(No Model.)

2 Sheets—Sheet 1.

L. DORN.

MACHINE FOR GRINDING PRINTING AND LITHOGRAPHIC INK.

No. 511,292. Patented Dec. 19, 1893.

Fig: 1.

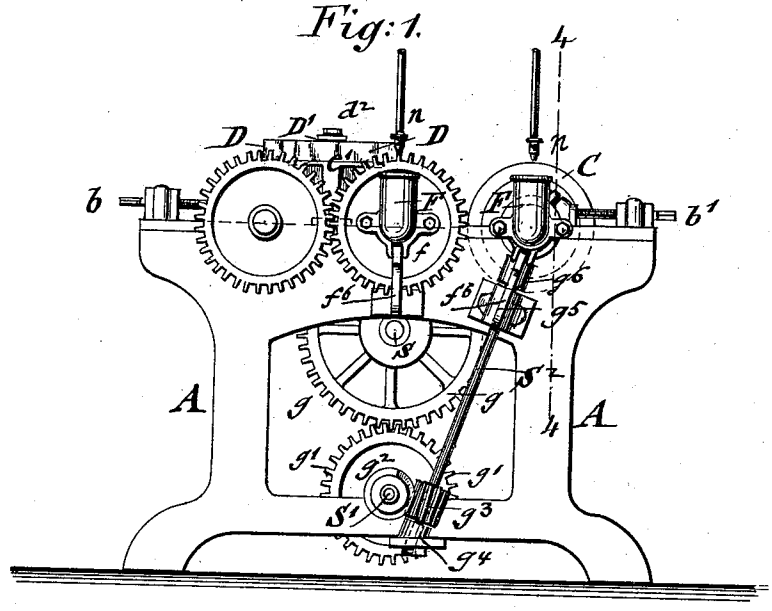
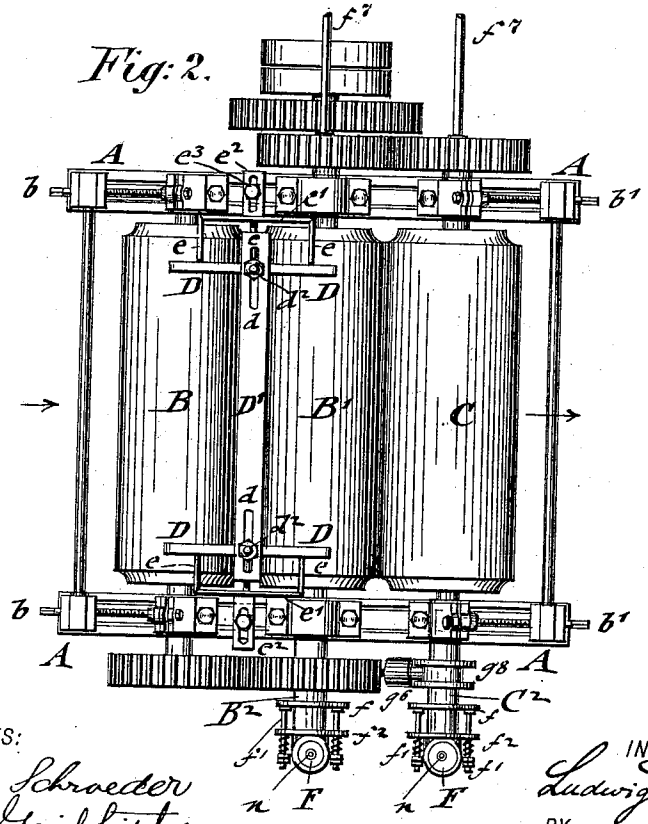


Fig: 2.



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(No Model.) 2 Sheets—Sheet 2.

L. DORN.

MACHINE FOR GRINDING PRINTING AND LITHOGRAPHIC INK.

No. 511,292. Patented Dec. 19, 1893.

Fig: 3.

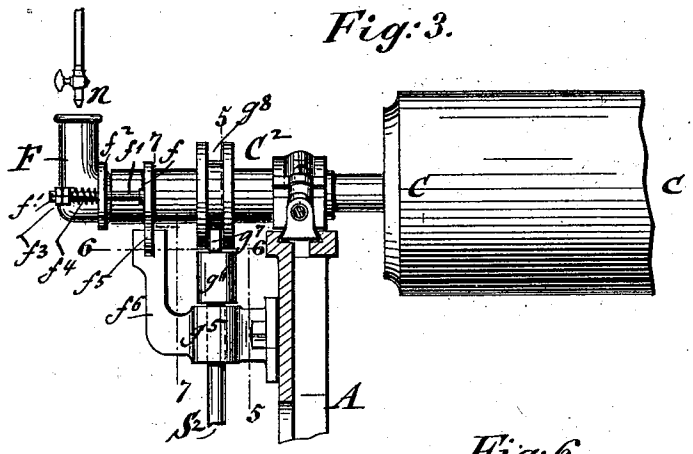


Fig: 5.

