(No Model.) 2 Sheets—Sheet 1.

F. SCHUMANN.

GRINDING MACHINE.

No. 489,333. Patented Jan. 3, 1893.

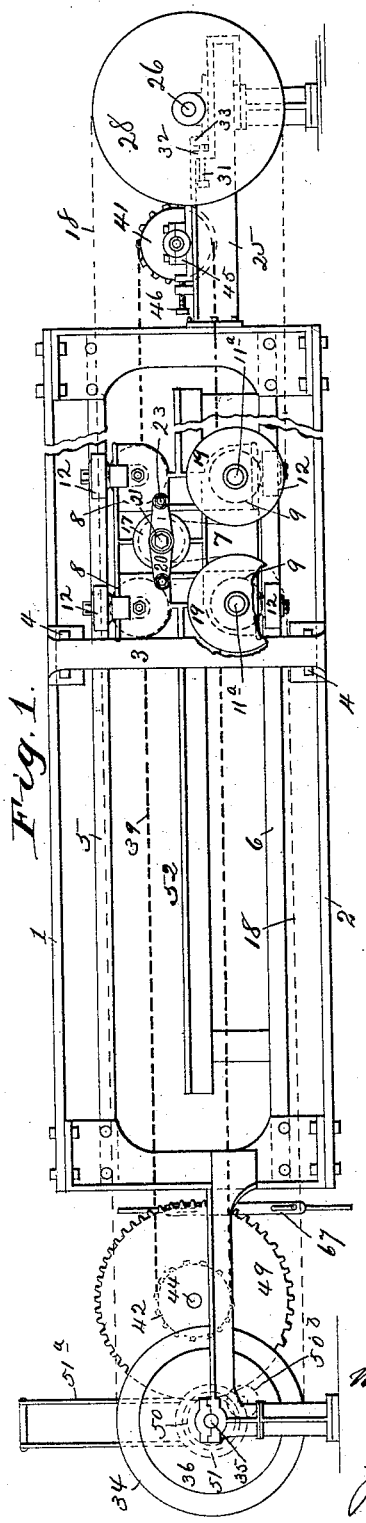


Fig. 1.

