M. PEDERSEN.

WHEEL CUTTING MACHINE.

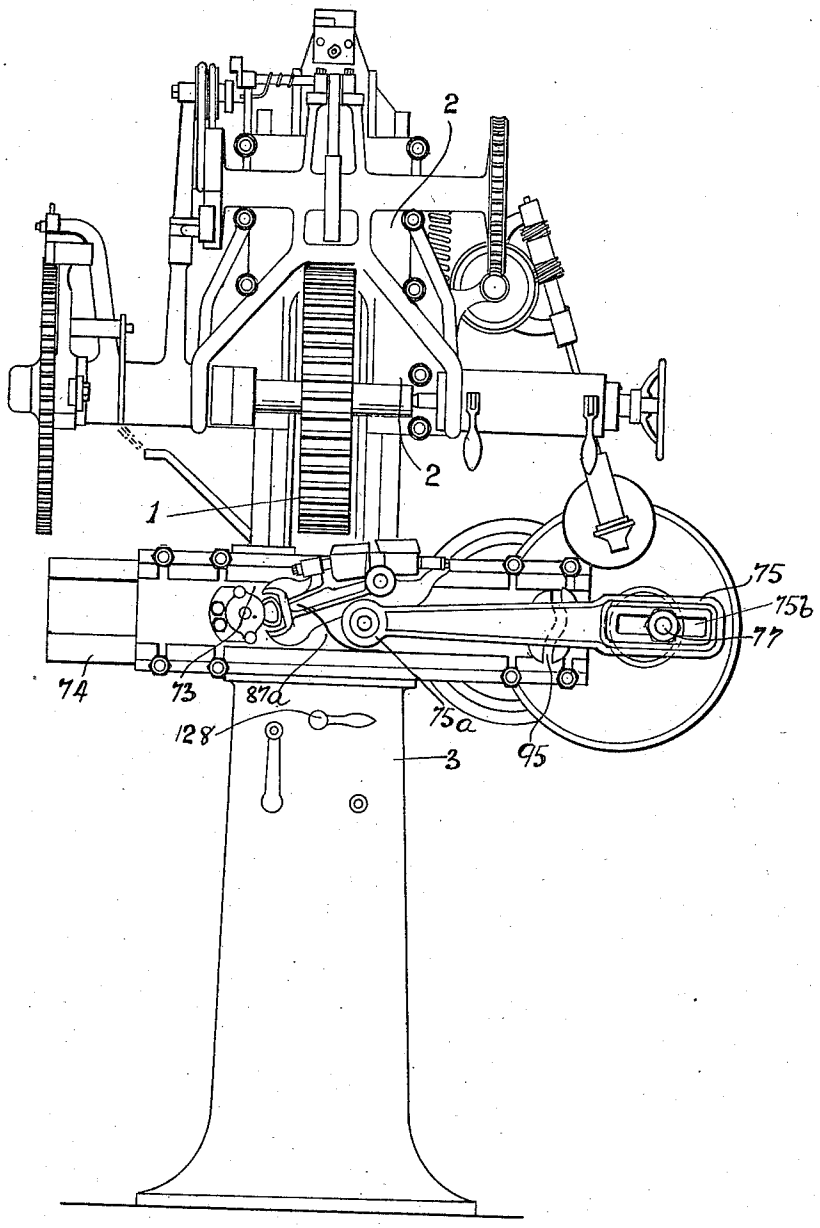
APPLICATION FILED SEPT. 10, 1906.

984,777.

Patented Feb. 21, 1911.

3 SHEETS—SHEET 1.

FIG. 1.



