June 17, 1930. J. W. SNARRY 1,764,901

TRIMMING MECHANISM FOR GRINDING WHEELS

Filed Oct. 14, 1929 2 Sheets-Sheet 1

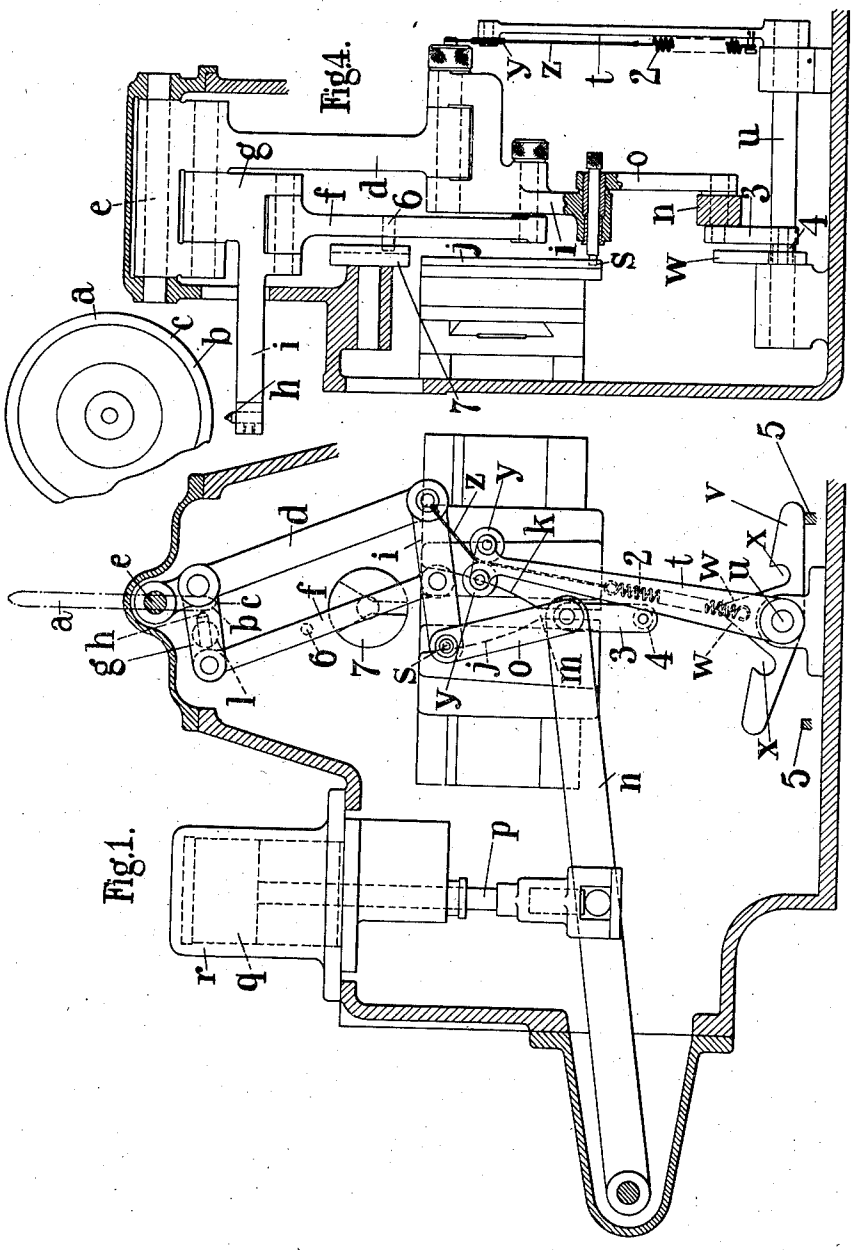


Fig.4.



Fig.1.

