(No Model.)

F. O. FRY.

ROLL GRINDING MACHINE.

No. 461,828. Patented Oct. 27, 1891.

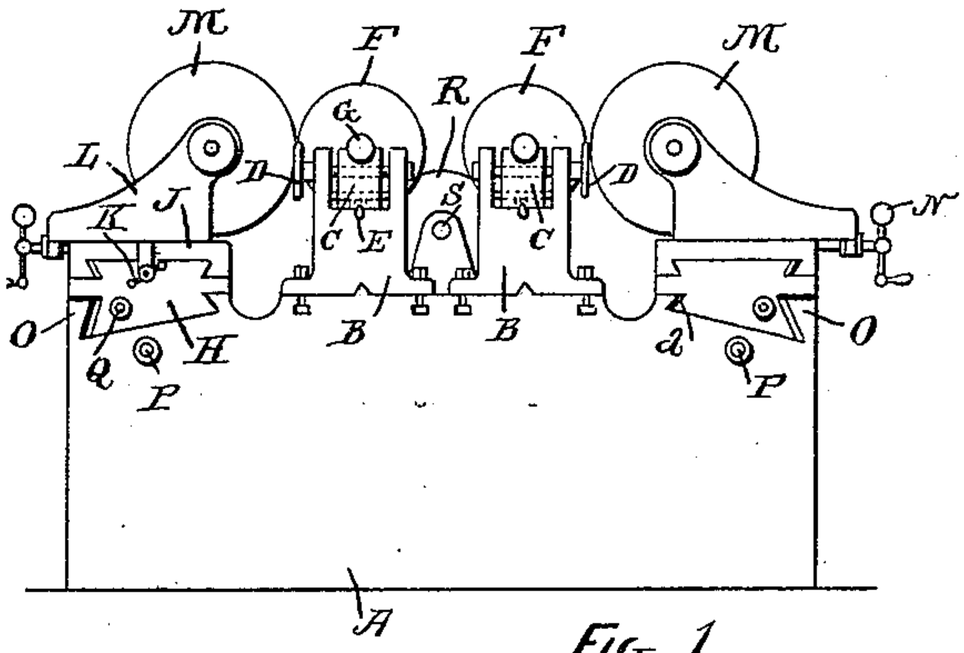

Fig. 1.

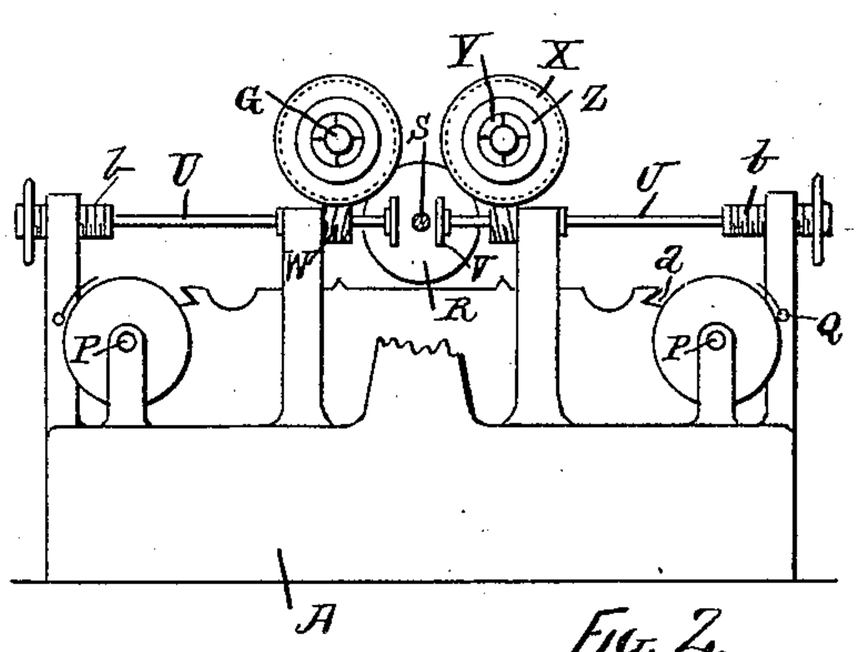

Fig. 2.

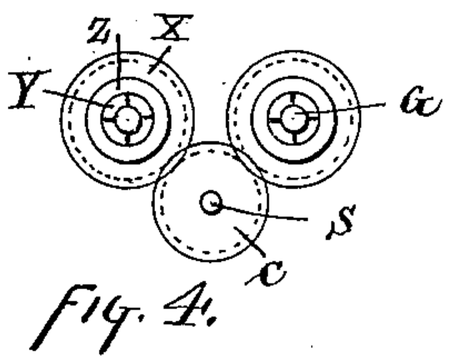

Fig. 4.