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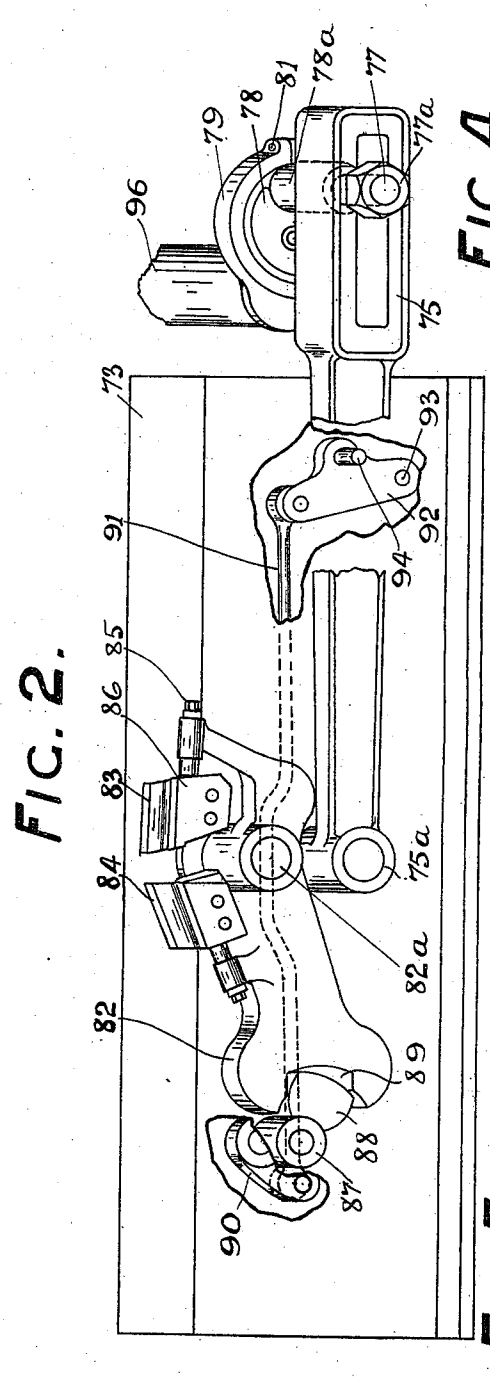

FIG. 2.

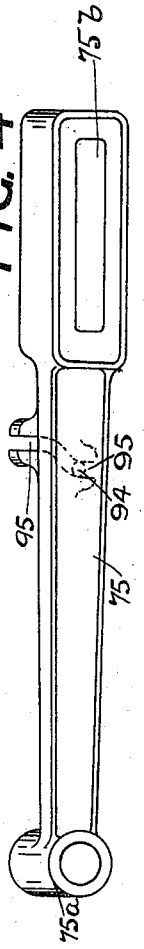

FIG. 4.

FIG. 3.

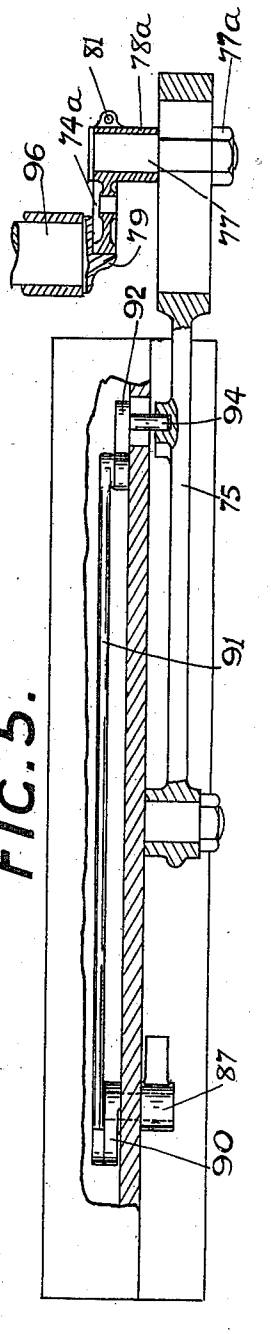

FIG. 5.

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3 SHEETS—SHEET 3.

FIG. 10.

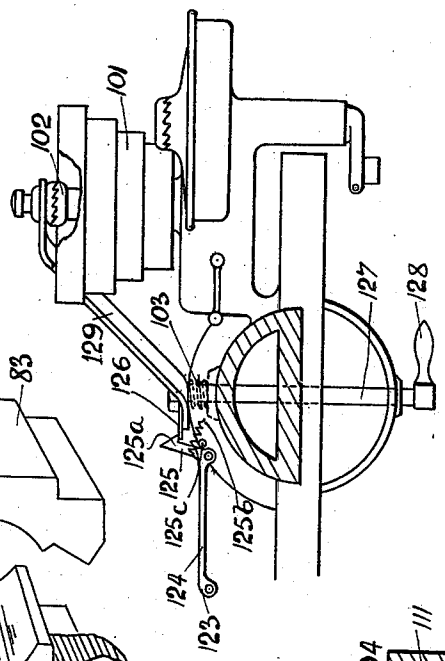


FIG. 8.