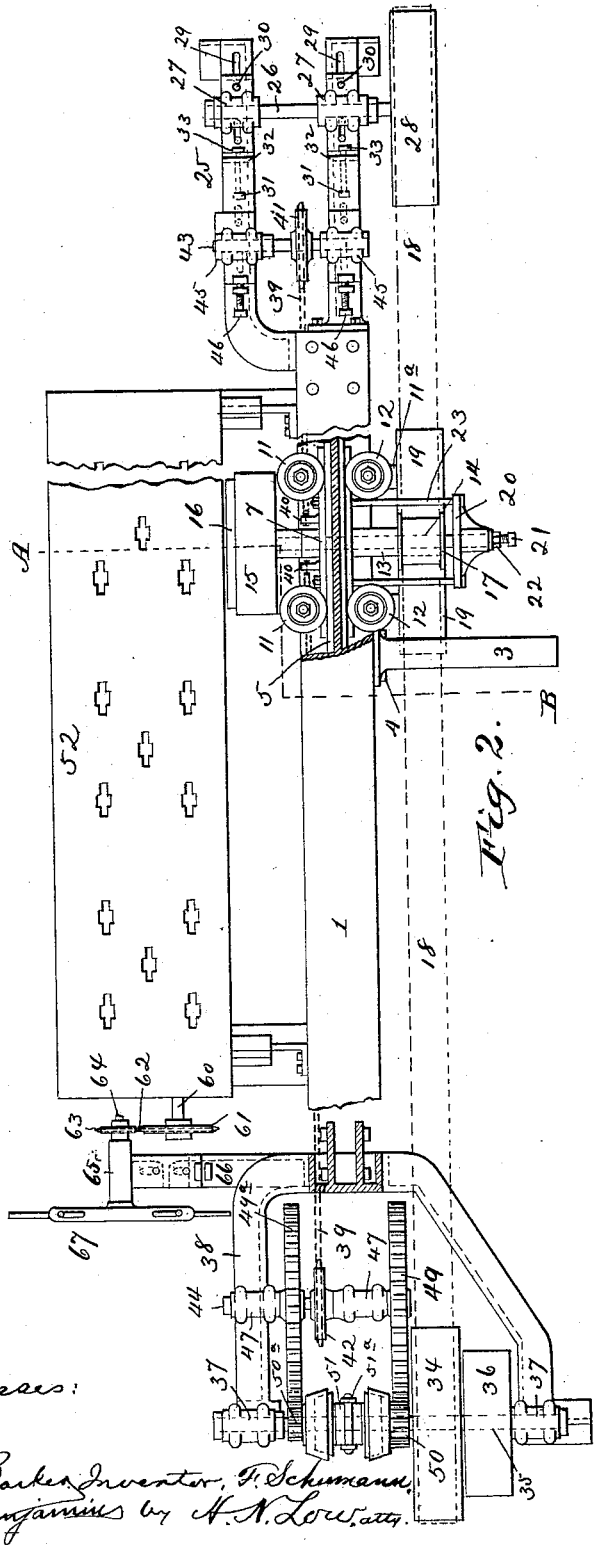


Fig. 2.

Witnesses:

J. S. Barker

H. Benjamin

Inventor, F. Schumann,
by A. N. Low, Atty.

(No Model.) 2 Sheets—Sheet 2.

F. SCHUMANN.

GRINDING MACHINE.

No. 489,333. Patented Jan. 3, 1893.

Fig. 3.

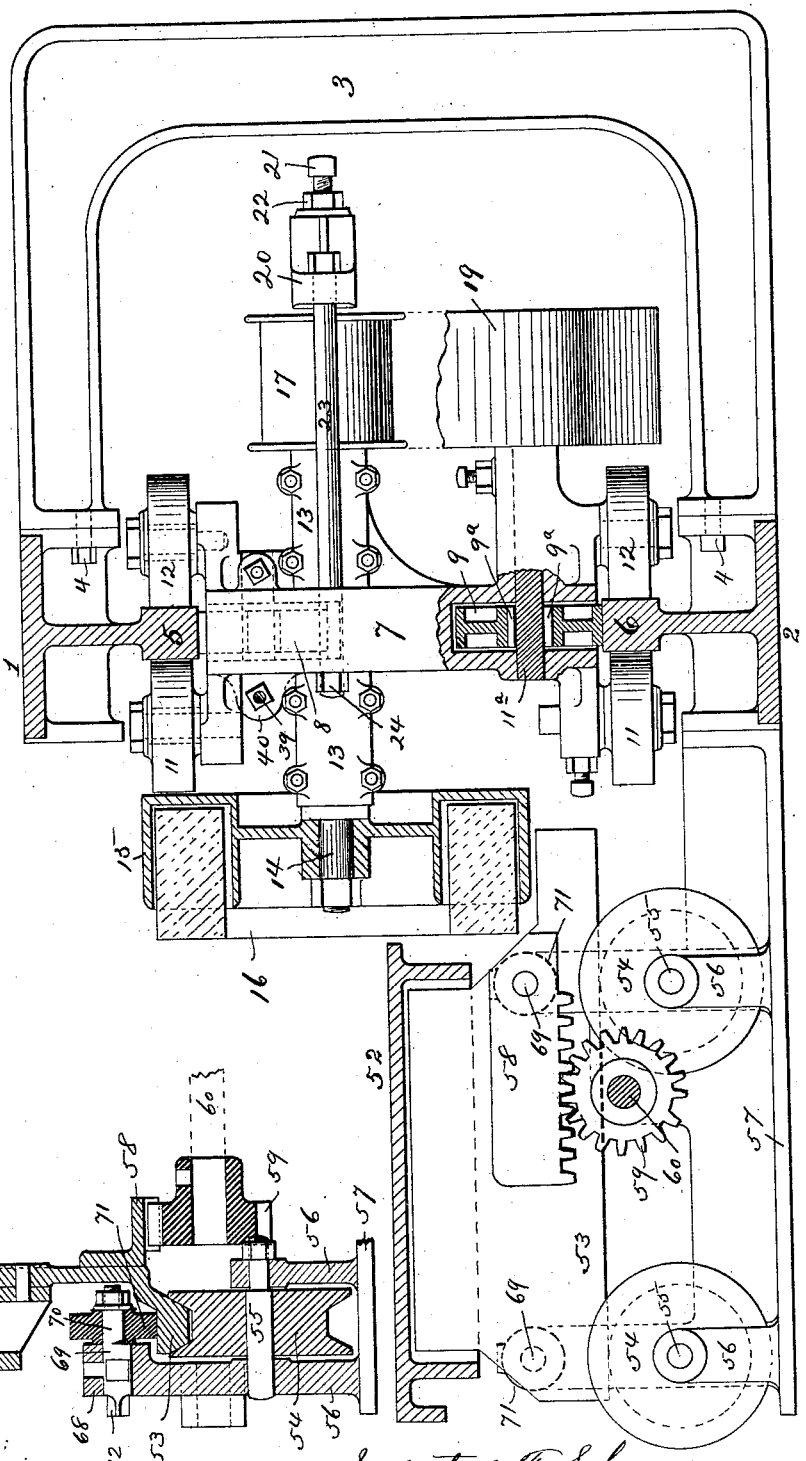
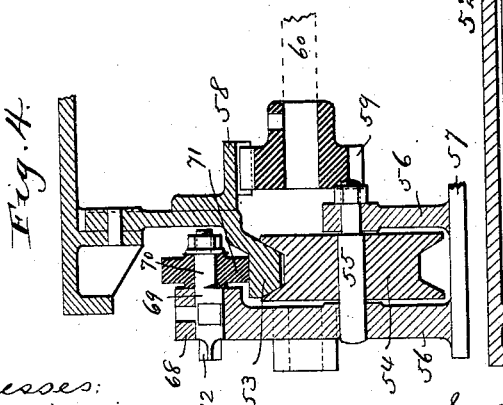