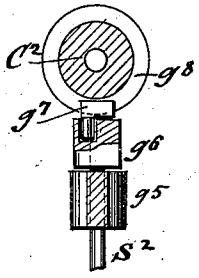


Fig: 6.

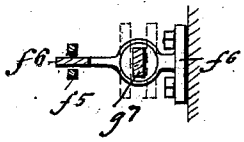


Fig: 7.

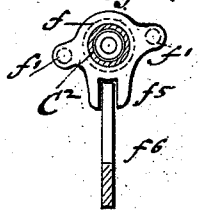
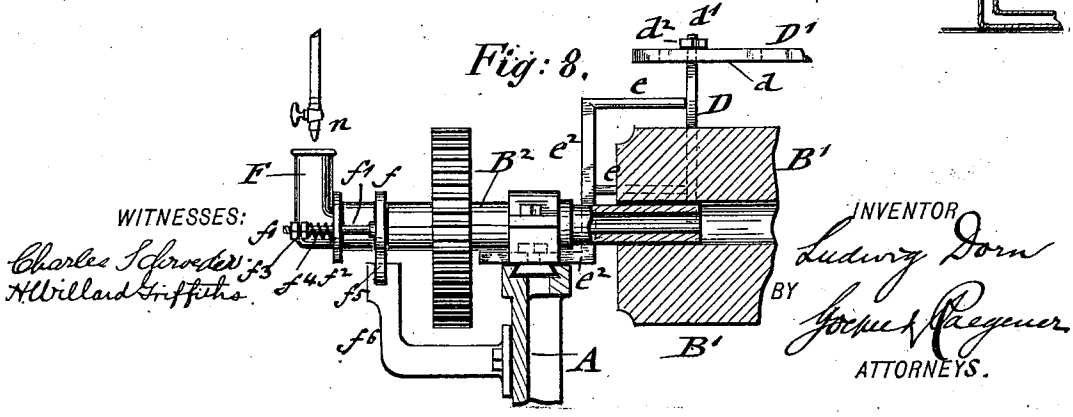


Fig: 4.

Fig: 8.



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MACHINE FOR GRINDING PRINTING AND LITHOGRAPHIC INKS.

SPECIFICATION forming part of Letters Patent No. 511,292, dated December 19, 1893.

Application filed June 7, 1893. Serial No. 476,815. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG DORN, a subject of the Emperor of Germany, and a resident of Feuerbach, near Stuttgart, in the Kingdom of Würtemberg and Empire of Germany, have invented certain new and useful Improvements in Machines for Grinding Printing and Lithographic Inks, of which the following is a specification.

This invention has reference to an improved machine for grinding and mixing printing and lithographic inks and it consists of certain details of construction and combinations of parts which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1, represents a side-elevation of my improved machine for mixing and grinding printing and lithographic inks. Fig. 2, is a plan-view of the same. Fig. 3, is a detail end-view, partly in section, of one end of the laterally-reciprocating grinding roll, showing the mechanism by which the reciprocating motion is imparted to said roll. Fig. 4, is a vertical longitudinal section through the laterally-reciprocating grinding roll and the mechanism for supplying water to the interior of the same. Figs. 5, 6 and 7 are detail sections respectively on lines 5 5, 6 6, and 7 7, Fig. 3, and Fig. 8, is a sectional elevation of the intermediate grinding roll, showing one of the guide-pieces and the steadying pins for the same.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents two upright standards by which the primary grinding rolls B B′ and the mixing and grinding roll C are supported. The upright standards A are connected by transverse bolts and provided with bearings for the shafts of the grinding rolls and of the motion-transmitting gears. The bearings of the intermediate roll B′ are attached in a stationary manner to the upright standards A, while the bearings of the roll B and of the grinding roll C are capable of adjustment on said standards by means of screws *b b′*, so that the rolls B and C can be adjusted to a greater or less distance from the intermediate roll B′ according as the ink has to be ground to various degrees of fineness.

Rotary motion is imparted to the primary grinding roll B′ from the driving shaft S by suitable transmitting gear wheels. From the shaft of the roll B′ rotary motion is transmitted by gear-wheels of equal size to the roll B, so that both rolls B and B′ are rotated at the same speed but in opposite directions to each other.

