

UNITED STATES PATENT OFFICE.

EUGENE HABER, OF SOUTH BOSTON, MASSACHUSETTS, ASSIGNOR TO MORSE TWIST DRILL AND MACHINE COMPANY, OF NEW BEDFORD, MASSACHUSETTS.

ROTARY CUTTER-HEAD.

No. 864,420.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EUGENE HABER, of South Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Cutter-Heads and Knives Therefor; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in rotary cutter-heads and knives especially adapted for use in wood working machinery, and the objects of the invention are to enable the knives to be adjusted either independently or simultaneously and also to clamp them securely. Also, when tonguing or grooving knives are used, to enable the knives to be adjusted longitudinally so as to produce any desired width of tongue or groove.

The essential parts and combinations of parts constituting the invention will be fully understood from the following description and the accompanying drawings forming part thereof, to which reference is had by figures and letters marked thereon; and the features for which protection is desired are set forth in the claims.

In said drawings—Figure 1 is a part end elevation and part transverse section of the complete cutter-head. Fig. 2 is a part section and part side elevation of Fig. 1. Fig. 3 is a detail transverse section of a knife-seat and knife. Fig. 4 is a longitudinal section of a knife-seat and knife. Fig. 5 is a side view of a knife-seat detached. Fig. 6 is a view of a tonguing or grooving knife detached. Figs. 7 and 8 are detail sectional diagrams illustrating the action of the tonguing and grooving knives. Fig. 9 is a detail.

The cutter-head comprises a main body A which is rigidly attached to the shaft S of the machine in which the head is used; said head is provided with equidistant longitudinal parti-cylindrical grooves *a*, in which the cylindric knife-seats B are mounted; and with flat-surfaced parts *a'*, intermediate these grooves *a*, to which the knife-clamps or cap-plates C are secured by bolts C'.

The knives D are parti-cylindric in cross section and are confined between the cylindric knife-seats B and the clamps C, said clamps having their larger ends concaved as at *c* to fit against the outer or rear side of the adjacent knife D, while the smaller ends of the clamps are concaved, as at *c'*, to fit against the adjacent knife-seat B, as shown, the clamps thus acting to bind the knives and the knife-seats securely in place on the body. The body A is also provided with grooves or recesses *a''*, adjacent to grooves *a*, to accommodate the inner parts of the knives and permit their adjustment on or with the knife-seats B.

Extending axially through each knife-seat B is a rotatable rod E which is provided, at intervals, with radially projecting pins *e*, extending through slots *b* in the head and engaging a slot *d'* in the adjacent knife as shown, so that by rotating shaft E (when the clamp is loosened,) the knife can be adjusted relatively to the body and seat, as is obvious.

The shaft E projects beyond the seat and can be squared at its end for engagement of a suitable wrench, so that it can be rotated in the seat and thus adjust the knife independently of the others as is obvious. A further adjustment of the knife is attainable by rotating the knife-seat, and for this purpose the seat B may be extended at one end beyond the body A, as at B'; this end B' being squared or flattened as at *b''* to enable the body to be engaged and turned by a wrench. Thus by means of rod E the knife can be adjusted relatively to the body and seat; and by means of the seat it can be adjusted relatively to the body.

For the purpose of enabling all the knives to be simultaneously adjusted, pinions F are mounted on the ends of the rods E, and all mesh with a common master-gear G loosely mounted on shaft S adjacent the body A, suitable means being provided to lock gear G against rotation while the cutter-head is in use, a clamping nut *g* being shown screwed onto a threaded part *s* of shaft S adjacent the gear G, by which the gear can be clamped against the body when it is desired to lock the gear.

The pinions F can be locked to the rods E by sliding them thereon until notches *f* in the pinions engage pins *e'* on the rods, then by rotating gear G all the rods E will be simultaneously rotated and all the knives D simultaneously adjusted. Gear G can be conveniently turned by means of a lever H having a segmental toothed head provided with an opening *h* which can be engaged with the end of a rod E and the toothed part engaged with gear G as indicated in the drawings, said lever being removed after the desired adjustment is effected.