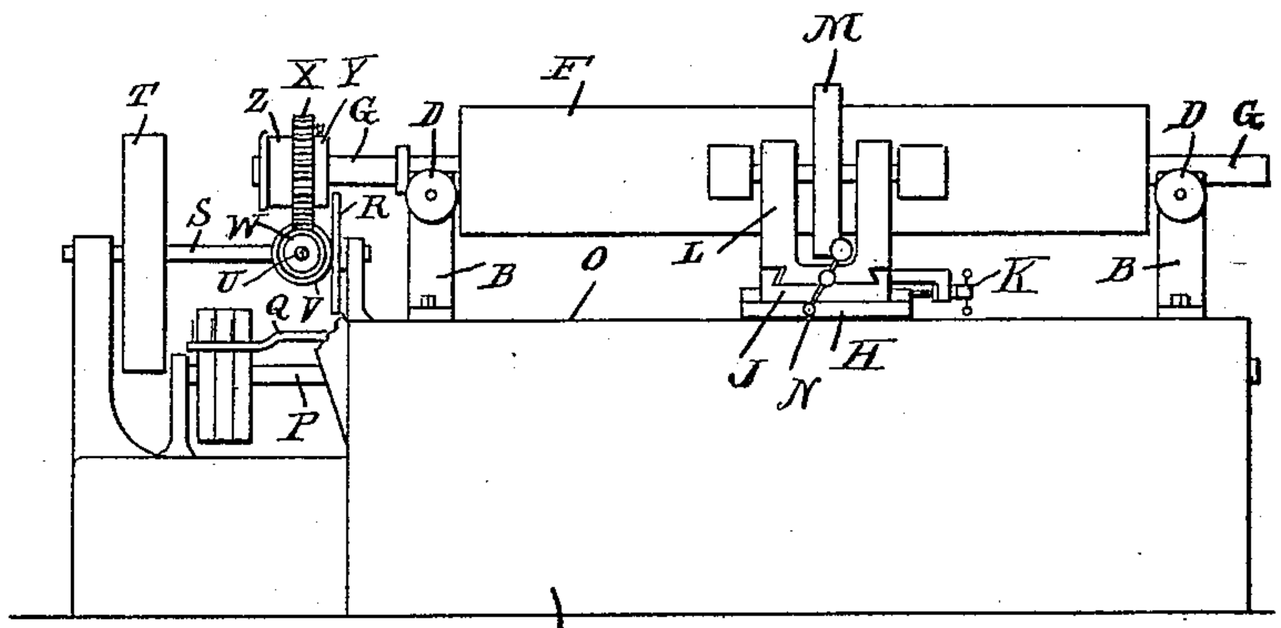

Fig. 3.

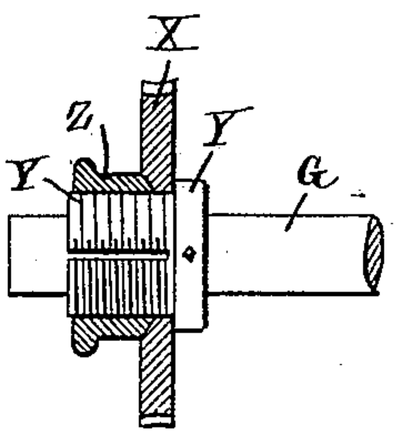

Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANKLIN O. FRY, OF RICHMOND, INDIANA.

ROLL-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 461,828, dated October 27, 1891.

Application filed April 11, 1891. Serial No. 388,603. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN O. FRY, of Richmond, Wayne county, Indiana, have invented certain new and useful Improvements in Roll-Grinding Machines, of which the following is a specification.

This invention pertains to improvements in that class of machines designed for the grinding, by means of rotating and traversing wheels, of cylindrical rolls—such, for instance, as are frequently used by flour-millers and by paper-makers.

My improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is an end elevation (tail end, as at the right-hand of Fig. 3) of a roll-grinding machine exemplifying my improvements; Fig. 2, an end elevation (head end, as at the left of Fig. 3) of the machine with certain parts broken away and with the wheel-carriages omitted; Fig. 3, a side elevation of the machine, with certain brackets for the support of shafts U broken away; Fig. 4 an end elevation (head end, as in Fig. 2) of certain parts illustrating a modification in the driving-gearing, and Fig. 5 a vertical diametrical section through one of the roll-gears.