The printing, lithographic or other ink is supplied to the tapering space between the primary rolls B B′ and retained within the space between the rolls by means of approximately V-shaped guide pieces D, which extend transversely over the rolls and the sides of which are slightly curved so as to conform to and adapt themselves to the peripheries or grinding surfaces of the rolls. The guide-pieces D are connected by a piece D′ which is provided with slots *d* through which a center-bolt *d′*, on each guide-piece, is passed, so that the connecting-piece D′ can be firmly applied to the guide-pieces D by a screw-nut d^2. The slots *d* in the transverse connecting piece D′ permit the adjustment of the guide-pieces D within certain limits nearer to or farther away from the ends of the rolls B and B′, according to the consistency of the ink to be ground. For thicker or heavier inks, the guide-pieces can be adjusted nearer to the ends of the rolls B B′ while for thinner and easier flowing inks, the guide-pieces D have to be adjusted farther from the ends of the rolls B B′ so that the body of ink is confined and prevented, when conducted over to the grinding roll C, from spreading too much so as to pass over the ends of the latter. For imparting to the guide-pieces D D′ a firm and steady position so as to enable them to resist the pressure of the body of ink supplied to the rolls B B′, each guide-piece D is held at the upper and lower ends by steadying pins *e* which extend from a T-shaped piece *e′* that is supported by a slotted bracket-piece e^2 at right angles to the upright T-shaped piece *e′* and which is secured by a fastening-bolt e^3 to the side-standard A. By the slotted piece e^2 the T-shaped piece *e′* and its side-pins *e* can be adjusted accurately to the position of the guide-pieces D.

The intermediate roll B′ and the grinding roll C are made hollow and attached to their hollow shafts B^2 and C^2 through which a water-supply is kept up, so as to exert a cooling action on the interior of the rolls B′ and C. The rolls B′ and C are made of steel and preferably shrunk on their shafts, so that a tight connection between the rolls and shafts is formed. Into one end of each shaft B^2 and C^2 are fitted angular supply-tubes F, which are connected with the ends of the shafts B^2 C^2 by means of loose rings f and bolts f' which pass through fixed rings f^2 on the lower horizontal portions of the angular supply-tubes F, as shown clearly in Figs. 3 and 8. To the outer ends of the bolts f' are applied screw-nuts f^3, between which and the fixed rings f^2 are interposed cushioning springs f^4. The loose rings f are fitted into circumferential grooves of the shafts B^2 and C^2 and engage by recessed downwardly-extending lugs f^5 bracket-arms f^6 which are attached to the upright side-standards A so that a tightly fitting joint between the supply-tubes F and the ends of the rotating shafts B^2 and C^2 is obtained. The diameter of the water supply tubes F is made sufficiently large, so that the water which is supplied by a nozzle n located above the vertical portion of the angular supply-tube F is conducted into the same without being spattered around.

The cooling water is conducted off from the rolls B^2 and C^2 through the hollow shafts at the opposite ends of the rolls B′ and C and then through outlet tubes f^7 tightly fitted thereto, into the enlarged upper ends of the discharge-pipes f^8. The ends of the outlet-pipes f^7 f^8 are connected by means of fixed collars f^9, on the pipes f^7 located at the outside and inside of the enlarged upper ends of the discharge-tubes f^8. The enlarged upper ends of the discharge-tubes f^8 are closed by a suitable cover f^{10}, as shown in Fig. 4.

The grinding roll C receives rotary motion by a gear-wheel transmission from the shaft B^2 of the intermediate roll B′. The grinding roll C is preferably rotated at a somewhat greater speed than the intermediate roll B′, the transmitting gear-wheels being properly proportioned for this purpose. Simultaneously with the rotary motion a slow longitudinally-reciprocating motion is imparted to the grinding roll C which motion is transmitted from the driving shaft S by transmitting gear-wheels g g' to an auxiliary shaft S′ that is supported in bearings at the lower parts of the upright standards A. A worm g^2 at the end of the auxiliary shaft S′ meshes with the worm-wheel g^3 at the lower end of the inclined shaft S^2 which is supported in a step-bearing g^4 at the lower end of the standard A and in a neck-bearing g^5 attached to the upper end of one of the standards A, as shown in Fig. 1. To the upper end of the inclined shaft S^2 is keyed a disk or cylinder g^6 to which is eccentrically pivoted the lower rounded off end or pivot of an angular piece g^7, the upper flat portion of which engages a grooved collar g^8 that is keyed to the shaft C^2 of the grinding roll C. The eccentrically-pivoted piece g^7 imparts at each rotation of the inclined shaft S^2 a slow longitudinally-reciprocating motion to the grinding roll C, which motion is equal to twice the distance of the center of the pivot of the piece g^7 from the axis of the shaft S^2. By the longitudinally-reciprocating motion imparted to the grinding roll C, the ink is intimately mixed and ground in a more effective manner than if merely rotary motion were imparted to the grinding roll C.