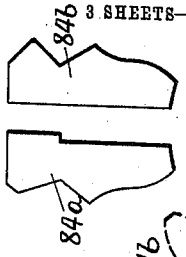


FIG. 7.

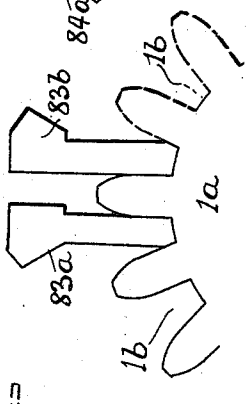


FIG. 6.

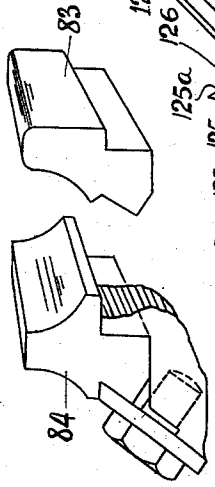
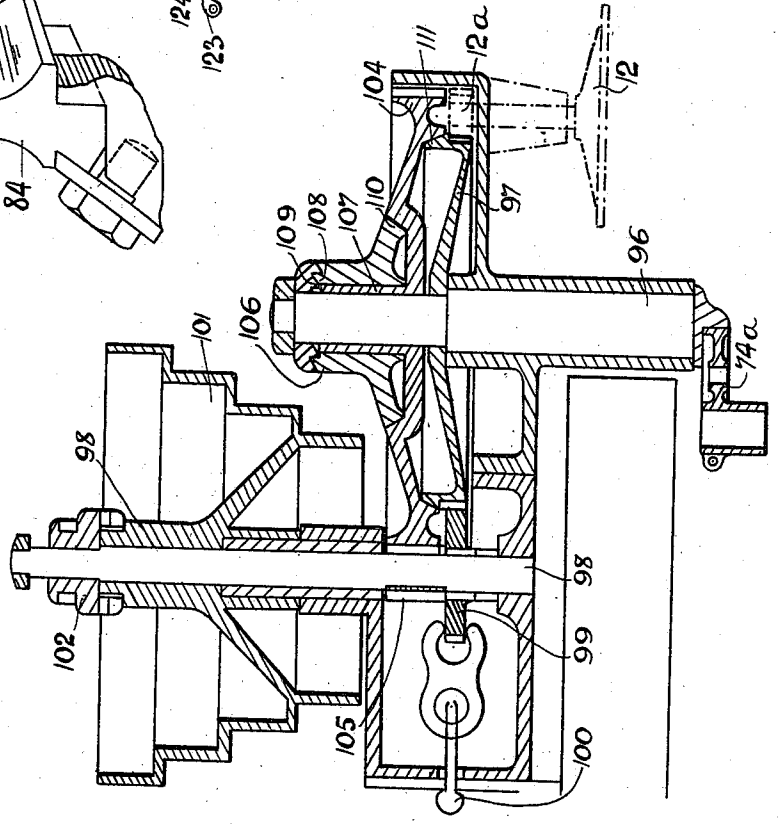


FIG. 9.



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MIKAEL PEDERSEN, OF DURSLEY, ENGLAND.

WHEEL-CUTTING MACHINE.

984,777. Specification of Letters Patent. Patented Feb. 21, 1911.

Application filed September 10, 1906. Serial No. 333,930.

To all whom it may concern:

Be it known that I, MIKAEL PEDERSEN, subject of the Kingdom of Denmark, residing at Raglan House, Dursley, in the county of Gloucester, England, engineer, have invented a certain new and useful Improved Wheel-Cutting Machine, (for which I have applied for a patent in Great Britain, No. 10,353, dated May 3, 1906,) of which the following is a specification.

This invention relates to improvements in machinery for cutting toothed wheels for gearing and the like, and has for its object to increase the working capacity of the machine consistent with simplification of the mechanism and accuracy of the work produced.

In order that this invention may be clearly understood and more easily carried into practice I have appended hereunto three sheets of drawings upon which I have illustrated the nature of my said improvements.

