May 14, 1929. C. WOLF 1,713,066

CUTTER HEAD

Filed Sept. 17, 1927

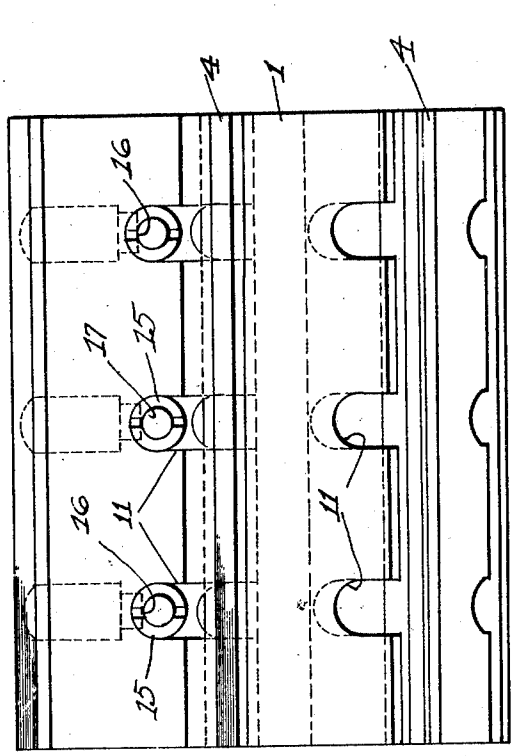


Fig. 2.

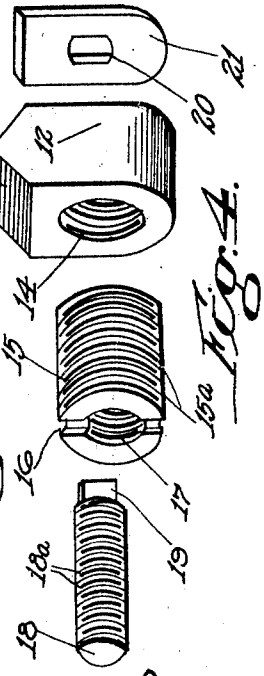


Fig. 4.

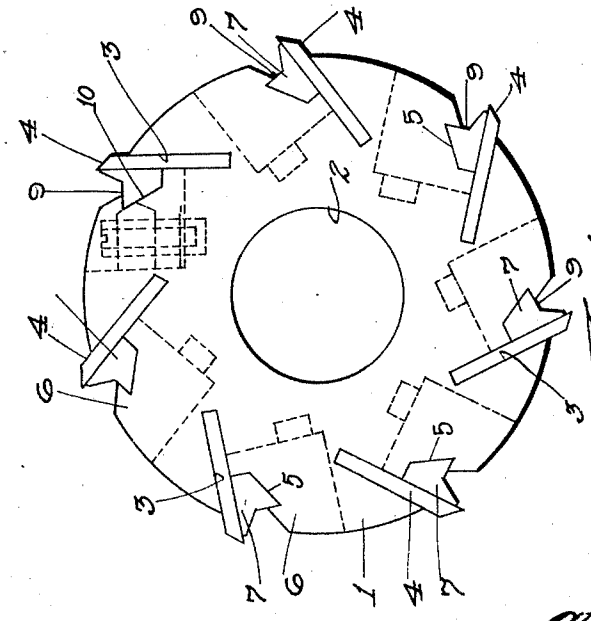


Fig. 1.

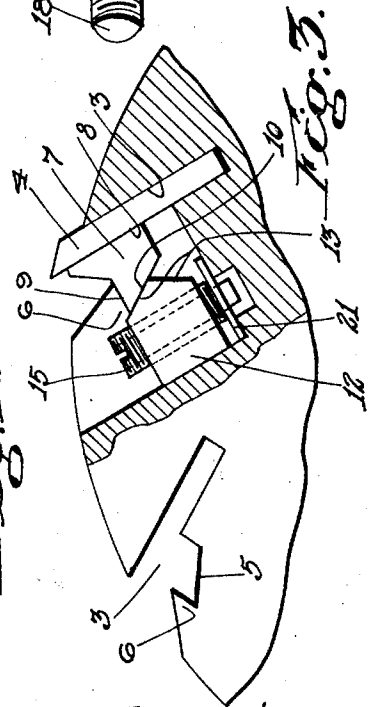


Fig. 3.

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UNITED STATES PATENT OFFICE.