Fig. 4.



Witnesses:
F. H. Benjamin
J. S. Barker

Inventor, F. Schumann,
by H. N. Lowe, attorney.

UNITED STATES PATENT OFFICE.

FRANCIS SCHUMANN, OF PHILADELPHIA, PENNSYLVANIA.

GRINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,333, dated January 3, 1893.

Application filed May 23, 1892. Serial No. 434,063. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS SCHUMANN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Grinding-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

It is the object of my invention to provide a grinding machine of such construction and mode of operation that the grinding of large pieces of work may be conveniently and economically performed.

It is more especially the object of the improvement to attain such result by a mechanism of simple construction involving a comparatively small number of parts, in which the power is directly applied to the actuated parts, and which may be easily controlled in all of its movements. I have also provided for the running of the work carrying parts with evenness and with the minimum friction without any sliding contacts or necessity of lubrication at that side of the machine where the emery dust would rapidily wear away such contacting parts.

In order to make my invention more clearly understood I have shown in the accompanying drawings means for carrying the same into practical effect, without, however, intending to limit the improvement, in its applications to the particular construction or embodiment which, for the sake of illustration, I have delineated.

In said drawings: Figure 1 is a side view of a grinding machine embodying my invention. Fig. 2 is a plan view of the same. Fig. 3 is a transverse, sectional view on line A—B, Fig. 2. Fig. 4 is a sectional detail view.

Referring to the drawings 1 indicates the upper portion of the main frame and 2, the lower portion, which parts are connected by one or more U-shaped brackets 3, being secured to the latter by bolts 4. The parts 1 and 2 of the frame are preferably horizontal and are provided with upper and lower tracks or guides 5 and 6 extending from end to end of the frame and parallel with its general direction.

7 is a crosshead or frame situated between and adapted to move upon the tracks 5 and 6. It preferably engages said tracks by means of upper and lower rollers 8 and 9 which are mounted upon axes fitting in suitable bearings in the crosshead and which run upon the inner (bottom and top) faces of said tracks. The crosshead is held in line with the tracks or guides by means of side rollers 11 and 12 which are carried upon suitable studs or shafts fixed in the crosshead. I thus avoid sliding contacts for the crosshead, which, on account of the emery dust, are very destructive to the machine making its parts so loose that accurate work cannot be done. All of these rollers also have their journals mounted on roller bearings, consisting of balls or rolls 9^a confined in a suitable cage.

13 is a transverse bearing formed in the crosshead in which is mounted a shaft 14 carrying upon one end a grinding wheel or grinding wheel holder 15. The emery or other grinding material or surface is indicated at 16, its operative surface being situated in a plane transverse to its actuating shaft. At another point on the shaft 14 is mounted a driving pulley 17 engaged by a belt 18 which is guided thereto by idler pulleys 19. These latter are for convenience mounted upon extensions of the shafts 11^a which support the rollers 9.

20 is a crossbar or yoke situated in line with shaft 14 and provided with a bearing socket for said shaft and with a tail or thrust screw 21 and jamb nut 22 for adjusting and receiving the pressure of the shaft 14, these devices being adapted to receive that endwise thrust upon the shaft which is caused by the pressure of the work against the grinding wheel.

23, 23 indicate rods or long bolts which pass through the ends of the yoke 20 and extend parallel with the shaft 14 to and through the body of the frame 7, which latter is engaged by nuts 24 mounted upon their screw-threaded ends.