Figure 1 is a front elevation of the machine with the blank in position for cutting. Fig. 2 is a general view of the mechanism for operating the cutters. Figs. 3 and 4 illustrate two of the parts shown in Fig. 2. Fig. 5 is a part sectional plan of the mechanism shown in Fig. 2. Fig. 6 illustrates the forms of tools which are preferably used in conjunction with the improvements. Fig. 7 illustrates the application of twin tools for the cutting of the teeth of wheels of small diameter. Fig. 8 shows the forms of the return tools which are used in connection with the tools illustrated in Fig. 7. Fig. 9 is a sectional plan of the variable gear mechanism which is preferably used in conjunction with the present machine. Fig. 10 is a part sectional plan of the machine.

In carrying this invention into effect the blank 1 to be cut is mounted upon a main slide or saddle 2 which is capable of movement in a vertical direction for the purpose of feed and regulation. The description of the mechanism for feeding and intermittently rotating the blank is omitted from this specification inasmuch as the present invention relates to the cutting mechanism and is independent of any particular method of operating the blank. For the description of a feed mechanism suitable for use in conjunction with the present invention reference may be had to the specification of my United States Patent 959,588, dated May 31st, 1910.

The cutting tools are carried upon a transverse or horizontal slide or table 73 which is mounted to reciprocate upon a bed 74 the latter being bolted or suitably fixed to the bed carrying the saddle 2.

The cutters are mounted upon a tool holder 82 which is pivoted to the slide 73 at 82^a and one cutter 83 is adapted to cut by the forward stroke and take out the central part between the teeth the other cutter 84 having for its purpose to finish the faces in the return stroke. In order to give the pivoted tool holder 82 the change of position necessary for bringing the cutting tools 83 and 84 into and out of the position for cutting, an actuating part 87 is pivoted upon the slide 73 such part 87 being provided with a lug or projection 88 which is adapted to work loosely in a slot 89 in one end of the tool holder 82. An oscillating motion is given to the actuating part 87 by which means it is adapted to alternately bring the tools 83 and 84 to the horizontal position in accordance with the movement of the slide 73 in which position it locks them during the period of cutting through the agency of the lever 92. A spring 87^a may be provided to prevent the objectionable slamming of the projection 88 in the slot 89 during the working of the mechanism.

The slide 73 receives its reciprocating motion from a crank 74^a which is mounted on a shaft 96, such shaft being driven through the medium of a variable gear from a shaft 98 which carries the cone of belt pulleys 101 by which the machine is driven. The crank 74^a comprises a ring or strap 79 which is mounted eccentrically upon the shaft 96 the said strap being adapted to embrace a disk 78 which carries the crank pin 77. The pin 77 is mounted eccentrically in the disk 78 in order to provide for the adjustment of throw of the crank, such adjustment being effected by rotating the disk 78 in the ring 79 until the desired distance between the centers of the pin 77 and shaft 96 is attained, the crank being fixed in the adjusted condition by the bolt 81 which is screwed up for the purpose of locking the whole to form the equivalent of an ordinary crank. A connecting rod 75 is pivoted at its one end 75^a to the slide 73, the other end of such rod being provided with a longitudinal slot 75^b within which the crank pin 77 is fixed by the nut 77^a. The slot 75^b provides for the adjustment of the length of the connecting rod and the crank

pin 77 is mounted to rotate in the boss 78[a] of the disk 78 during the working of the machine.

The mechanism for imparting the oscillating movement to the part 87 is illustrated in Figs. 2, 3, 4 and 5. In such mechanism a lever 92 is pivoted at its one extremity to the slide 73 at 93 and such lever is coupled at its other extremity with an arm 90 of the actuating part 87, the connection being effected through the medium of the connecting link 91. The lever 92 carries a stud or projection 94 upon which a roller may be mounted, and a cam slot 95 is provided on the back of the connecting rod 75 to receive such stud, the oscillating movement of the rod 75 on the center 75[a] being thereby caused to reciprocate the connecting link 91 for the purpose of operating the part 87.

