This invention relates to a method of grinding cylindrical workpieces between two grinding discs.

In the grinding of cylindrical workpieces of great length, it is well-known to impart to the work a rotation about and at the same time a feed motion in the direction of their longitudinal axis and thus pass them between two belt-driven grinding discs which rotate in opposite directions and which, theoretically, ought to have the same number of revolutions. It has been found, however, that it is extremely difficult and practically impossible to continually grind the work to exactly the same unvarying diameter, because grinding discs running at top speed cannot be balanced and dressed so as to operate always without the slightest deviation in circumferential direction.

The more or less uneven grinding of the work pieces is due to the fact, not recognized hitherto, that the position of those points of both discs which during rotation of the latter simultaneously contact with the work gradually varies owing to irregular slipping of the driving belts.

This gradual displacement of the points of impact involves a change of distance between the two discs. If, for example, the highest points of both discs meet when contacting with the work, the narrowest space between the discs during one revolution will be at its minimum.

On the other hand, if the highest point of one disc coincides with the lowest point of the other in contacting the work, the narrowest space possible between them will be at its maximum.

The result is that the work is gradually alternately ground to a smaller and larger diameter and constant maximum accuracy in grinding is unobtainable.

It has already been proposed to increase working accuracy in machines for grinding cylindrical work between two circumferentially acting grinding discs or between a rotating grinding disc and a non-grinding companion disc by driving both discs at different speeds. This method, however, is open to the objection that the work does not receive any special individual drive and its direction of rotation is determined by the grinding or companion disc.

In the grinding of cylindrical work to which independent rotation is imparted while they are fed between two circumferentially acting grinding discs rotating in opposite directions, the above-mentioned difficulties are overcome by driving the discs at different circumferential speeds and the work in the same direction as the disc running at lower speed in such a manner that the circumferential speed of the work is equal to one-half, or approximately so, of the difference in speed of the two discs.

In this way, the complete change in the position of the points of contact of both discs with the work is effected in so short a time that during this period the work is fed only a very short distance amounting at most to a fraction of the width of the disc. Owing to this measure, the work is ground over its whole length to a uniform diameter. Furthermore, in order to obtain equal cutting speed of both discs in spite of their different circumferential speeds, the work is rotated so that it moves at a corresponding circumferential speed in the same direction as the slower running disc. Due to their equal, or approximately equal, cutting speed, both discs show uniform wear notwithstanding their unequal circumferential speeds, so that the mechanical adjustment of the discs is not rendered difficult.

The invention is illustrated, by way of example, in the accompanying drawing which shows a diagram for explaining the method.

Referring to the drawing, a and b are two grinding discs rotating, respectively, at slower and higher speed, and c is a work piece which is independently rotated in the same direction as the disc a while being simultaneously advanced in its longitudinal direction. The greater the difference in speed of the two discs a and b the more quickly will be the change of the points of contact of the discs with the work c. For example, if the disc a makes 1,500 revolutions per minute and the disc b 1,800, each point of the circumference of the disc a will meet each point of the circumference of the disc b 300 times each minute or 3 times each second in establishing contact with the work c so that the spacing of the discs is constantly and rapidly compensated and the work is continually ground to uniform thickness over its entire length.

To provide for equal, or approximately equal, cutting speed in spite of the different circumferential speeds of both grinding discs the work c has imparted to it a rotation of its own by an independent drive at corresponding speed in the same direction as the disc a. Assuming that each disc in the example mentioned has a circumference of one metre, the circumferential speed of the discs a and b will be, respectively, 25 and 30 metres. When the work c in this instance is rotated at a circumferential speed of 2.5 metres per second, the cutting speed of the disc a will be 25+2.5 m/sec. and that of the disc b 30+2.5 m/sec.
Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

A method of grinding cylindrical work pieces between two circumferentially acting grinding discs, comprising imparting to the work an independent rotary motion about and at the same time a feed motion in the direction of its longitudinal axis, passing the work thus operated between the two grinding discs while rotating these discs in opposite directions at different speeds, causing the rotation of the work to take place in the same direction as that of the slower moving disc and at such a speed as to produce a substantial compensation of the different cutting speeds of the two grinding discs due to their different circumferential speeds.

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