In the drawings, A indicates the bed of the machine, the machine being what might be called a "double-grinding" lathe, the upper surface of this bed forming appropriate slides to receive the supporting-bearings for the rolls and to receive and guide the carriages, in which are mounted the grinding-wheels; B, two pairs of head-stocks mounted on the bed and fitted for longitudinal adjustment thereon to suit the length of roll being operated upon, these head-stocks being arranged in pairs for the support of the two rolls parallel with each other; C, journal-boxes supported one in the top of each head-stock and adapted for movement therein transverse to the axes of the rolls, these journal-boxes being arranged to fit the journals of the rolls to be operated upon; D, hand-screws mounted in the head-stocks and engaging the journal-boxes, and adapted to effect the transverse adjustment of the journal-boxes in the head-stocks; E, index-pointers on the head-stocks, pointing to graduations on the journal-boxes and adapted to indicate the position of transverse adjustment into which the journal-boxes have been put by means of the hand-screws; F, rolls to be ground, two of them, with their journals running in the journal-boxes C; G, the shafts of the rolls; H, a pair of saddles, one at each side of the machine outside the rolls, fitted to slide along the machine in accurate guideways formed in the bed; J, a slide carried by each saddle and arranged to have a short sliding motion thereon in a direction parallel with the traveling motion of the saddles; K, a screw at each slide for effecting the movement of the slides on the saddles; L, a wheel-housing mounted in each slide and adapted for sliding adjustment therein in a direction at right angles to the path of travel of the saddles; M, the grinding-wheels, usually emery-wheels, one mounted in each wheel-housing, and adapted to be driven by belt, as usual in this class of machines; N, a cross-screw in each wheel-housing for adjusting the housing in and out on its slide; O, guide-ribs, one at each side of the bed and engaged by the saddles, the inner wall of this guide-rib being accurately formed to give to the saddles a traveling movement truly in a right line; P, the usual feed-screws as generally employed in this class of machines, mounted in the bed and engaged by the saddles and adapted to give the longitudinal traveling motion to the saddles, so as to move the grinding-wheels along the rolls; Q, the usual reversing-rod, by means of which the moving saddles automatically reverse their directions of motion at the ends of their trips, these rods acting as usual to shift the belts which drive the feed-screws; R, a driving disk or plate at one end of the machine, with its axis parallel with the rolls; S, the driving-shaft, on which this plate is mounted, this shaft being supported in suitable journal-boxes on the bed; T, the driving-pulley on this shaft to receive a belt to give motion to the rolls; U, a pair of worm-shafts, mounted at the head of the machine, with their axes in the same line and on a level with the axis of the driving-plate, these shafts being at right angles to the shaft S; V, a disk on the inner end of each worm-shaft, the peripheries of these disks engaging the face of the driving-plate and being driven by frictional contact therewith; W, a worm,

splined one to each worm-shaft and supported against endwise motion by bearings upon the bed, the worms thus being revolved by the worm-shafts, while the worm-shafts are capable of sliding in the worms; X, a gear secured upon the shaft of each roll and adapted, when the rolls are in position, to engage the worms W, these gears having a bore larger than the roll-shafts and having the outer ends of their bore beveled, as shown in Fig. 5; Y, a split and threaded hub, fitting or bushed to fit the roll-shaft, its exterior fitting the bore of gear X and having a collar fitting against the inner face of the gear; Z, a nut screwed upon the hub Y and having its inner end beveled to fit the bevel of the bore of gear X; *a*, the slideways in the bed, in which slide the wheel-saddles, the floors of these slideways having a transverse slope downwardly and outwardly; *b*, screw-sleeves mounted in bearings on the bed and forming the outer bearings for the worm-shafts U, and serving as means by which the shafts may be moved endwise to shift the disks V to selected positions upon the driving-plate R.

Hub Y being placed upon the roll-shaft and secured thereto by set-screw, if desired, and nut Z being tightened up, the gear X is truly centered and firmly clamped to the roll. The rolls may then be laid in the journal-boxes with their gears engaging the worms, and the rolls may be readily lifted from place when completed. If the worm system of driving be not desired, then driving-shaft S may, instead of driving through a plate and disks, have fixed upon it a spur-gear, as at *c* in Fig. 4, in which the gears X may engage. The rolls being in place and plate R being in motion, the friction of the disks on the plate drives the worm-shafts and worms, and consequently the rolls, and the disks V may be adjusted to such radial position on the plate as will give to the rolls the desired peripheral speed of rotation, thus permitting the best available speed to be selected for different rolls and permitting the machine to operate at most advantageous speed simultaneously upon two rolls of different diameters. Either disk may be withdrawn beyond the plate, so that either roll may be stopped while the other is running. The grinding-wheels are rotated in the usual manner and their traveling motions and reversal of direction of travel are produced in the usual manner. The grinding-wheels in traveling along the rolls are accurately guided by the guide-ribs O, and the downward outward transverse slopes of the slideways of the saddles cause the saddles to always hug the inner walls of the guide-ribs, thus insuring accuracy of travel. The general in-and-out adjustment of the wheels upon the saddles is effected by means of the cross-screws N. It often occurs that the end corners of the rolls are to be chamfered, and it is not at all convenient to employ a beveled grinding-wheel. Nor is it convenient to effect the chamfering by means of a cross-feeding movement of the wheel in conjunction with the longitudinal traveling motion of the saddle. I therefore provide for such chamfering by means of the slides J and screws K. The saddles being stationary, the two handles K and N may be operated to give simultaneously transverse and longitudinal travels to the wheel-housing, the resultant of which may be the desired bevel or rounding chamfer at the corner of the roll.

