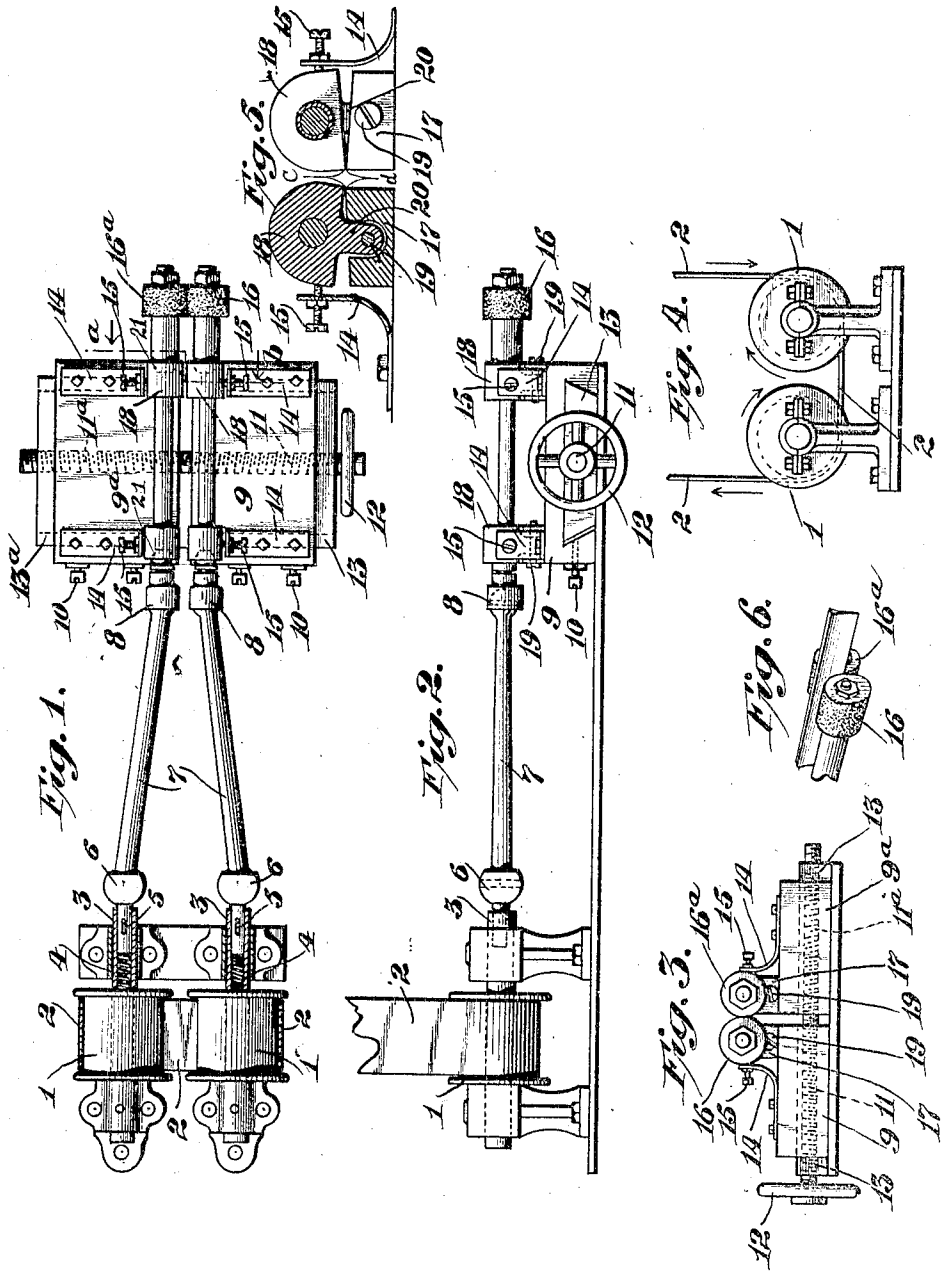
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H. L. HENRY & W. ALTHOFF.

GRINDING MACHINE.

APPLICATION FILED FEB. 23, 1906.



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HORACE LYNFORD HENRY AND WALTER ALTHOFF, OF GENEVA, NEW YORK.

GRINDING-MACHINE.

No. 849,391. Specification of Letters Patent. Patented April 9, 1907.

Application filed February 23, 1906. Serial No. 302,374.

To all whom it may concern:

Be it known that we, HORACE LYNFORD HENRY and WALTER ALTHOFF, citizens of the United States, and residents of and whose post-office addresses are Geneva, in the county of Ontario and State of New York, have invented certain new and useful Improvements in Grinding-Machines, of which the following is a specification.

