley 18 can be connected. As shown in the Figures, the driven pulley 18 is co-mounted, geometrically inside your closer to the drive arm 10, to a right eccentric 6. The right eccentric, as will be understood to those skilled in the art of mechanical design, is a round gear or the like with the rotational attachment point to which an item can be rotatably attached for the delivery of reciprocating motion as the eccentric 6 is rotated. The right eccentric 6 and the driven pulley 18 would need to be mounted such that the drive belt 17 did not inhibit the rotation of the right eccentric 6 or movement of the attached right push rod, and vice versa. Attached on the opposite side of the drive arm 10, coaxially with the driven pulley 18 and the right eccentric 6 is a left eccentric 7.

Attached to the right eccentric 6 is a right push rod 8 which extends forward along the length of the drive paddle 11

towards the knife head attached thereto. Similarly attached to the left eccentric 7 is a left push rod 9 which again extends forward along the length of the drive paddle 11 towards the knife head thereof. In the embodiment shown, the right and left push rods 8, 9 are actually attached directly to their respective eccentrics by way of a right connecting rod 20 and a left connecting rod 21. These connecting rods connect directly to the journal on the eccentric in question to provide a stable point of rotation on one end and a fixing point for the respective push rod on the other end. It can be seen that the paddle 11 provides a retainer of sorts for the right and left push rods 8, 9, as they are each moved by the respective eccentrics.

Generally speaking at the distal end of the drive paddle 11, there is shown a knife head 22 which is generally speaking the portion of the overall drive assembly 4 which connects to the bifurcated knife portions. As can be seen, the right push rod 8 is connected to a right bell crank 23 on the knife head area 22. The bell crank converts the fore and aft motion of the right push rod 8 into a left/right motion at the knife head. In the embodiment shown it would pivot on cartridge bearings. Similarly, the left push rod mine is connected to a left bell crank 24 on the knife head area 22, which will

convert the fore and aft motion of the left push rod 9 into a left/right motion at the knife head. As outlined elsewhere herein, the eccentrics 6, 7 will be aligned in relation to each other and attached to their respective push rods 8, 9 in such a way that the left/right motion at the left bell crank 24 will be approximately equal and opposite to the left/right motion at the right bell crank 23.

The right bell crank 23 will be connected to a right-hand bifurcated knife section, and the left bell crank 24 will be connected to a left-hand bifurcated knife section. The precise means a connection of those cranks or similar motion conversion apparatus to the bifurcated knife sections will be understood by those skilled in the art.

Dependent upon the size of the drive pulley 5, more or less adjustment may be required to put the required tension on the drive belt 17. One size of drive belt 17 can be used for all applications so the range of adjustment of this belt tensioner is quite wide. If it was alternatively desired to use belts that were closer in size to the combination of pulleys etc., changing the drive belt 17 could also result in the functional need for less ability to tension the belt 17.

Synchronized drive of two knives:

As is outlined elsewhere herein, bifurcating the knife on the harvesting header into two sections of similar length, and consistently applying equal and opposite reciprocal movement to each of those two knife sections, is a key element of the present invention. Translation and transmission of eccentric movement, 180° out of phase, to the two knife sections from the rear of the table, can be done in a number of different ways by those skilled in the art of mechanical design and it will be understood that all such modifications or different approaches to achieving the same objective will be understood by those skilled in the art to be within the scope of the present invention.

Weight distribution:

The knife drive assembly of the present invention accomplishes an advantage in the weight distribution of a completed or assembled harvesting header over the prior art, insofar as the mounting of the knife drive assembly which is unitary and simpler, resulting in less weight to begin with,

is mounted relatively close to the centerline of the harvesting header which results in less weight to throw the header off balance or resulting in additional torsional stress on the mounting hardware of the harvesting header to the combine or power unit. A knife drive assembly such as is disclosed herein, mounted in proximity to the centerline of a harvesting header and providing opposed reciprocal movement to a bifurcated knife at the front of the header table, insofar as the weight of the overall harvesting header is reduced and the distal weight at the ends of the harvesting header is also reduced, is explicitly contemplated to represent a technical benefit over the current state-of-the-art.

In addition to reducing the weight of the header at the distal ends of the table, by moving the heavier components of the knife drive system in the present invention to the rear of the table, the weight of the drive system at the cutter bar is reduced which gain also represents a benefit over the prior art designs even including prior art center drive designs with gearboxes or the like.

