May 12, 1936. H. E. PEYREBRUNE 2,040,331

VIBRATING MECHANISM

Filed July 5, 1934 3 Sheets-Sheet 1

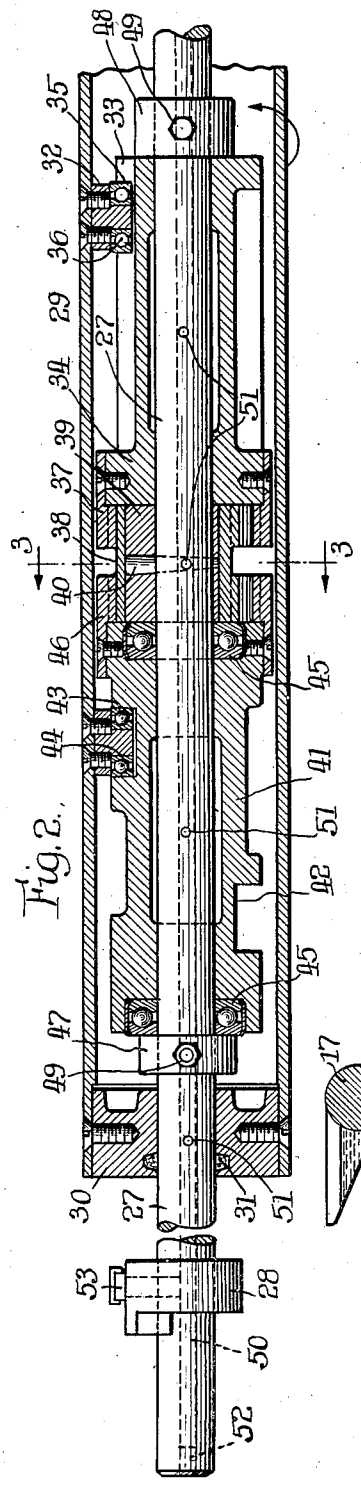

Fig. 2.

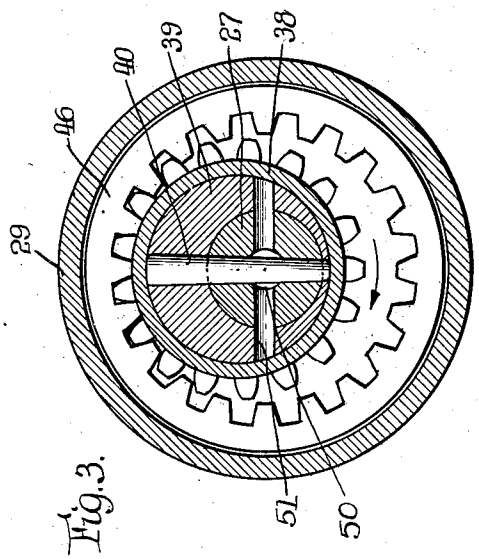

Fig. 3.

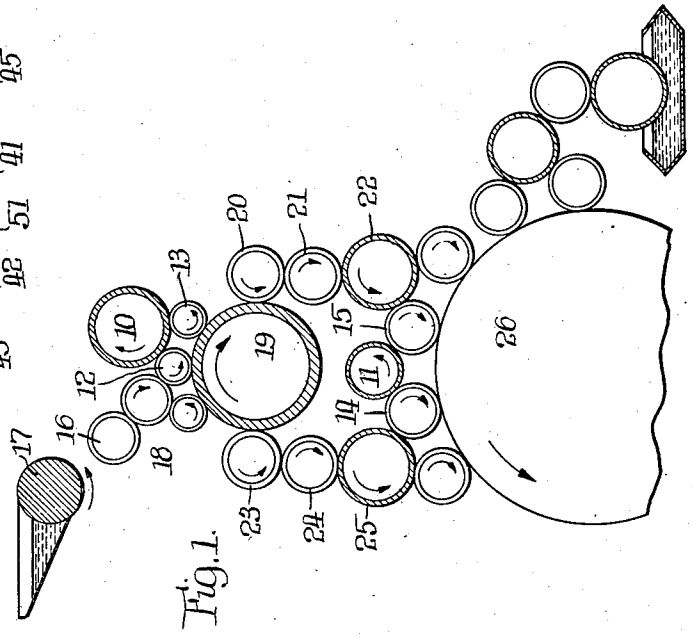

Fig. 1.

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Filed July 5, 1934 3 Sheets-Sheet 2

Fig. 4.