Our invention relates to improvements in grinding-machines, and especially to grinding-machines in which the work is intended to be held between two wheels each grinding opposite faces.

The objects of our invention are to provide a simple, durable, inexpensive, effective machine easily operated and capable of nice adjustment, both manual and automatic. We attain these objects by the devices described and illustrated in the accompanying specification and drawings.

Figure 1 is a plan view of the principal elements of our machine. Fig. 2 is a side elevation of the same. Fig. 3 is a front end elevation omitting the driving-pulleys and belt. Fig. 4 is a rear end elevation showing only the driving-pulleys, belt, and bearings. Fig. 5 is a detail view of the pivoted bearings carrying the grinding-wheel arbors, partly in section, on the line *a b*, Fig. 1, and showing the pressure-springs. Fig. 6 is a perspective view of the grinding-wheels with a razor-blade between the same.

Referring to the figures, 1 1 are the driving-pulleys; 2, the belt passing around both pulleys, thus driving them in the same direction; 3 3, sleeves forming a part of the driving-shafts; 4 4, springs to maintain longitudinal pressure on the balls and sockets of the connecting-rods; 5 5, slots containing pins secured in the sleeves 3, by which arrangement longitudinal motion is permitted without interfering with the rotation of the parts.

6 6 and 8 8 are ball-and-socket joints permitting angular relation between the various parts of the driving mechanism.

7 7 are connecting-rods to transmit motion between the pulley-shafts and grinder-arbors.

9 9^a are sliding carriages carrying the bearings and grinder-shafts and sliding upon the beveled table 13.

10 10 are adjusting-screws to clamp or adjust the motion of the carriages on the table.

11 11^a is a right-and-left screw by which the carriages 9 9^a are moved by the wheel 12 toward or away from each other at the will of the operator.

14 14, &c., are springs bearing against the pivoted bearing-blocks 18 18.

15 15 are adjusting-screws for regulating the tension of the springs.

16 16^a are the grinding-wheels; 17 17, the bases or lugs supporting the bearing-blocks 18; 19 19, pivot-screws on which the tongues 20 20 oscillate and by which they are secured in the bases 17.

21 21 are cone-bearings for the grinding-shafts.

Heretofore in grinding-machines the grinding-wheels have maintained a more or less rigid relation to each other, generally only capable of manual and definite adjustment, and in the case of grinding razors making it impossible to satisfactorily grind an oval bevel, which is necessary in a full concave razor. This has been done in the past by hand. It is important that there should be an opportunity for automatic adjustment as well, so that inequalities of speed, shape of wheels, or in the material operated upon may be provided for by means not dependent upon a fixed relation of the grinding-surfaces or mere manual skill. Moreover, it is often desirable that different-sized wheels may be used on the same machine. At the same time the drive should be direct and positive and capable of high speed.

We prefer to drive our wheels in the same direction and use a single belt passing about both driving-pulleys, which are of course mounted in fixed bearings. This insures equal speed in the two driving-pulleys. It is evident that if wheels are used of such size that the shafts, connecting-rods, and arbors are all in line then when smaller wheels are used and the carriages 9 9^a are screwed nearer each other these connecting-rods will lie at an angle to each other, (the arbors and pulley-shafts necessarily always remaining parallel.) To permit this change in relation, means must be employed to transmit the motion of the pulleys to the grinders irrespective of the difference in angular direction and

the ensuing difference of distance between the source and point of application of the power in the organized machine. We prefer to employ the well-known ball-and-socket joints and rigid connecting-rod, having found that the ordinary universal joints or flexible shafting are impracticable at high speeds such as are necessary to attain our ends. We sometimes employ a speed as high as six thousand revolutions per minute. The springs 4 insure sufficient pressure in the ball-and-socket joints, and the cones 21 accommodate any thrust.

The lugs or bases 17 are secured to or may be integral with the carriages 9 9^a, and to these lugs the bearing-blocks 18 are movably secured as follows: The tongue 20, which is preferably an integral part of the bearing-block 18, is mounted on the pivot 19, held in the lug 17 in such a way that the bearing-block 18 is free to rock thereon. The construction is such, however, that the motion of the arbor-bearings toward each other is limited to the contact of the edges *c d*, Fig. 5, and these bearings are normally held in that position by the resilience of the springs 14, but are capable of considerable motion away from each other against the resistance of the springs.