Single part knife speed adjustment:

One of the issues which needs to be addressed in terms of the manufacturer of this type of an apparatus is to provide a knife drive which allows for optimizing the knife speed across a wide range of applications. For example on different combines, the output shaft to which a knife drive might be mechanically connected, or connected by a belt for the transmission of rotational power, might have different output shaft speed. Providing a center mounted knife drive assembly which allowed for the accommodation of varying output shaft speeds without the need to significantly alter the knife drive assembly itself would be another significant technical advantage. In this particular case, the drive pulley 5 can be changed - varied in diameter - according to the common output shaft speed, in order to accomplish the desired gearing ratio and to achieve the desired knife speed. The primary drive belt is not even envisioned to need to be changed, but could be tensioned or loosened the required amount to accommodate the variation in the diameter of the drive pulley. As will also be understood to those skilled in the art there could also be a drive arm adjustment provided that would allow for modification or positioning of the drive pulley in an optimal location for best alignment with the combine output shaft. By providing a drive arm adjustment device such as this, in

conjunction with the belt tensioner and other related components, results in the ability to provide an angle adjustment to the positioning of the drive pulley for optimal alignment with the combine output shaft without the need to change any parts.

Low profile at cutter bar:

One of the additional key benefits of the present invention is that the knife drive assembly of the present invention when deployed on either a rigid or a flex table does not interfere with crop flow through and over the knife onto the draper. With a very low profile at the cutter bar, the present invention allows for a normal skid plate profile under the cutter bar which means the knife itself can be positioned as low as possible to the ground to perform at or near the ground in flex cutting mode. In addition to being deployable very close to the ground by virtue of the low skid plate profile, the knife drive of the present invention also allows for a low profile above the cutter bar guards, lower than the draper deck, which is needed to facilitate the crop flow onto the draper after cutting. The low profile at the cutter bar

of the present invention can be seen in the embodiment shown in Figures 4 through 6.

Floating assembly for flex table:

Many harvesting headers deploy what is referred to as a flex table design, in which portions of the draper deck or the cutter bar float or flex to accommodate deviations in the crop surface. The knife drive assembly of the present invention could be manufactured to accommodate a flex table design and in fact utility of the present invention with a flex table design coupled with the low profile provided at the front of the draper deck and in relation to the cutter bar is one of the key benefits to the present invention.

Reduced mass at distal ends of the header:

Since the mechanical drive elements for the knife are being moved into the center of the header table, the remainder of the mass and the end struts of the header can be reduced in width and mass for optimal crop dividing performance. Relocation of the knife drive to the center of the table

eliminates the requirement for wide end struts on the header to encompass a drive assembly. [traditional wide end struts can be seen at elements 16 and 18 of prior art Figure 1] A narrow end strut reduces the impact of the strut on the crop outside the range of the cutting knives as less crop is damaged as the structure is pushed through it. This knife drive design will allow for a header table to have the absolute minimum structural which required the end struts to be reliable and stable.

Header with dual reciprocating knife sections:

As outlined elsewhere herein, in addition to the knife drive assembly of the present invention, for use in a harvesting header, it is also explicitly contemplated that a complete harvesting header which employees a center mounted low-profile knife drive assembly which provides fully synchronized and 180° out of phase movement of two bifurcated knife sections, is contemplated within the scope of the present invention. Rotational force from the combine is translated and applied to left and right eccentric gears, to which are attached left and right pushrods which in conjunction with a low-protile bell crank device attached to