25 is a supplemental frame secured to one end of the main frame, and provided with bearings 27 in which is mounted a shaft 26 carrying a pulley 28 over which runs the driv-

ing belt 18. The bearings 27 are adjustable and serve to act as a belt tightener, the frame 25 being for this purpose formed with slots 29 through which pass the securing bolts 30 of said bearings. When the latter bolts are loosened the bearings may be adjusted by set screws 31, which engage lugs 32 on the frame 25 and bear against lugs 33 formed on the bearings 27. At the other end of the machine the driving belt 18 passes over a pulley 34 mounted on the power shaft 35, to which latter power is imparted from an engine or other motor through a pulley 36. The shaft 35 is mounted in bearings 37 supported upon a supplemental frame 38 which is securely bolted or otherwise attached to the end of the main frame of the machine. It will thus be seen that the driving mechanism for the grinding wheel is such that the longitudinal movement of the crosshead and the grinding wheel in the main frame can take place while the grinding wheel is being rotated. Said longitudinal movement is effected by the following means: 39 is a chain attached at its ends to the crosshead by ears 40, extending parallel with the main frame, and passing around sprocket wheels 41, 42, mounted respectively on shafts 43 and 44. The former shaft is mounted in bearings 45 on the frame 25, which bearings are adjustable by screws 46 in the manner already described in the description of the bearings 26. The shaft 44 is mounted in bearings 47 upon the frame 38 and is provided with a spur wheel 49 which is engaged by a driving pinion 50 upon the shaft 35. This pinion is adapted to be coupled with and uncoupled from the latter shaft by means of a friction clutch mechanism 51. When therefore the pinion 50 is coupled with the power shaft the rotation of the grinding wheel will be accompanied by a longitudinal motion of the cross head, along the work which is being operated upon, in one direction—say toward the left in Figs. 1 and 2. 49^a is a second spur wheel on the shaft 44 which is driven from a pinion 50^a on the power shaft through the medium of an idler pinion 50^b (Fig. 1) and consequently in a direction opposite to that imparted to pinion 50. When therefore the pinion 50^a is actuating the cross head 7 the latter will move toward the right in Figs. 1 and 2. The clutch mechanism is caused to effect these movements by a clutch lever 51^a which oscillates in the vertical plane of the shaft 35. This mechanism operates very delicately and the least pressure in one direction or the other on the lever 51^a will send the cross-head with its grinding wheel rapidly along the tracks 5 and 6.

The work table is indicated at 52 and is made of any usual form or character adapted to have the work securely clamped or held thereon in suitable relation to the grinding wheel. Said table extends in a direction parallel with the main frame and is of a length substantially equal to the travel of the crosshead. It is provided with transverse rails 53 (Figs. 3 and 4) which fit the grooves of rollers 54, which latter are mounted upon journals 35 parallel with the main frame and held in bearings formed in brackets 56. The latter are mounted upon base pieces 57 which are secured to the bottom portions 2 of the main frame. The table 52 is also provided at each end with a rack 58, which racks are engaged by pinions 59 carried and actuated by a longitudinal shaft 60. The end of the latter is provided with a chain wheel 61 (Fig. 2) which is connected by a chain 62 with a chain wheel 63 carried by a longitudinal shaft 64. The latter is mounted in a bearing 65 which is adjustable toward and from the shaft 60 upon a frame 66 which latter is attached to the main frame. A hand wheel 67 on the shaft 64 serves, through the mechanism just described, to move the table 52, carrying the work which is being operated upon toward or from the grinding wheel, as may be required by the exigencies of the work.

Since the work table is in a measure loosely mounted, by means of the rollers 54, it is necessary to provide means for firmly holding the table in contact with said rollers, and for taking up any wear which may occur. To this end each of the outermost of the brackets 56 is formed with an upward extension constituting a bearing 68 (Fig. 4) in which is mounted a cylindrical pin 69 which carries at its end a journal 70 eccentric to the main body of the pin. On this journal is mounted a roller 71 which bears upon the upper surface of the rail 53. By turning the pin 69 through the medium of its square head 72 the roller 71 may be caused to accurately bear against the rail 53 so as to permit no jarring or looseness of the table and on the other hand so as not to prevent the freedom of its movement toward and from the grinding wheel. As many of the rollers 71 may be provided as are desired. The rollers 11 and 12 and 8 and 9 are similarly made adjustable by eccentric pins toward the rails or tracks 5 and 6 to insure a neat fit of the cross head therein.

The operation of the machine will be clear from the foregoing description of its construction and of the functions and movements of its parts.