Fixed on the shaft 96 is a spur wheel 97 which gears with a pinion 99 slidably keyed on the shaft 98, the pinion 99 being adapted to be brought into and out of engagement with the spur wheel 97 by a pivoted hand lever 100 or equivalent arrangement for the purpose of changing the speed. The cone of belt pulleys 101 are mounted loosely upon the shaft 98 and may be locked thereto by a sliding ratchet clutch 102 which is keyed to the shaft 98, and is kept in engagement in the manner hereinafter described. A lower gear is provided for, and in this case the shaft 96 receives its motion through the medium of a larger spur wheel 104 which is driven from a smaller pinion 105 fixed to the shaft 98, when the pinion 99 is out of engagement with the spur wheel 97, the power being transmitted from the spur wheel 104 to the shaft 96 through the medium of a clutch 106 which is mounted upon an extension or sleeve 107 upon the said spur wheel 104. The clutch 106 has ratchet teeth 108 at its outer end which bear against similar teeth upon the sleeve 109 which is fixed to the shaft 96, the wedging so produced causing the spur wheel 104 to be locked between the friction faces 110, 111 and thereby locked to the shaft. In the high speed the spur wheel 97 rotates with the shaft 96 and clutch 106 at a greater speed than the spur wheel 104 the latter running free in this case by which arrangement no wedging action takes place the friction faces 110, 111 being in loose contact. The feed mechanism for the blank may be operated from the wheel 97 as for instance by the friction disk 12 which is driven through the medium of the pinion 12[a].

For engaging and disengaging the sliding clutch 102 with the driving belt pulley 101, a longitudinally sliding rod 127 is provided and mounted in bearings in the body of the machine to be operated by a handle 128 (Fig. 10). A suitable coupling part or arm 129 is provided upon the rod 127 and so connected to the clutch 102 that it permits of the rotation of the latter but provides for its displacement by the longitudinal movement of the hand operated rod 127 for the purpose of connecting and disconnecting the clutch and driving belt pulley. A coiled spring 103 is provided upon the rod 127 intermediate to the projection 129 and the body of the machine to normally retain the clutch 102 out of engagement and such clutch 102 may be held in engagement against the action of the spring 103 during the working of the machine by a ratchet hook 125[a] upon the one arm 125 of a double lever 124, such hook engaging with a suitable projection 126 which is mounted upon the rod 127 and may be formed in one with the aforementioned coupling part or projection 129. The double lever 124 is suitably pivoted upon the body of the machine and a coiled or other spring 125[b] is provided and adapted to normally retain it in the required position against a stop 125[c], whereby the starting of the machine may be effected by bringing the projection 126 into engagement with the ratchet hook 125[a] through the medium of the handle 128. The arm 123 of the lever 124 may be coupled with the mechanism for intermittently rotating the blank in such a manner as to provide for the automatic disconnection of the clutch 102 when the cutting of a wheel is complete.

The cutting tools are formed more or less to the shape of the slots between the teeth as shown in Fig. 6, in which 83 is the forward cutter and 84 the return cutter. When toothed wheels 1[a] (Fig. 7) of small diameter are under the operation of cutting it may be necessary in cases where the machine is working at a high speed, to substitute for the tool 83 cutting during the forward stroke, twin tools 83[a] and 83[b], and for the tool 84 cutting during the return stroke, the tools 84[a] and 84[b] (Fig. 8) so that the required amount of backing off or clearance is obtained with each cut as in the case of wheels of large or normal size, the reasons for this modification being that the recesses 1[b] (Fig. 7) between the teeth of small wheels are parallel or approximately so for a part of their depth such part consequently being in continual contact with the sides of the ordinary cutters if such are used, through which contact the metal of the blank is liable to adhere to the cutter, the friction produced being detrimental to the production of a clean cut. The cutting tools 83, 84 or 83[a], 83[b] and 84[a] 84[b] are preferably of the same section for the whole of their length and are suitably shaped at their base to be held in the tool holders, such form necessitating their grinding only across the cutting end and rendering them of the same form or shape until they are worn out. For the purpose of holding the cutting tools in the

proper position, the tool holder 82 is formed to fit their base in such a manner that they may be pushed forward so as to compensate for the grinding, by means of screws 85 or the like and they are preferably kept in position by plates 86 which are bolted to the tool holder 82.

Claim:—

In a wheel cutting machine, a bed, a slide, means causing the slide to reciprocate on the bed, an oscillating tool holder pivoted to the slide and having a slotted part at one end, two cutters mounted on the tool holder, an oscillator pivoted to the slide and having a lug contained in the slotted part of the tool holder, a lever pivoted at one extremity to the slide, means connecting the lever to the oscillator, and means actuating the lever to rock the oscillator and tool holder bringing the cutters alternately into operative relation with the work.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

MIKAEL PEDERSEN.

Witnesses:

THOS. SANDERS,

ERNEST A. VESSEY.