During the longitudinally-reciprocating motion of the roll C the loose ring f at the end of the shaft C^2 rides on the upper end of the bracket arm f^6 and causes thereby the supply-tubes F to follow the longitudinal motion of the shaft C^2, the opening in the supply-tube being sufficiently large, so that notwithstanding the longitudinally-reciprocating motion imparted to it by the shaft C^2 the water is supplied to the tube F without spilling. The bolts f' which connect the loose rings f on the shafts C^2 and B^2 with the fixed rings f^2 on the tubes F prevent the latter from following the rotary motion of the shafts C^2 and B^2 while still keeping up the tight connection of the supply-tubes F with the hollow shafts C^2 and B^2, so that the regular flow of water through the grinding-roll C is kept up. The discharge-tube f^8 of the roll C is adapted to follow the longitudinally-reciprocating motion of the outlet-tube f^7 the connection of the vertical portion of the discharge-tube with the horizontal portion being preferably made in such a manner that this small degree of oscillating motion is permitted.

The advantages of my improved mixing and grinding machine for printing and lithographic inks are, first, the guide-pieces and their steadying pins keep the body of ink to be ground within certain limits on the rolls so as to prevent the lateral spreading of the ink and the flowing of the same over the ends of the grinding rolls; secondly, by the internal cooling of the rolls the heat produced by the grinding action on the rolls is neutralized so that no injurious action is exerted on the inks to be ground by the heating of the rolls; thirdly, the longitudinally-reciprocating motion of the last grinding roll is produced by a very effective transmitting mechanism by which the required longitudinal play is imparted to the roll, simultaneously with the rotary motion of the same.

I am aware that it is old in machines for grinding ink to arrange between contiguous rolls a pair of guides or dams to prevent the spreading of the ink, and I am also aware that it is common in certain machines to provide laterally-adjustable pieces which form guides for the material that passes between them, and do not therefore claim either of those constructions broadly.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent—

1. In a machine for grinding printing or other inks, the combination, with primary grinding-rolls, of transverse laterally-adjustable guide-pieces, that extend into the space between and conform to the peripheries or grinding-surfaces of the rolls, and means for supporting the guide-pieces in position on the rolls, whereby the ink-space between the rolls may be increased or diminished according to the consistency of the ink to be ground, substantially as set forth.

2. In a machine for grinding printing and other inks, the combination with primary grinding-rolls, of transverse laterally-adjustable guide-pieces extending into the space between and conforming to the peripheries or grinding-surfaces of the rolls, means for supporting the guide-pieces on the rolls, and separate adjustable-devices for steadying the guide-pieces against the pressure of the ink, substantially as set forth.

3. In a machine for grinding printing and other inks, the combination, of primary grinding-rolls, transverse guide-pieces extending in the space between the rolls, a connecting piece for said guide-pieces, and steadying pins pressing on the upper and lower ends of the guide-pieces, said steadying-pins being supported by a bracket frame on the side standards of the machine, substantially as set forth.

4. In a machine for grinding printing and other inks, the combination, with primary grinding rolls, of transverse guide-pieces extending into the space between the rolls, a connecting piece having slotted ends, bolts for connecting the guide-pieces with the slotted ends, and laterally-adjustable frames supported on the side-standards of the machine and provided with steadying pins that bear against the upper and lower ends of the guide-pieces, so as to support the same against the pressure of the body of ink supplied to the grinding rolls, substantially as set forth.

5. In a machine for grinding printing and other inks, the combination of primary grinding-rolls, transverse laterally-adjustable guide-pieces supported on said rolls and extending into the space between them, the same conforming to the peripheries or grinding-surfaces thereof, and a rotary and longitudinally-reciprocating grinding-roll rotating in contact with the intermediate grinding-roll, substantially as set forth.

6. The combination, with primary grinding-rolls of a third grinding roll, rotating in contact with the intermediate grinding roll and means for imparting reciprocating motion to the third grinding roll, said means consisting of an intermediate shaft, a worm-gear transmission, a stepped inclined shaft, a disk or cylinder on the upper end of said inclined shaft, an eccentrically pivoted angular piece and a grooved roller on the shaft of the third grinding roll, engaged by the flattened upper end of the eccentrically pivoted piece, substantially as set forth.

7. In a machine for grinding printing and other inks, the combination of a hollow grinding roll and the hollow shaft of the same, with a loose ring arranged in a groove at the end of the hollow shaft, a bracket-arm, the lower recessed end of the ring riding on said arm, an angular water supply tube, a fixed ring on said tube, bolts connecting the loose ring on the hollow shaft with the fixed ring on the supply-tube, screw-nuts at the outer ends of the bolts and cushioned springs between the fixed ring and the nuts, whereby any axial motion of the supply-tube is prevented and a tight connection between the hollow shaft and the supply-tube secured, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

LUDWIG DORN.

Witnesses:
PAUL GOEPEL,
CHARLES SCHROEDER.