The seats B may be similarly simultaneously adjusted as follows: On the other ends of rods E can be mounted pinions I, which mesh with a gear J mounted on shaft S, like gear G, and provided with a clamping nut J' or other suitable clamping device. When it is desired to adjust the seats simultaneously, pinions I are moved inward to cause pins *b''* on the seats to engage sockets *i* in the pinions, then by applying a wrench, as H, to the gear J all the seats can be simultaneously rotated, and thereby all the attached knives adjusted.

In the drawings the knives D are shown as tonguing or grooving knives, and for this purpose are provided with spiral rib-shaped cutters D', on their outer faces, and on their inner faces are provided with spiral ribs

d^3 , adapted to engage corresponding spiral shaped grooves b^3 in seats B. By reason of this construction it will be obvious that if the knife is moved on the seat, it will be shifted slightly endwise of the seat.

5 In practice the alternate knives and knife-seats may have right and left spirals, respectively, so that the cutter D' of one will cut one side of the tongue or groove, and the cutter D' of the next will cut the opposite side, as indicated in Fig. 7; while Fig. 8 shows
10 how the like alternate arrangement of knives may be used to cut grooves. With such knives (D', D') it is possible to cut any width of tongue or groove desired by adjusting the knives endwise relatively to the knife-seats, so that the cutting edges of the alternate
15 knives are moved to or from a median line. For this purpose the knife seats B are provided with spiral grooves b^3 on their outer cylindric faces (see Fig. 5), and the knives D with spiral ribs d^3 on their inner faces, (see Fig. 6), the ribs d^3 being adapted to engage
20 the grooves b^3 so that if the knife-seat and knife are rotated relatively to each other, the rib and groove will cause the knife to shift longitudinally of the seat. The knives can be held against rotation by rods E, while the seats D are rotated, either independently,
25 or simultaneously, by means of gear J and pinions I as above described. Owing to the spiral shape of the cutting ribs D' it will be seen that they have the desired clearance so that they will clear themselves, or "clean cut", both in the tonguing (Fig. 7) and in
30 grooving (Fig. 8.)

In the drawings I have shown gage rings M for setting the knives, but do not claim them herein; these rings can be slipped onto the cutter-head when setting the knives, and removed when the cutter-head is in use.
35 The clamps C should be provided with a groove to accommodate the ribs D' of the tonguing and grooving cutters, as shown. Obviously the knife seats, rods E, and clamps are useful in connection with planing or molding knives, and I do not consider the invention restricted
40 to the tonguing and grooving knives although the particular form of such knives is a subsidiary feature of the invention. The outer part of the knife-seats B is reduced or grooved longitudinally as shown at b^2 for the purpose of forming a breaking surface for the chips, and
45 gives clearance room for the chips to pass in and facilitates the removal or insertion of the knives by a turning movement of the knives relatively to the seats.

As shown in Fig. 9 the ribs D' may be made slightly oblique in cross section, to give what is known as "overhang" thereto when sharpened, so that they will cut
50 clean and sharp in the corners of the tongues or grooves. The ribs d^3 and grooves b^3 have, or should have, the same inclination or angle to the length of the blade as the cutting ribs D', so that it is unnecessary to adjust
55 the knife-seats every time the knives are sharpened to insure correct positioning of the cutting ribs.

It will be observed that the clamps C press the knives downwardly and inwardly, and that the greatest pressure exerted thereby on the knives is applied near-
60 est the working or outer edge of the knives; because the clamps are applied to the outer side of the knives and press them inwardly, instead of outwardly. This mode of clamping the curved knives is very effective.

After the parts are properly adjusted the knives and
65 seats are firmly locked, by the clamps, as the knives

must be held rigidly in position during the operation of the cutter-head.

While the pinions and gears afford convenient means for quickly adjusting the knives and knife-seats, it is obvious that they may in some cases be dispensed with
70 and the adjustments effected by hand; and therefore I do not limit my invention to the use of such adjusting means, although they are useful and valuable and included as elements in some of the claims.