Having thus described my invention what I claim is:

1. In a grinding machine, the combination of a main frame having longitudinal tracks or guides, a, crosshead or frame mounted on said guides and adapted to reciprocate longitudinally of the machine, a grinding wheel and shaft for actuating the same mounted in said crosshead, a worktable extending in a direction parallel with the movement of the crosshead, a chain connected with the cross head, sprocket wheels on each side of the cross head for actuating the same, and means for moving said table toward and from the grinding wheel, substantially as set forth.

2. In a grinding machine, the combination

of a main frame having longitudinal tracks or guides, a crosshead or frame mounted on said guides and adapted to reciprocate longitudinally of the machine, and roller supports for said crosshead engaging the inner and lateral faces of said guides a grinding wheel and shaft for actuating the same mounted in said cross head, a work table extending in a direction parallel with the movement of the crosshead, and means for moving said table toward and from the grinding wheel, substantially as set forth.

3. In a grinding machine, the combination of a main frame having longitudinal tracks or guides, a crosshead or frame mounted on said guides and adapted to reciprocate longitudinally of the machine, and roller supports for said cross-head adjustable toward said tracks a grinding wheel and shaft for actuating the same mounted in said crosshead, a worktable extending in a direction parallel with the movement of the crosshead, and means for moving said table toward and from the grinding wheel, substantially as set forth.

4. The combination with the main frame having the longitudinal guide rails or tracks, of a crosshead or carriage provided with vertical rollers engaging the inner faces of said tracks, horizontal rollers engaging the sides of the tracks, and adapted to sustain the crosshead in position against the pressure of the work operated upon, a power shaft mounted in said crosshead, a grinding wheel carried by said shaft, a worktable, and means for actuating said table and crosshead, substantially as set forth.

5. The combination with the main frame having longitudinal tracks or guides, a cross head engaging and movable along said guides, a chain attached to said cross head and extending in both directions therefrom parallel with the frame, a sprocket wheel at each end of the frame supporting said chain, a shaft and grinding wheel mounted on said cross head, a belt pulley on said shaft, stationary belt pulleys at each end of the frame, idler pulleys carried by said cross head, a driving belt passing around said stationary pulleys, idlers, and the pulley of the grinding wheel shaft, and a work table in proximity to the grinding wheel, substantially as set forth.

6. The combination with the main frame having longitudinal tracks or guides, a cross head engaging and movable along said guides, a chain attached to said cross head and extending in both directions therefrom parallel with the frame, a wheel at each end of the frame supporting said chain, gearing for actuating one of the latter wheels to reciprocate said chain and cross head, a friction clutch connected with said gearing and through which the gearing is actuated, a shaft and grinding wheel mounted on the cross head, and a work table, substantially as set forth.

7. The combination with the main frame, and a grinding wheel longitudinally movable thereon, of a work table, racks and pinions for actuating the same, a shaft 60 carrying said pinions, a chain wheel 61 on said shaft, a chain pinion 63, a shaft 64 carrying the latter, and a hand wheel 67 upon the latter shaft, substantially as set forth.

8. The combination with the work table having rails 53 of rollers 54 supporting said rails, rollers 71 engaging the tops of said rails, and journals for the latter rollers adjustable toward or from the rails to confine the latter, substantially as set forth.

9. The combination with the crosshead of frame 7, having bearings 14, of the shaft 14 carrying a grinding wheel, a cross bar or yoke 20 having a bearing for said shaft and a set screw 21 and bolts 23 connecting said yoke with the crosshead on each side of the shaft, substantially as set forth.

10. In a grinding machine, the combination of the main frame consisting of the upper and lower portions 1 and 2 having respectively the tracks 5 and 6, the U-shaped brackets 3 connecting said portions, a crosshead 7 mounted upon said tracks and having a grinding shaft 13 and driving pulley 17, and stationary pulleys 28 and 34 and idler pulleys 19, said pulleys being mounted in line with the space formed by said brackets, substantially as set forth.

11. In a grinding machine having a reciprocating cross head or carriage and a grinding wheel thereon, and as a means of reciprocating said cross head or carriage, a flexible connection such as a chain attached to said cross head and extending in both directions therefrom parallel with its direction of reciprocation, a wheel at each end of the frame supporting said flexible connection, gear wheels 49, 49^a connected with one of said supporting wheels, a counter shaft 35, pinions 50, 50^a mounted loosely on said shaft, an idler pinion 50^b interposed between said gear wheels 49^a and 50^a, and a double friction clutch adapted to be operated to connect either of said pinions 50 or 50^a with said counter shaft, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRANCIS SCHUMANN.

Witnesses:
H. N. LOW,
THOS. S. HOPKINS.