The operation of the device is: By means of the wheel 12 and screw 11 11^a we adjust the wheels 16 16^a against a razor or other blade to be ground. The belt 2 turns the pulleys 1 at the same speed and in the same direction. The motion is transmitted at an angle through the ball-and-socket joints 6 8 and connecting-rods 7 to the arbors running in the bearings 18, the springs 4 preserving the thrust on the driving elements. The springs 14, pressing against the bearings 18, tend to keep the wheels 16 normally at the point determined by the adjusting-screws 15; but they yield sufficiently to allow the bearings 18 to oscillate away from each other, as may be necessary during the operation of grinding, thus securing an even grind, which is especially important in grinding certain forms of beveled razors and which has been heretofore difficult or impossible to accomplish except by hand. It will also be seen that it is impossible for the bearings to be moved or jarred nearer together than the distance set by the right and left screw 11 11^a, as the rocking motion is away from the blade. This obviates any chance of cutting the blades thin in spots.

We do not limit ourselves to the exact form, dimensions, or arrangement of the elements of devices here shown, as they are only our preferences.

Where we have used the word "flexible" we mean by that to include such connections as permit the arbors to be moved to or from each other out of the line of the driving-shafts, while yet transmitting the motion of the latter, and thus may include different forms of joint or other connections capable of being bent; but

What we do claim, and desire to secure by Letters Patent, is—

1. The combination of a plurality of driving-pulleys actuated by a single belt passing about both in the same direction; pulley-shafts having a sleeve, and internal springs; driving-arbors movably secured to said sleeves and abutting against said springs; grinding-arbors running in cone-bearings; connecting-rods provided with ball-and-socket joints connecting the driving-arbors and grinding-arbors; movable carriages carrying bearing-lugs; bearing-blocks pivotally secured to the lugs so as to admit of a rocking motion away from the opposite ones; springs adjustably bearing against said bearing-blocks; and a right-and-left-handed screw controlling the carriages and adapted to regulate their relation.

2. The combination of a plurality of driving pulleys and shafts equally driven and revolving in the same direction; grinding-arbors; and ball-and-socket connections joining the driving-shafts and grinding-arbors; bearings holding the grinding-arbors, pivotally mounted upon oppositely-adjustable carriages; adjustable springs bearing against said bearings, and a screw adapted to adjust the position of the carriages.

3. The combination of driving-pulleys and shafts; grinding-arbors; flexible connections between the shafts and arbors; movable bearings holding the arbors, mounted upon oppositely-movable carriages, and adjustable means mounted on said carriages for automatically resisting the separation of the bearings; and means for adjusting the carriages.

4. The combination of arbors; oppositely-movable carriages carrying oppositely-movable bearings holding the arbors; resilient means mounted on said carriages for automatically resisting the separation of the bearings; means for communicating motion to the arbors, and means for adjusting the carriages.

5. In an abrading-machine, oppositely-movable bearings holding arbors mounted on oppositely-movable carriages; resilient means interposed between the carriage and the bearing adapted to resist the separation of the bearings, and means for adjusting the relative position of the carriages.

6. In an abrading-machine, bearings carrying grinding-arbors pivotally mounted upon carriages; resilient means mounted on said carriages adapted to automatically resist the separation of the bearings, and means for adjusting the relation of the carriages.

7. The combination of oppositely-movable carriages; bearings pivotally mounted thereon carrying arbors, and springs interposed

between the bearings and the carriages adapted to normally and automatically resist the separation of the bearings.

8. The combination of transversely-movable carriages; bearings carrying grinding-arbors pivoted thereon; means for adjusting the carriages, and adjustable resilient means interposed between the bearings and the carriages adapted to automatically resist the separation of the bearings.

9. In a grinding-machine, transversely-movable spring-regulated pivoted bearings carrying grinding-arbors mounted on transversely-movable carriages, and means for adjusting the same.

10. In a grinding-machine, the combination of fixed driving-shafts, transversely-movable oppositely-disposed and spring-adjusted grinding-arbors, and flexible connections between the shafts and arbors.

11. The combination of a plurality of shafts equally driven and revolving in the same direction; arbors; flexible connections between the shafts and arbors; oppositely-adjustable carriages supporting pivotally-mounted bearings holding the arbors, and adjustable springs bearing against said bearings, and means for adjusting the position of the carriages.

Signed at New York, in the county of New York and State of New York, this 19th day of February, 1906.

HORACE LYNFORD HENRY.

Witnesses:
HENRY S. REYNOLDS,
A. M. SEIDLER.

Signed at Geneva, in the county of Ontario and State of New York, this 20th day of February, 1906.

WALTER ALTHOFF.

Witnesses:
E. J. CORK,
F. D. WHITWELL.