SIZING DEVICE FOR GRINDING MACHINES

Filed Oct. 29, 1931
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Application October 29, 1931, Serial No. 571,892

7 Claims. (Cl. 51—165)

Sizing devices as heretofore constructed gage the work by coming in contact with the work itself, suitable mechanism being provided to stop the feed of the grinding wheel when the work is reduced approximately to finished size, and then operating to withdraw the grinding wheel and operate other mechanism when the work is ground to its finished size and polished. This invention provides a sizing device having means engageable with the grinding wheel itself for controlling the size of the work so that when the grinding wheel reaches a certain predetermined position in its movement toward the work it is engaged by suitable fingers which are moved to set in operation mechanism for stopping further feeding of the grinding wheel toward the work and for slowing down either rotation or oscillation of the work or operating any other desired mechanism and further feeler fingers are provided engageable with the grinding wheel when the work has been ground to finished size for stopping operation of the rotating or oscillating mechanism for the work and for withdrawing the grinding wheel out of engagement with the work. By the use of the present device a higher degree of accuracy of work is insured in that wear on the grinding wheel will make no appreciable difference on the size of the work.

Among other objects of the invention are to provide means for adjusting contact fingers, means for resetting the fingers after each sizing operation and for quickly withdrawing the sizing fingers out of contact with the grinding wheel as the next contact is made.

Referring to the accompanying drawings, which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is an end view in elevation showing the method of mounting the sizing device on a grinding machine,

Figure 2, a front elevation,

Figure 3, an enlarged end elevation showing one of the adjustable feeler fingers,

Figure 4, an enlarged end elevation with the housing removed to show some of the inner operating mechanism,

Figure 5, an end elevation of a feeler finger looking in the direction of the arrow in Figure 3,

Figure 6, a plan view with the top cover removed,

Figure 7, a plan view of the contact arm, and

Figure 8, a diagrammatic showing of the wiring.

Figure 9 is a plan view of a grinding machine showing the sizing device mounted thereon.

In the drawings numeral 10 indicates a housing in which are mounted shafts 11 and 12 which carry latches 13 and 14. To the outer ends of the shafts 11 and 12 are attached fingers 15 and 16 in the ends of which are held diamonds 17, adapted to engage the periphery of the grinding wheel 18. The fingers 15 and 16 are preferably made of some very light material such as aluminum. The finger 16 is securely clamped to the end of the shaft 12. The finger 15 is secured to and adjustable on a block 19. Clamps 20 are secured to finger 16 by screws 21, the free ends of the clamps being secured against the sides of the block 19 by screws 22, as shown in Figure 5. A screw 23 is secured in finger 15. The head of this screw is drilled and tapped to receive an adjusting screw 24. The block 19 is secured to the shaft 11 by means of a screw 9, the finger 15 being slotted where the shaft 11 passes through it to permit the necessary adjustment of the finger on the block 19. The latches 13 and 14 are bi- lated counterclockwise by springs 25. Arms 26 and 27 are mounted rotatably on a shaft 28 to the outer end of which shaft is attached a lever 29. The shaft 28 has a crank 30 attached to it, which crank has a pin 31 extending through its outer end which pin is adapted to engage the upper sides of the arms 26 and 27 to move them against the tension of springs 27 and 28. A spring 8 on shaft 28 and attached to lever 29 tends to hold lever 29 in elevated position. During a grinding operation the ends of the arms 26 and 27 rest beneath the lower ends of the latches 13 and 14. The arms are in position to engage just a narrow edge on the lower arms of the latches so that a slight rotation of the latch in a clockwise direction will permit the end of the arm 26 or 27 to slip off the latch and to follow the beveled edge 32 or 33. This action rotates the ratches clockwise and so assists in quickly throwing the feeler fingers out of danger of further contact with the grinding wheel. The grinding wheel engages the diamond only instantly so there is no danger of injuring the diamond. The arms 26 and 27 carry insulating blocks 34 and 35 which are secured to the arms by means of screws 36. The arms are biased upwardly by means of springs 37 and 38. Contact springs 39, 40 have bent ends which carry contact points 41 and 42 which are adapted to be brought into contact with points 43 and 44 on spring arms 45 and 46. Contact points 41 and 44 are in circuit with a battery 47 through solenoids or other electric responsive devices 50 and 51. These solenoids may control any suitable mechanism on the grinding machine such as example means for...
stopping feeding of the grinding wheel toward the work and for slowing down oscillation of the work or rotation of the work or any other mechanism, the speed of which should be changed when the work has been reduced substantially to its finished size. Contacts 42 and 43 are in circuit with the battery 40, through solenoids 40 and 41. Contacts 42 and 43 are brought together when the work has been ground to its finished size. Solenoids 40 and 41 therefore may control means for withdrawing the grinding wheel from the work and for stopping operation of such mechanism. Operation is stopped when the work has been ground to its finished size. The base 10 of the sizing device is mounted upon a slide 52 which is adjustable toward and from the work by means of screw 53 which is threaded through a bracket 54 on base 10. The slide 52 moreover is pivoted at 55 to a block 56 which in turn is mounted for further adjustment on a bridge 57. The bridge is secured to a carriage 59 by T-bolts 58 and is adjustable axially of the work.

The sizing device may be mounted upon any suitable grinding machine such as, for example, as shown in Figure 9. The particular type of grinding machine here shown is an internal grinding machine having a base 60 with a suitable work support 61 mounted thereon. The work support carries a work holding device 62 showing work 63 supported therein. The work is rotated by a suitable motor 64. A wheel support 65 has a wheel spindle 66 carrying a grinding wheel 18. The wheel spindle is driven by a motor 67. Cross feed mechanism 68 of conventional and well known construction is provided. This cross feed may be manually operated by hand wheel 69 or automatically effected by precision mechanism 70.