In grinding chilled-iron rolls, especially corrugated mill-rolls, great wear occurs to the grinding-wheels as they move along the roll, and consequently a parallel setting of the axis of the rolls with the guide-ribs will not produce a cylindrical roll. I overcome this defect by so adjusting the hand-screws D as to throw the rolls out of parallelism with the guide-ribs, whereby the grinding-wheels will commence their trips with cuts tending to increase in depth as the wheels proceed along the rolls, the wear of the wheels compensating for the obliquity of roll-setting. When such trip is completed, then the initial end of the roll is moved outward and the return trip of the wheel made, and so on, the adjustment of cut of wheel thus being effected by adjusting the roll instead of the wheel. This method, by reason of its gentleness, also avoids those peculiar fractures of the grinding-wheels which are found to result from the usual method of adjusting the wheels inwardly to their work by tapping upon the cross-screws N with a mallet.

The journal-bearings of roll-grinding machines have heretofore been mounted for transverse adjustment by means of two set-screws at each bearing; but such arrangement will not realize my invention, as the adjustment cannot be made while the wheel is cutting. The adjustments must be made and fastened before the wheel is started in its cut, while in my device the gentle transverse adjustment may be made during the trip of the wheel. In the old arrangement the slacking of an adjusting-screw would leave the bearing loose till the opposite screw was tightened, thus positively prohibiting the use of the screws for delicate adjustments while the machine was working. I disclaim the double set-screw arrangement.

I claim as my invention—

1. In a roll-grinding machine, the combination, substantially as set forth, of a bed, a wheel-carriage and grinding-wheel arranged for longitudinal motion thereon, a pair of head-stocks mounted on the bed, journal-boxes mounted fixedly in the head-stocks and arranged for transverse adjustment therein, a single hand-screw at each head-stock for adjusting the journal-boxes transversely in the head-stocks, and mechanism for rotating the roll supported in the journal-boxes and for rotating and longitudinally moving the grinding-wheel, whereby the bearings may be properly adjusted while the wheel is cutting.

2. In a roll-grinding machine, the combina-

tion, substantially as set forth, of a single bed provided with a guide at each side, two pairs of head-stocks mounted thereon and arranged to support two rolls to be ground, two wheel-carriages and grinding-wheels arranged for longitudinal travel independently along said guides, one at each side of the bed, and mechanism for rotating two rolls supported by the head-stocks and for rotating and longitudinally moving the two grinding-wheels.

3. In a roll-grinding machine, the combination, substantially as set forth, of a bed, a pair of head-stocks mounted thereon to support a roll, a wheel-carriage and grinding-wheel arranged for longitudinal movement upon the bed along such roll, a rotating driving-plate, a disk with its periphery engaging the face of said disk, gearing connecting the roll with said disk, and means for adjusting said disk radially on said driving-plate.

4. In a roll-grinding machine, the combination, substantially as set forth, of a bed, a pair of head-stocks arranged to support a roll to be ground, a wheel-carriage and grinding-wheel arranged for longitudinal movement upon said bed along such roll, a toothed gear secured directly to the shaft of said roll, and driving mechanism disposed below said roll and engaging the lower portion of said wheel.

5. In a roll-grinding machine, the combination, substantially as set forth, of a bed having a guide-rib and slideway, the floor of the slideway sloping downwardly and outwardly toward the inner face of said guide-rib, a wheel-carriage and grinding-wheel arranged for longitudinal motion in said slideway, a pair of head-stocks arranged to support a roll, and mechanism for rotating such roll and grinding-wheel and for moving the grinding-wheel carriage along the slideway.

6. In a roll-grinding machine, the combination, substantially as set forth, of a bed, a traveling wheel-carriage and grinding-wheel, a pair of head-stocks arranged to support a roll, mechanism for rotating such roll through the medium of gearing, a threaded split and collared hub upon the shaft of said roll, a gear mounted on said hub and having a bevel counterbore, and a bevel-ended nut engaging said hub and gear.

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