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CUTTER HEAD.

Application filed September 17, 1927. Serial No. 220,175.

My invention relates to cutter heads of the type ordinarily employed for cutting and planting wood, such devices being characterized by the employment of a rotary block or head carrying a number of radially disposed cutting tools or knives presenting cutting edges extending parallel to the axis of rotation of the head.

It is desirable to operate cutting heads of the above described type at a high speed of rotation which makes it essential that the tools or knives be firmly held so that the action of centrifugal force on the knives will not tend to displace them. It is also desirable that any adjustments of the knives in the head should be made without disturbing the balance of the head on its rotational axis, for it has been found that any unbalancing of the head will, due to the high speed of rotation, result in vibration and uneven operation.

According to the present invention I provide an improved cutter head so constructed that the knives will be firmly held in position on the head without possibility of accidental displacement, further provision being made for maintaining the balance of the head when the cutting knives are removed and reassembled on the head for any reason. My improved head also carries a maximum number of knives and the above and other advantageous features of the invention will hereinafter more fully appear, reference being had to the accompanying drawings, in which—

Fig. 1 is a view in end elevation of a cutter head embodying my invention.

Fig. 2 is side elevation of the parts shown in Fig. 1.

Fig. 3 is a view of a portion of the head shown in Fig. 1, a portion of this figure being shown in section to more clearly show the details of the knife holding means.

Fig. 4 is a view showing the various elements of one of the compensating devices for clamping the knives in position on the head.

Referring first to Fig. 1 the device consists of a cylindrical metal block 1 having a central opening 2 whereby the block 1 may be mounted on a suitable arbor or mandrel not shown. The block 1 is provided with a number of radial slots 3, the sides of which are parallel at the bottom portions and are of substantially the same width as a number of tools or knives 4 received in the slots 3. The slots 3 are wider than the knives 4 at the periphery of the block 1 and each slot further provides a bevelled portion 5 underlying a lip 6 which extends parallel to the tool 4 and is spaced therefrom.

Each slot 3 also receives a wedging block or gib 7 of substantially the same length as a tool 4, the gib 7 providing one face 8 in contact with the tool 4 and another face 9 extending at right angles to the face 8. This face 9 is in engagement with the under side of the lip 6 and has contiguous thereto a bevelled face 10, the inclination of which corresponds with the inclination of the bevelled portion of the slot at 5. Thus each gib 7 is adapted to fit rather closely in a slot 3 and is capable of movement therein only in the direction of the tool 4, the lip 6 preventing radial movement of the gib 7 with respect to the rotational axis of the cutter head.

Each slot 3 has communicating therewith two or more radially bored recesses 11 which enter into the bevelled portion 5 of each slot and extend below the same. Each recess 11 receives a nut 12 having side faces 13 with the same inclination as the face 10 of the gib 7. The nut 12 provides a threaded opening 14 which receives an externally threaded sleeve 15 provided with tool receiving slots 16 at one end whereby the sleeve 15 may be turned in the nut 12. The sleeve 15 provides a central threaded opening 17 threaded oppositely with respect to the opening 14 to receive a threaded stud 18 which extends through the sleeve 15 and is provided at its end with a squared portion 19 which is received in a correspondingly shaped opening 20 of a plate 21. The plate 21 fits closely in the bottom of the recess 11 and so prevents the stud 18 from turning.

It will be noted that the threaded sleeve 15 is in contact at its lower end with the plate 21 so that with the parts in position as shown in Fig. 3, the sleeve 15 cannot move any deeper into the recess 11. Consequently when the sleeve 15 is turned in a clock-wise direction it will cause the nut 12 to tend to move radially outward from the axis of the block 1. As this occurs the inclined face 13 of the nut 12 which is in engagement with the bevel face 10 of the gib 7 causes the gib 7 to exert a side pressure tending to hold the knife 4 in its slot 3. As previously pointed out the gib 7 cannot move in radial direction because of its engagement with the lip 6, so that the entire force exerted by the nut 12 resolves itself into

a pressure tending to hold knife 4 in its slot.