While the cutter-head has been described as particularly designed for wood working, it can be employed in working metal and other material.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a rotary cutter-head, the combination of a body, 80 rotatably adjustable knife-seats thereon, adjustable knives on said seats, rotatable rods for shifting the knives on the seats, pinions on said rods, means for locking the pinions to the rods or to the seats, and a master gear, for the purpose set forth. 85
2. In a rotary cutter-head, the combination of a body, rotatably adjustable knife-seats thereon, rotatably adjustable knives on said seats, rotatable rods for shifting the knives thereon, pinions on the opposite ends of said rods, means for locking the pinions to the rods or to the seats, and master gears on the head engaging said pinions, for the purpose set forth. 90
3. A cutter-head comprising a body having longitudinal grooves, rotatable knife-seats in said grooves, curved rotatably adjustable knives, clamps interposed between adjacent knife-seats, adapted to fasten the knives and seats, and means for adjusting the knives and seats independently or simultaneously. 95
4. In a cutter-head, the combination of a body having longitudinal grooves, rotatable cylindric knife-seats in said grooves, curved rotatably adjustable knives, clamps adjustably attached to the body between adjacent knife-seats, adapted to fasten the knives and seats, rotatable rods in the seats engaging the knives, and means for adjusting the knives and seats independently or simultaneously. 100
5. In a cutter-head, the combination of the body, longitudinal axially rotatable knife-seats thereon, longitudinal curved knives fitted to the seats, and means for fastening the knives and seats in place. 105
6. In a cutter-head, the combination of a longitudinally grooved body, rotatable knife-seats fitted in the grooves, curved knives secured between the body and seats and adjustable with said seats, and knife-clamps. 110
7. In combination, a body having longitudinal grooves, rotatable knife-seats in said grooves, longitudinal curved knives secured between the body and seats and adjustable relatively to said seats, and clamps attached to the body to secure the knives and seats in place. 115
8. In combination, a body, adjustable knife-seats thereon, knives having longitudinal cutting edges and rotatably adjustable with the seats; means for rotatably adjusting said knives relatively to the seats, and knife-clamps. 120
9. In combination, a body, longitudinal rotatably adjustable knife-seats thereon, curved rotatably adjustable knives having longitudinal cutting edges, fitted to the seats and adjustable therewith; means for also rotatably adjusting said knives relatively to the seats, and knife-clamps. 125
10. In a cutter-head, the combination of a body, a longitudinally arranged transversely curved knife adjustably mounted thereon, a rotatable rod extending axially of the body, and connections between the rod and knife for adjusting said knife, and knife-clamps. 130
11. In a cutter-head, the combination of a longitudinally grooved body, rotatable knife-seats in the grooves thereof, knives adjustably mounted on the seats, rotatable rods in the seats and connections between the rods and knives. 135
12. In a cutter-head, the combination of a body, longitudinally arranged rotatably adjustable knife-seats thereon, rotatably adjustable knives adjustable with the seats, and means for adjusting the knives relatively to said seats. 140