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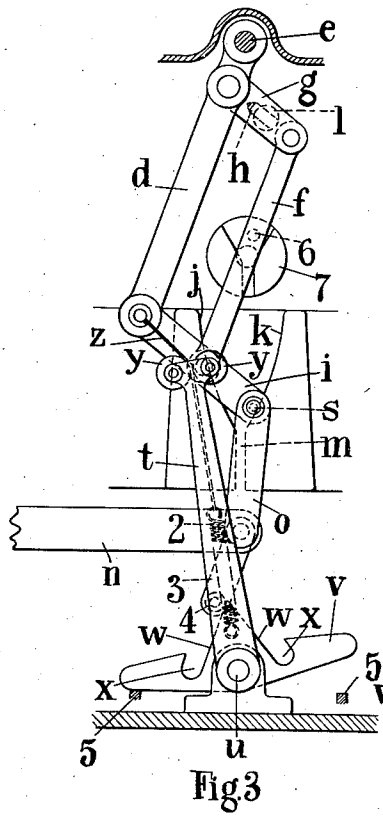


Fig.3

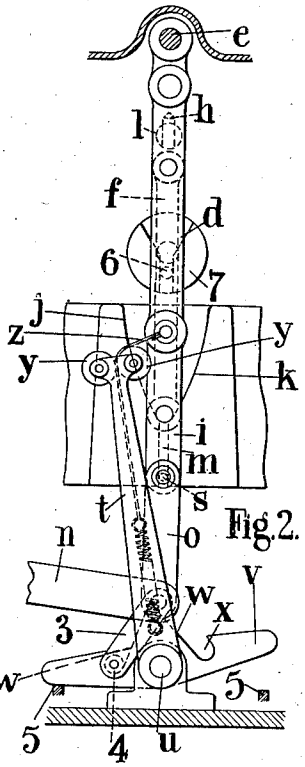


Fig.2.

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# UNITED STATES PATENT OFFICE

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## TRIMMING MECHANISM FOR GRINDING WHEELS

Application filed October 14, 1929, Serial No. 399,675, and in Great Britain December 15, 1928.

In the grinding of such mechanical parts as gear wheels, spline shafts and the like by means of suitably shaped grinding wheels, it is usual to employ trimming mechanisms for periodically restoring the contour of the wheels by a diamond or other hard tool, the motion of which is determined by a pantagraph mechanism co-operating with a templet. Hitherto a pair of trimming tools have been used for operating on the two principal faces of the grinding wheel, and a separate pantagraph mechanism has been necessary for actuating each tool. The object of the present invention is to simplify the trimming mechanism by enabling a single tool and pantagraph mechanism to effect the trimming of both of the principal faces of the grinding wheel.

The invention comprises the combination of a single pantagraph mechanism, a trimming tool carried at a suitable position on the mechanism, a pair of templets the operative parts of which engage the pantagraph mechanism alternately, and means for moving the said mechanism past its central position out of engagement with one templet into engagement with the other.

In the two accompanying sheets of explanatory drawings:—

Figure 1 is a front elevation of a pantagraph mechanism constructed in accordance with this invention.

Figures 2 and 3 are front elevations showing the main portion of the mechanism in two different positions.

Figure 4 is a side elevation of the mechanism.

In the application of the invention as shown to the trimming of a grinding wheel *a* having an operative surface *b* formed on each side adjacent to the periphery *c* of the wheel, I employ a pantagraph mechanism comprising a main link *d* attached at its upper end to a fixed pivot *e*, a subsidiary link *f* arranged parallel with the main link, a lever *g* joining the upper ends of the main and subsidiary links and carrying the trimming tool *h*, and a lever *i* joining the lower ends of the link and co-operating with a pair of templets *j*, *k*. The trimming tool *h* on the upper link *g* consists of a diamond or other hard substance mounted on one side of a bar *l* (Figure 4) rigidly secured to and extending from one side of the link at a suitable position between the ends of the link. The two templets correspond in form to the shape required on the wheel, and they are disposed with their inner operative edges adjacent to each other, the templets being conveniently separated at their lower ends by a gap *m*. Motion is imparted to the mechanism by an operating lever *n* connected by a link *o* to the lever *i* which co-operates with the templets and is actuated by a rod *p* connected to a piston *q* in a hydraulic cylinder *r*.