In operation the feeler fingers are in a position, so that the diamond lies exactly on a center line joining the axis of the wheel and the pivots of the fingers. As the grinding wheel moves into the work its periphery contacts with the diamond in the feeler fingers. As soon as the diamond in feeler finger 15 is touched by the grinding wheel the finger will be held in a position and then from the pivot. This is the latch 13 clockwise permitting the end of the arm 26 to ride along the cam edge 32. This will cause the latch 13 clockwise and move the feeler finger further away from the periphery of the grinding wheel. When the arm 26 reaches its uppermost position insulating block 34 will engage the lower end of the spring arm 39 and bring together contacts 41 and 44. This will close the circuit through the battery and solenoids 55 and 51 to stop further feeding of the grinding wheel toward the work and to operate any other mechanism which it may be desirable to control at this stage of the grinding. The grinding wheel continues to polish the work until the diamond in finger 16 contacts with the work. When this occurs this finger is lifted to rotate finger 16 a clockwise direction to permit arm 27 to slip off the end of the latch 14 so that this arm will rotate the latch in a clockwise direction to lift feeler finger 16 away from the wheel. When arm 27 reaches its uppermost position insulating block 35 lifting arm 40, 35 will engage together contacts 42 and 43. This will stop further feeding of the grinding wheel and will set in operation or stop operation of such mechanism as should be operated or stopped from operation when the work has been reduced to its finished and polished form. From the foregoing description it will be apparent that at all times I gauge the position of the grinding wheel in its relation to the work rather than the size of the work. In any case, however, the actual result is to gauge the size of the work. One advantage of this is that there may be certain inaccuracies in certain places along the work which if they serve to operate the solenoids 40 and 41, the grinding wheel will stop before it is reduced to its proper size throughout. My device gauges the position of the periphery of the grinding wheel so that any slight irregularities in the work will not influence the gauge or sizing device.

It will be apparent from the drawings and the specification that the spirit of the invention and therefore I do not limit myself to what is shown in the drawings and described in the specification, but only as indicated by the appended claims.

Having thus fully described my said invention, I claim as new and desire to secure by Letters Patent, is:

1. A sizing device for grinding machines comprising a plurality of feeler fingers, each of said feeler fingers having a sharp point adapted to engage the periphery of a grinding wheel when the work has been reduced to a predetermined size, a plurality of solenoids in control of the operative mechanism of the machine, switches in said control line, and means operable by engagement of the fingers with the grinding wheel for first releasing the fingers free of the grinding wheel and thereafter instantly closing the said switches to operate the said solenoids substantially as set forth.

2. In a grinding machine having a plurality of solenoids in control of all operative mechanism on the machine, a plurality of switches in control of circuits for energizing the solenoids, a pair of fingers positioned with their ends adjacent to but normally out of contact with the periphery of the grinding wheel, said fingers being biased in a direction to close the said switches, a latch for holding each of said fingers in position to maintain the switches in open condition, engagement of the periphery of the grinding wheel first with one of the fingers then with another causing said latches to release mechanism for closing said switches to energize the said solenoids, substantially as set forth.

3. In a grinding machine having a plurality of solenoids in control of mechanism for operating the grinding wheel, a pair of shafts each having a finger mounted thereon, the finger extending toward the periphery of the grinding wheel, a latch on said shaft said latch being engageable by an arm for holding the finger extended toward the grinding wheel, a pair of switches in control of circuits to the said solenoids, engagement of the periphery of the grinding wheel first with one of said fingers and then with another causing the release of said latches to permit closing of the circuits to the solenoid, closing of said circuits first causing cessation of some operations and contact of another finger with the grinding wheel causing cessation of other operations, substantially as set forth.

4. In a grinding machine having a plurality of solenoids in control of mechanism for operating the various elements of the grinding machine, a pair of shafts each having a finger mounted thereon, the finger extending toward the periphery of the grinding wheel, a latch on said shaft an arm engageable with said latch for holding the finger extended toward the grinding wheel,
a pair of switches in control of circuits to the said solenoids, engagement of the periphery of the grinding wheel first with one of said fingers and then with another causing the release of said latch to permit closing of the circuits to the solenoid, closing of said circuits first causing cessation of some operations and contact of another finger with the grinding wheel causing cessation of other operations, and an arm for holding said latch, said arm serving to throw the finger to a relatively remote position from the grinding wheel when the latch is released from the said arm, substantially as set forth.

5. In a device of the kind described a grinding wheel, a feeler adapted to engage said grinding wheel at a predetermined point in a grinding operation, electrical contacts adapted to be actuated by said feeler and means responsive to the rotary movement of said wheel to actuate said feeler, and means operable upon the actuation of said feeler for removing it out of engagement with the wheel.

6. In a device of the kind described a wheel support, a grinding wheel mounted thereon, means to rotate said wheel, a work support, means to effect a relative feeding movement between said supports, a feeler adapted to engage said wheel at a predetermined point in said grinding operation and means to separate said feeler and said wheel immediately after said engagement.

7. In a device of the kind described a wheel support, a grinding wheel rotatably mounted therein, means to rotate said wheel, means to move said wheel support, feelers in the path of the said wheel and adapted to engage said wheel at a predetermined point in a grinding operation, an electric circuit, contacts on said feelers for opening and closing said circuit and means to throw said feelers clear of the wheel upon engagement therewith and thereby to close said contacts.

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