13. In a cutter-head, the combination of a body, rotatably adjustable knife-seats thereon, rotatably adjustable knives on the seats, and rotatable rods and connections for adjusting the knives on said seats, and knife-clamps.
14. In combination, a rotatable body, rotatable knife-seats in the periphery thereof, knives adjustable with the seats; means for adjusting the knives relatively to the seats, and means for clamping the knives and seats.
15. In a cutter-head, the combination of a body, rotatably adjustable knife-seats thereon provided with inclined grooves, and knives fitted to said seats and provided with ribs engaging the grooves, for the purpose set forth.
16. In a cutter-head, the combination of a body, rotatably adjustable knife-seats thereon, knives on and adjustable with said seats, interlocking spiral ribs and grooves on said knives and seats, and means for adjusting the knives relatively to said seats.
17. In a cutter-head, the combination of a body, longitudinally arranged rotatable cylindric knife-seats thereon, curved knives fitted to said seats, interlocking spiral ribs and grooves on said knives and seats and means for clamping the knives and seats, for the purpose specified.
18. In combination, a body, a rotatable knife-seat thereon, a knife fitted to said seat and a rod journaled in said seat and provided with radially disposed fingers or arms engaging the knife, for the purpose specified.
19. In combination, a body, a rotatable longitudinally disposed knife-seat thereon, a curved knife fitted to said seat and adjustable therewith, and a rod journaled in said seat and provided with radial fingers or arms engaging the knife, for the purpose specified.
20. In a cutter-head, the combination of a body, longitudinally disposed knives thereon, rotatable rods parallel with the knives, pinions on said rods, connections between the rods, and a master-gear engaging the pinions for simultaneously turning the rods.
21. In a cutter-head, the combination of a body, longitudinally arranged transversely curved knives thereon, rotatable rods mounted on the body, connections between the rods and knives, pinions on said rods, and a master-gear for simultaneously turning the rods.
22. In a cutter-head, the combination of longitudinally arranged rotatable knife-seats, knives fitted to and adjustable with the seats, a pinion for each seat, and a master-gear adapted to cause said pinions to simultaneously adjust the seats and knives.
23. In a cutter-head, the combination of longitudinally arranged rotatable knife-seats, knives fitted thereto and adjustable therewith, a pinion for each seat, and a master-gear on the cutter-head shaft engaging said pinions to simultaneously adjust the seats.
24. In a cutter-head, the combination of a body, and a cylindric rotatable knife-seat thereon; with an adjustable knife fitted to the seat and having an angularly disposed cutting rib, and angularly disposed, interlocking ribs and grooves on the meeting faces of the knife and seat.
25. In a rotary cutter-head, the combination of a body and an adjustable rotatable cylindric knife-seat thereon; with a curved adjustable knife having a spiral cutting rib, and interlocking spiral ribs and grooves on the meeting faces of the knife and seat.
26. In combination with a cutter-head having longitudinal rotatable knife-seats, transversely curved knives fitted to said seats, and clamps adjustably secured to the head and bearing at one end upon the outer or back faces or knives, and at the other end upon the adjacent knife-seat, substantially as described.
27. In a cutter-head, the combination of the body having longitudinal grooves, cylindric and rotatable knife-seats fitted therein, curved knife-blades, and means for holding the knife-blades and seats in place.
28. In a cutter-head, the combination of the body, internal knife-seats thereon, external knife-clamps, and curved knives having angularly disposed or spiral cutting ribs fitted and clamped between said clamps and seats.
29. In a cutter-head, the combination of the body, curved knives having angularly disposed or spiral cutting ribs, and knife-clamps having recesses and projections to correspond with the cutting ribs of the knives.
30. In a cutter-head, the combination of the body, rotatable knife-seats thereon, pinions attached to said seats, a master-gear, and means for fastening the gear and pinions in place.
31. In a cutter-head, the combination of the body, knife-seats, curved knives, rods journaled in said seats, pinions attached to said rods, a master-gear, and means for fastening the gears and pinions in place.
32. For a cutter-head, curved knives having spiral ribs or grooves on their internal surfaces for the purpose of lateral shifting of the same.
33. In a cutter-head, the combination of a body, rotatable knife-seats, and curved knives having ribs or grooves, or shoulders to engage with corresponding parts on the knife-seats for the purpose of adjusting the knives.
34. In a cutter-head, the combination of a body, cylindric rotatable knife-seats to engage the knives, and flattened or squared for the purpose of rotatably adjusting the knives, and knives engaging said seats.
35. In a cutter-head, a body, cylindric knife-seats thereon, and knives having spiral grooves or ribs engaging the corresponding ribs or grooves on the seats for the purpose of laterally shifting the knives.
36. In a cutter-head, the combination of a longitudinally grooved body, rotatable knife-seats fitted in the grooves, curved knives adjustable with said seats, and knife-clamps.
37. In combination, a body having longitudinal grooves, rotatable knife-seats in said grooves, longitudinal curved knives adjustable relatively to said seats, and clamps attached to the body to secure the knives and seats in place.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

EUGENE HABER.

In presence of—
ADRIAN B. SMITH,
G. W. FRIZZELL.