As previously pointed out the sleeve 15 is also internally threaded to receive the stud 18 and as the threads on stud 18 are opposite to the threads in nut 12, turning of the sleeve 15 will result in moving the stud 18 in a direction opposite to the movement of the nut 12. The relative pitch between the threads 15^a on sleeve 15 and the threads 18^a on stud 18 is determined by the relation between the weights of the nut 12 and of the stud 18 respectively. In other words, the threads 15^a and 18^a bear such a relation that when the nut 12 and the stud 18 are moved in opposite directions by turning the sleeve 15 the position of the center of gravity of the parts so moved remains unchanged. Another way of stating the same proposition is that any loosening and tightening of the tool clamping device, as described above, will not affect the balance of the whole tool head and the manner in which this works out in practice will now be discussed.

When the cutter head embodying my invention is first assembled at the factory, all of the cutter blades or knives 4 are of substantially the same weight and proportion, although there may be a very slight variation in the thicknesses of the knives 4. The various parts entering into each clamping device including the nut 12, sleeve 15 and the stud 18 are also made identical, so that when all of the knives 4 are assembled in slots 3 and clamped therein the entire cutter head is in perfect balance and can be driven at a high speed of rotation without vibration.

After a cutter head has been used in service for some time the knives 4 become dull and it is necessary to remove them from the cutter head in order that the knives may be reground. This regrinding is very carefully done so that each knife has the same amount of metal removed therefrom, but even with this precaution, there is no assurance that each knife will be returned to the same slot in which it was originally assembled. Consequently when the reground knives 4 are again clamped in the head, any slight variations in the thickness of the knives will necessitate changing the original adjustments of the clamping devices. However, each one of my improved clamping devices automatically compensates for any readjustments of its parts, for any inward or outward movement of the nut 12 from its original setting will be counterbalanced by the opposite outward or inward movement of the stud 18 of such an amount to maintain the center of gravity of each clamping device substantially unchanged. Consequently when all of the knives 4 have been reset, the cutter head will rotate with its balance unaltered due to the fact that the radius of gyration of each clamping device is the same as for the original adjustment of the device.

It is also apparent that minor adjustments of the cutter head to insure that the knives 4 are tightly clamped has no effect on the balance of the head. The balance remains unchanged, even though the operator making the adjustment applies different degrees of force to turn the various sleeves 15 to clamp the knives. This is a feature wherein my improved cutter head differs from those previously constructed with no provision for compensation of the amount of adjustment in each clamping device.

It will be noted in Fig. 1 that the gibs 7 extend completely across the block 1 and completely fill the spaces between the knives 4 and the opposite edges of the slots 3. Consequently there is no tendency for pitch from the wood being cut accumulating in the slots and making it difficult to remove the knives 4 when this pitch hardens. Nor is there any possibility of the pitch getting between the co-acting wedging faces of the gibs 7 and the nuts 12. My improved construction makes it possible to place a maximum number of knives on a cutter head of given diameter owing to the fact that the slots 3 are only wide enough to receive the knives and gibs 7. The boring of the recesses 11 for receiving the clamping devices does not weaken the metal between adjacent slots to any great extent so that the slots 3 can be placed almost as closely together as clearances between adjacent slots and recesses will permit.

I claim:

1. An improved cutter head comprising a rotatable body providing slots extending in a generally radial direction from the axis of said body, knives received in said slots and clamping devices for said knives providing means for securing varying degrees of pressure on said knives against the sides of the slots and means for compensating for changes in position of said pressure exerting means to maintain the rotatable body always in balance.

2. An improved cutter head comprising a rotatable body providing radial slots, knives received in said slots and a retaining device for each knife comprising a clamping member movable only at right angles to its knife and members radially movable in opposite directions for imparting movement to said clamping member without altering the position of the center of gravity of said retaining device, as a whole.

3. An improved cutter head comprising a rotatable body providing radial slots, knives received in said slots and a retaining device for each of said knives comprising a clamping member movable only at right angles to its knife, a wedging member movable parallel to said knife to operate said clamping member and a compensating member movable in a direction opposite to that of said wedging member whereby the center of gravity

of said retaining device remains unaltered when said device is adjusted to clamp the knife.

4. In a retaining device for cutter head knives a rotatable body providing a radial slot extending the length of the head, a knife received in said slot, recesses extending into said head parallel to said slot and communicating therewith, a clamping member received in said slot and capable of movement therein only at right angles to said knife, a wedging member in a recess, a stud passing through said wedging member and a threaded member adapted to move said wedging member and said stud in opposite directions whereby to maintain unchanged the position of the center of gravity of said retaining device when the wedging member is moved to cause said clamping member to exert a sidewise pressure on said knife.

CHARLES WOLF.