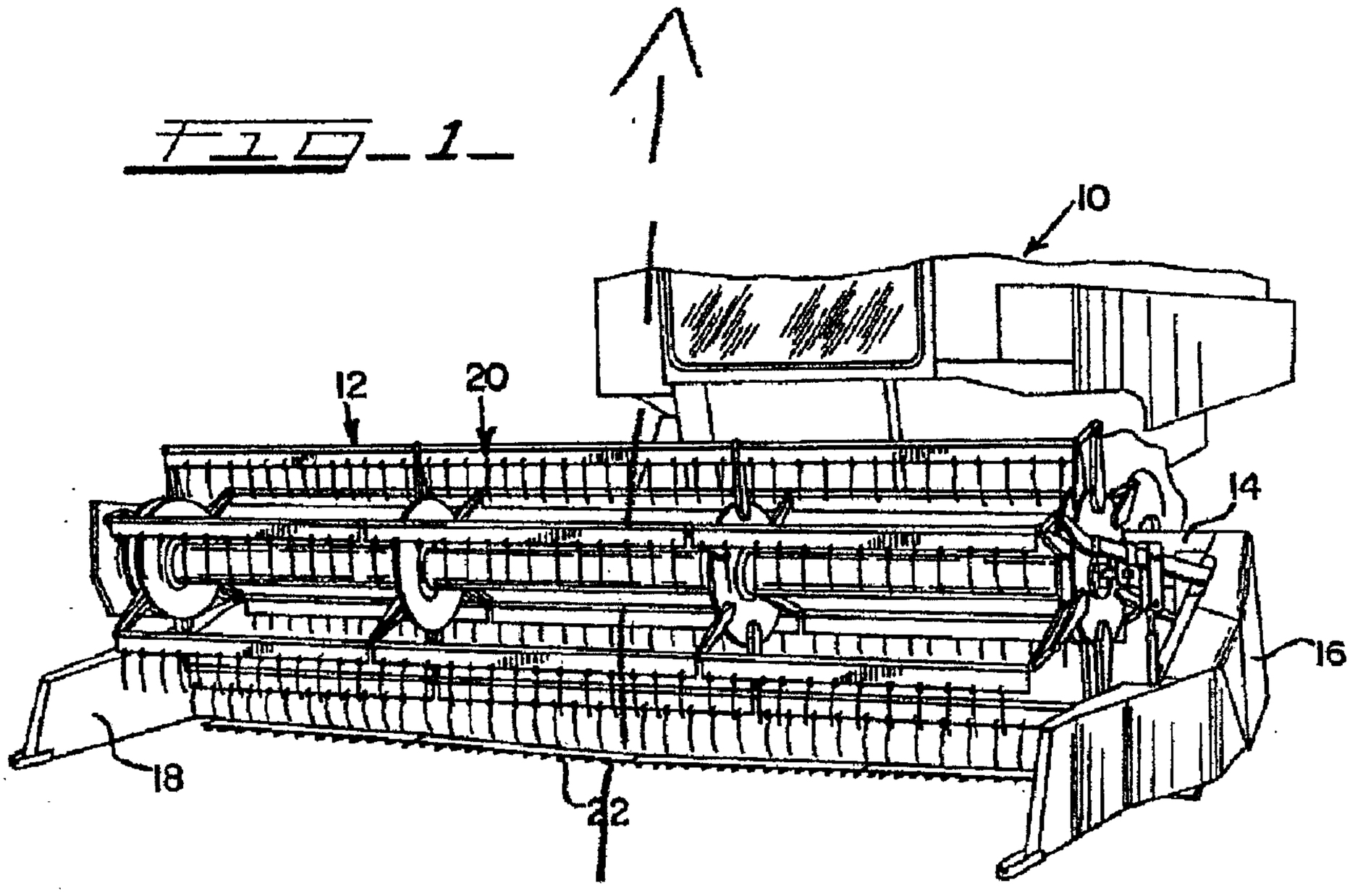
the bifurcated knife sections at the front of the header table will result in the two knife sections traveling in equal and opposite directions.

The deployment of the knife drive assembly and dual reciprocating knife sections in accordance with the present invention could be modified for use on many different type of harvesting header designs and it will be understood that all such modifications to implement the present invention in those type of headers are all contemplated within the scope of the present invention would not be conceived to depart from the general scope and intention hereof.

CLAIMS:

1.

FIGURE 1:



VCL

5

FIGURE 2:

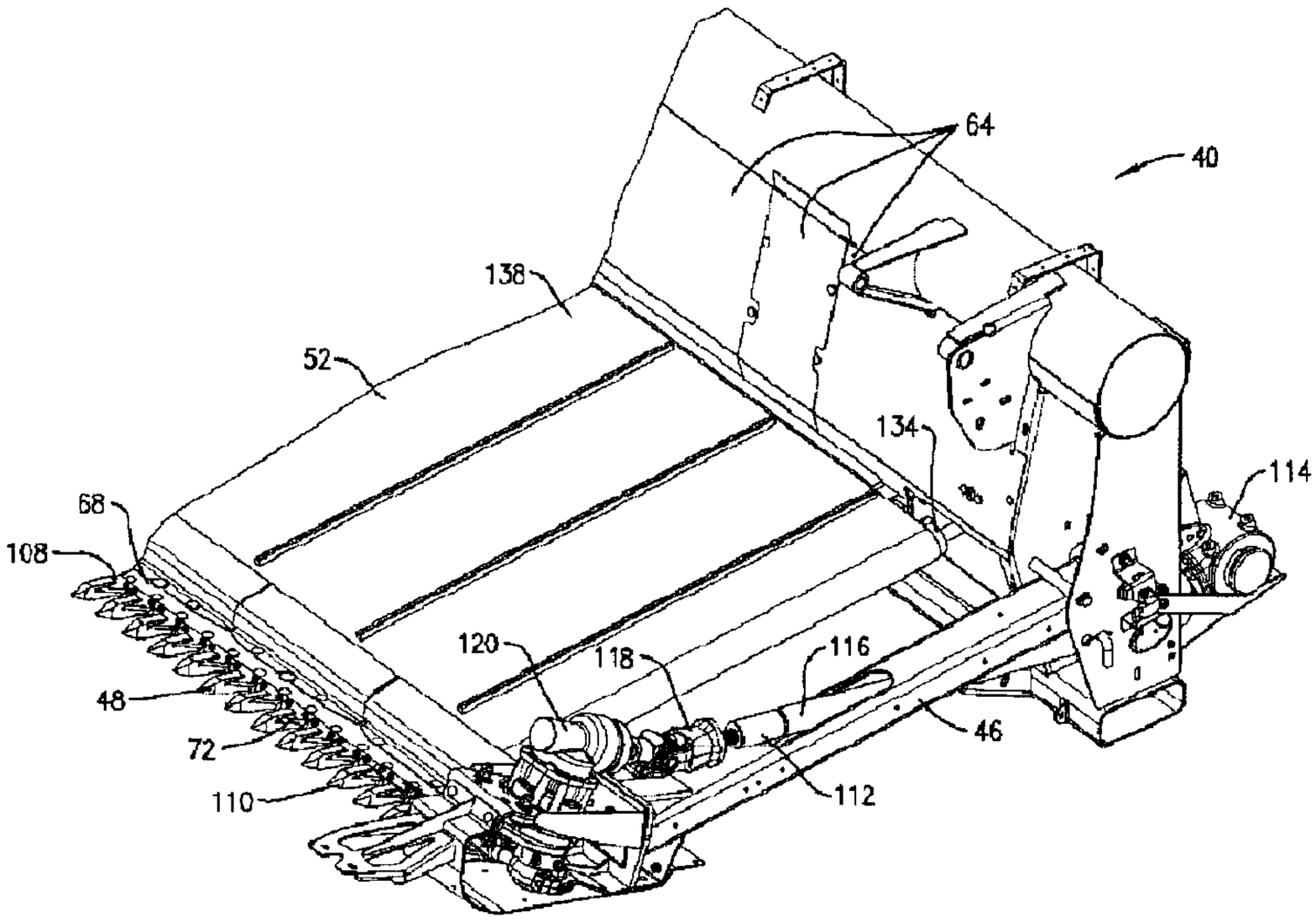


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FIGURE 3:

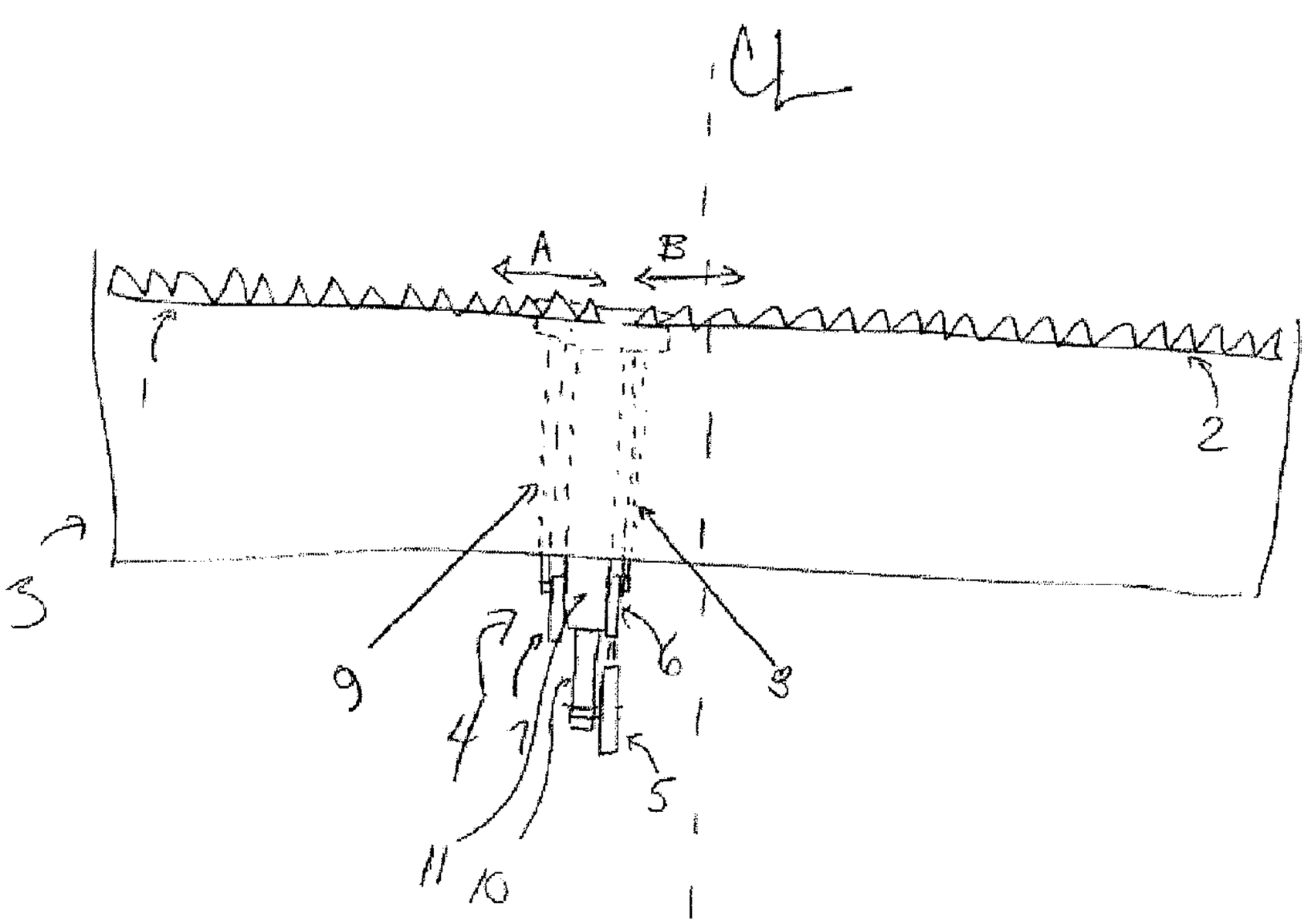


FIGURE 4:

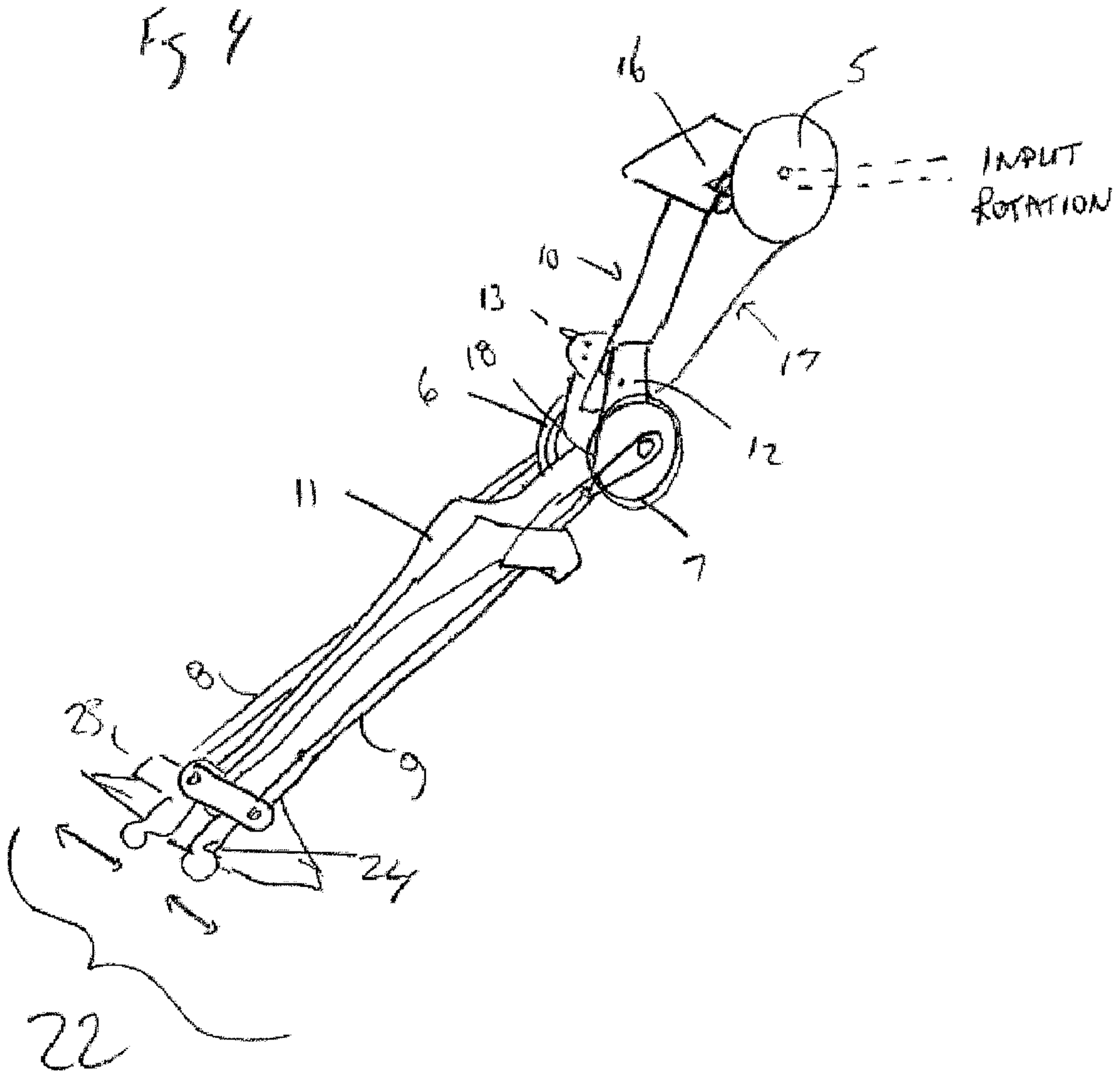


FIGURE 5:

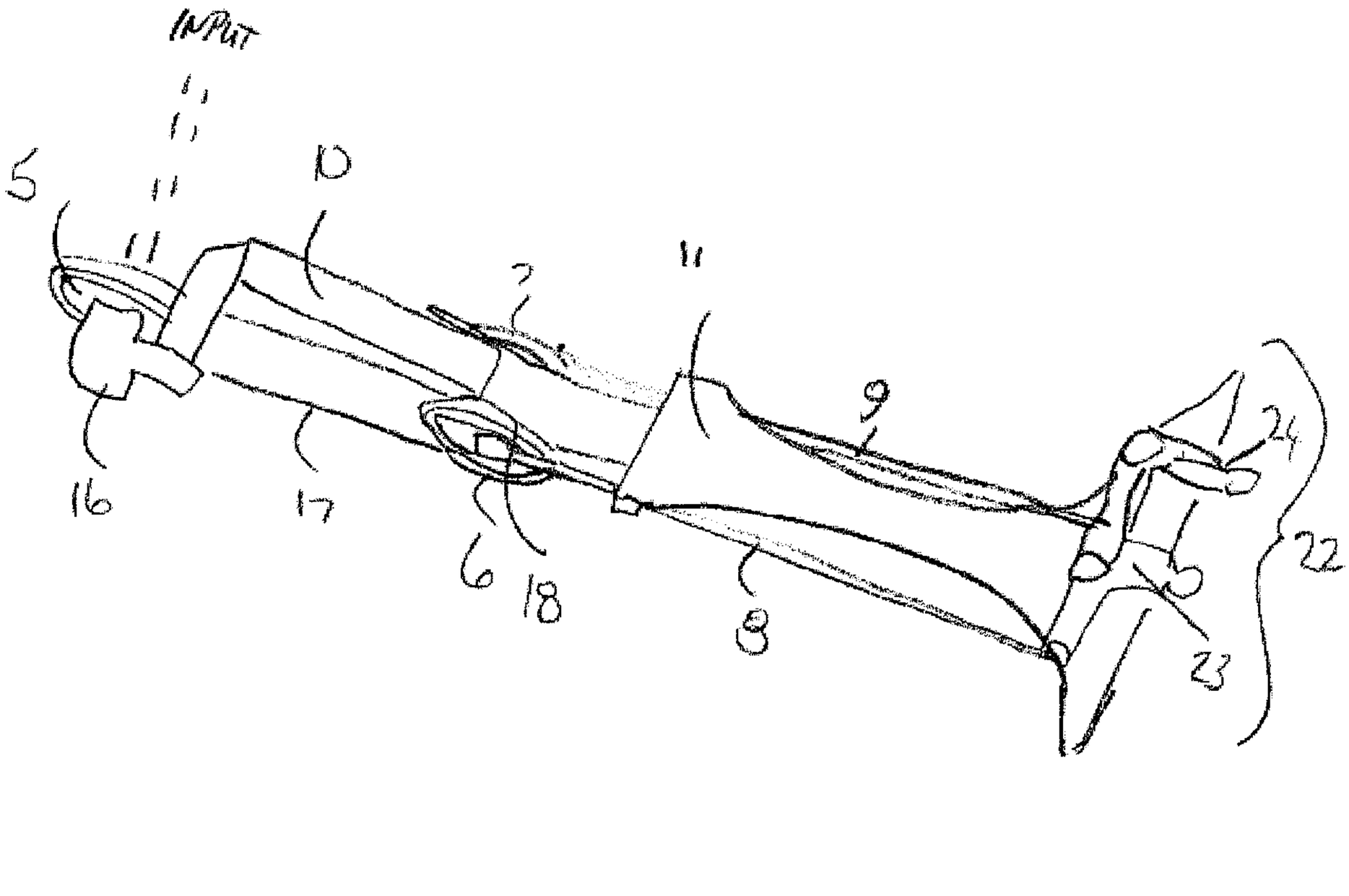
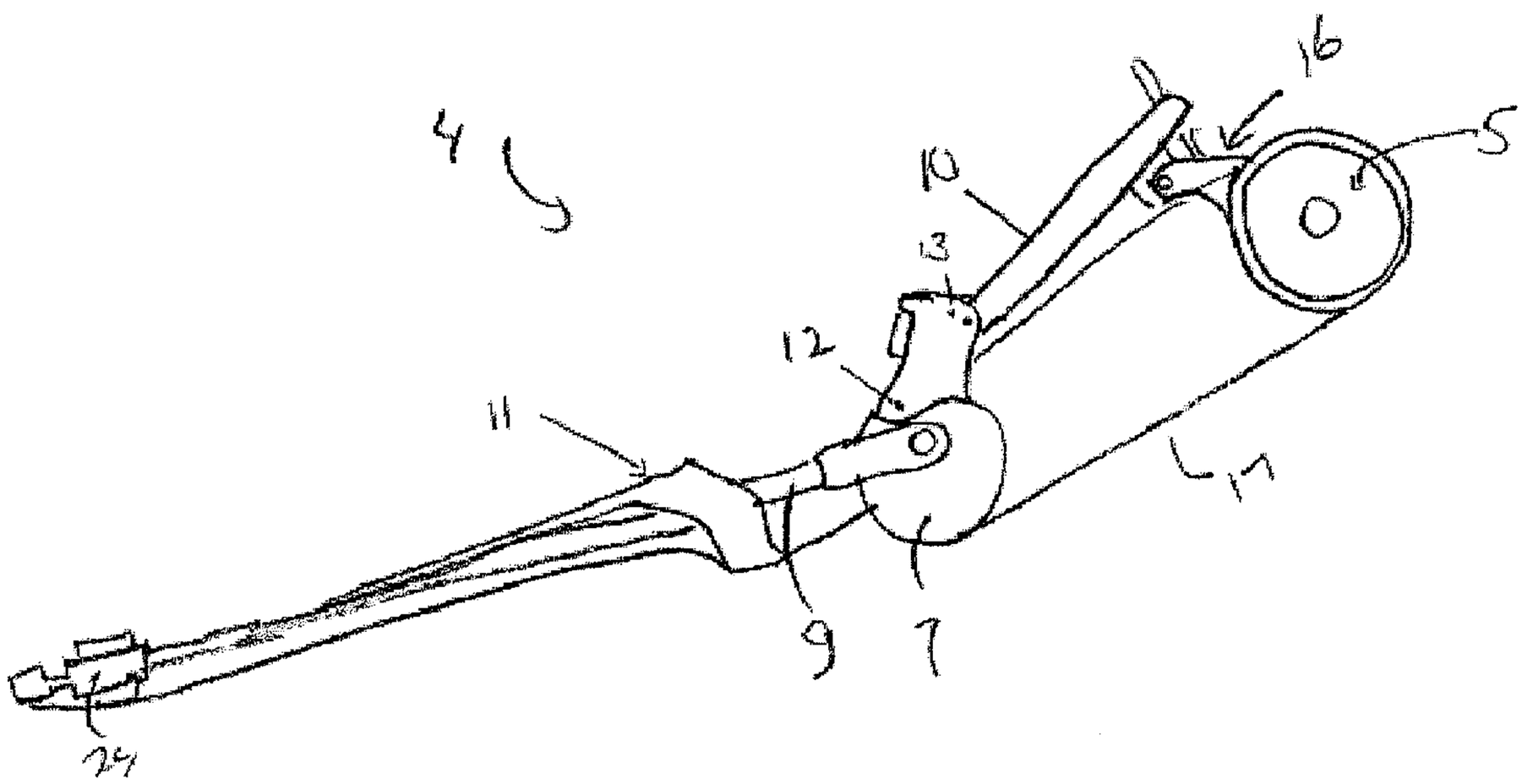