Whilst a roller or lateral projection *s* on the lower lever *i* is traversing the operative edge of one of the templets, for example *j* (Figure 1), the tool *h* moves in the required manner across one of the faces of the grinding wheel *a*. When the said projection *s* reaches the lower end of the templet it enters the gap *m* above mentioned, and all the members of the pantagraph mechanism then occupy a vertical central position as shown in Figure 2; also the tool has moved out of contact with the grinding wheel. To move the mechanism past the central position I employ a lever *t* pivoted at *u* and secured to another lever *v* which is formed with a pair of relatively inclined edges *w* and recesses *x*. The upper end of the lever *t* carries a pair of rollers *y* between which passes a wire cable or other flexible member *z* which at one end is attached to the junction of the lever *i* and link *d* and at the other end is attached to a spring 2. The latter is attached to the lever *t*. Also on the end of the lever *n* adjacent to the link *o* is pivoted a depending member 3 provided at its lower end with a projection 4 which can slide down the inclined edges *w* of the part *v* and engage either of the recesses *x*. Further, on the link *f* a projection 6 is provided to engage a slotted member 7 fixed on the machine. The slot in the part 7 is made of the shape shown. The projection 6 moves into and out of the slot during the movements of the link *f*. Starting with the mechanism in the position shown in Figure 1, when the lever *n* approaches the lower part of its movement, the projection 4

slides down the left hand edge *w* until it engages the left hand recess *x*. Continued motion of the lever *n* causes the member 3 through the projection 4 to rock the levers *v*, *t* over as shown in Figure 2. Meanwhile the pantagraph mechanism has reached the vertical position shown in Figure 2, and the projection 6 has entered the narrow part of the slot in the part 7. In this position there is sufficient tension in the spring 2 to exert a pull on the lower end of the link *d* in the left hand direction, and the mechanism then rocks about the part 6. During the return, or upward, movement of the lever *n* the projection *s* slides up the gap *m* and along the curved surface of the other templet *k* and the tool *h* traverses the opposite side of the wheel *a*, as shown in Figure 3. In this motion the projection 4 slides up the left hand inclined edge *w* and eventually leaves that edge. After the upward motion has been completed the lever *n* returns, causing the projection *s* to slide down the templet *k* until the pantagraph mechanism again assumes the vertical position. Meanwhile the projection 4 passes down the right hand inclined edge *w* and eventually engages the right hand recess *x*, when the levers *v* and *t* are rocked over to the right hand side. The member *z* now exerts a pull towards the right hand side on the part *d*, so that when the lever 4 again rises, the projection *s* will be caused to follow the edge of the templet *j*. At either limit of movement of the lever *v* it rests on stops 5.

The invention is particularly advantageous for use in forming convex faces on the grinding wheels used for operating on internally toothed wheels, but is also applicable with advantage to the treatment of wheels having concave or other grinding faces.

The invention is not limited to the example above described, and subordinate details may be varied to suit different requirements.

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

1. In trimming mechanisms for formed grinding wheels used in grinding gear wheels, spline shafts and the like, the combination of a single pantagraph mechanism, a trimming tool carried at a suitable position on the mechanism, a pair of templets the operative parts of which engage the pantagraph mechanism alternately, and means for moving the said mechanism past its central position out of engagement with one templet into engagement with the other, substantially as described.

2. In trimming mechanisms for grinding wheels as claimed in claim 1, a pantagraph mechanism comprising a pair of pantagraph links, and a pair of levers connecting the upper and lower ends of the links, a trimming tool on the upper of the said levers, an operating lever connected to the lower of the said levers, a pair of templets, a projection on the above mentioned lower lever co-operating with the templets, a rocking lever, means comprising a spring and flexible member for connecting the rocking lever to the pantagraph mechanism, and means in combination with the pantagraph mechanism or its operating mechanism for actuating the rocking lever and thereby moving the pantagraph mechanism through its central position, substantially as described.

In testimony whereof I have signed my name to this specification.

JOHN WILDSMITH SNARRY.