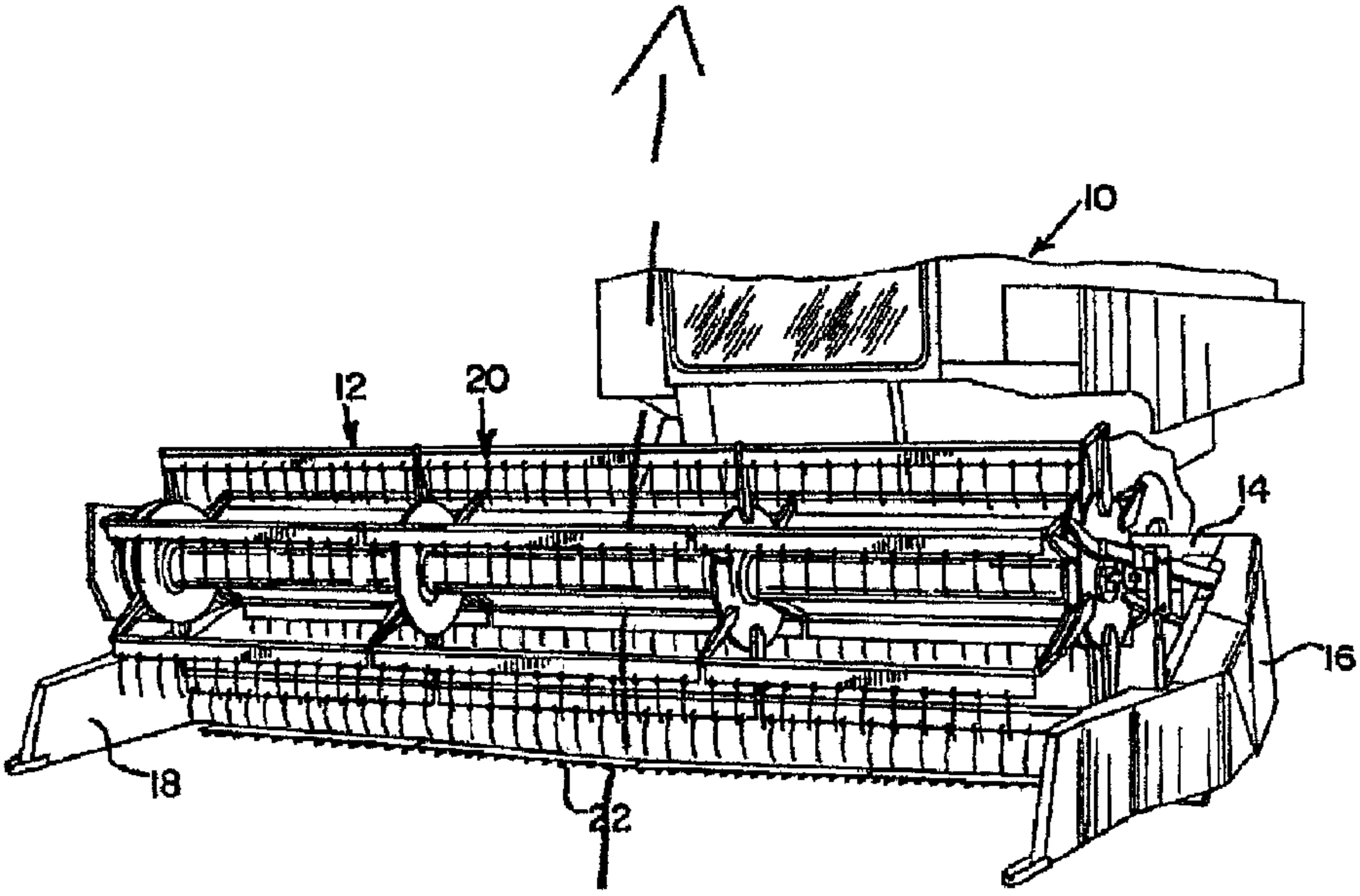


FIGURE 6:





VCL