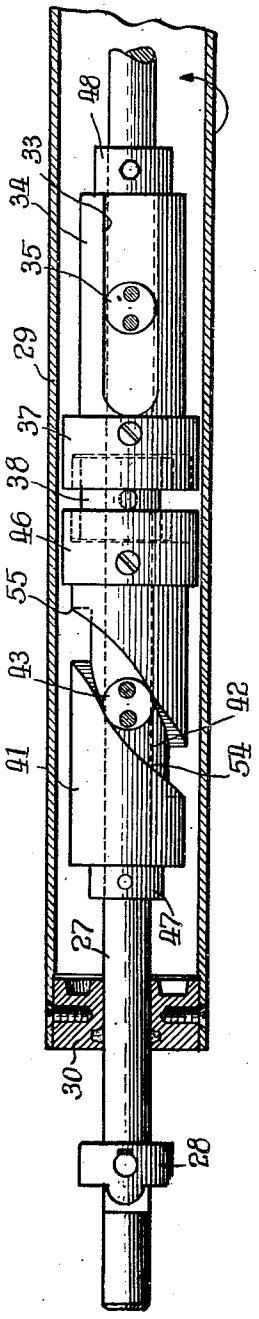
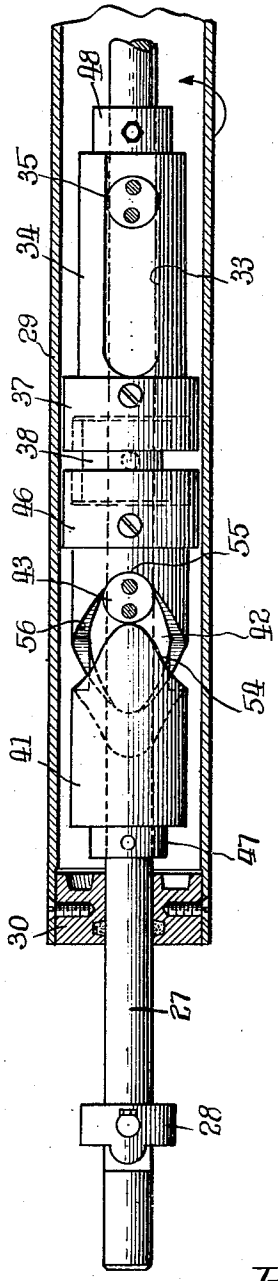


Fig. 5.



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Filed July 5, 1934 3 Sheets-Sheet 3

Fig. 7.

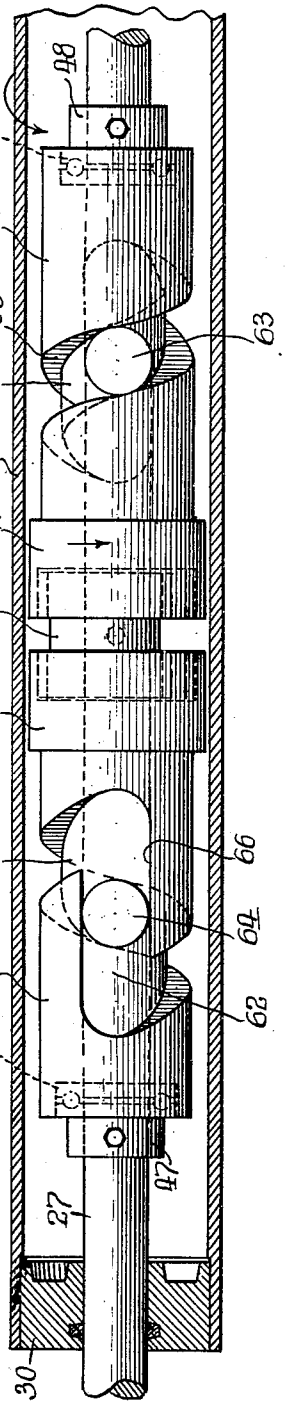
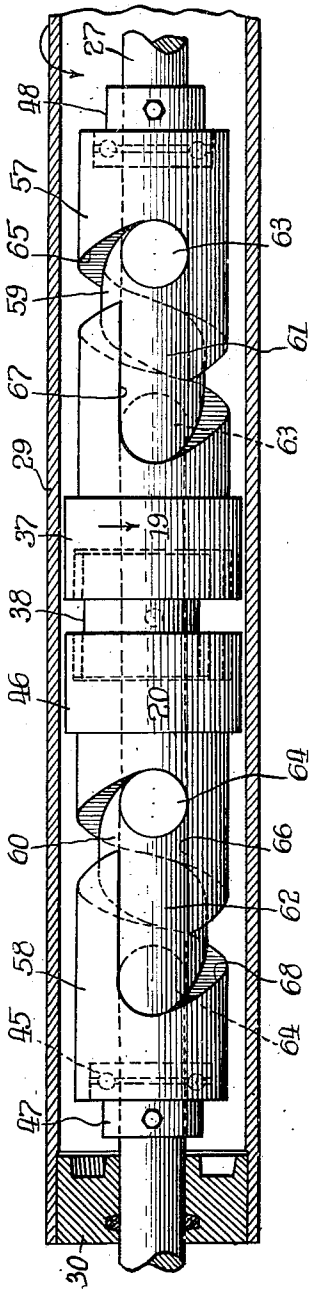


Fig. 6.



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Patented May 12, 1936 2,040,331

UNITED STATES PATENT OFFICE

2,040,331

VIBRATING MECHANISM

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Application July 5, 1934, Serial No. 733,703

25 Claims. (Cl. 101—348)

This invention relates to mechanism whereby a lateral reciprocating motion is imparted to a rotary member such as an ink distributing roller or drum of a printing press.

In mechanism heretofore used for that purpose, the reversing of the rollers at each end of their lateral reciprocating strokes was accomplished by rather delicate switch members operating in reverse intersecting spiral grooves, and which members were subject to excessive wear and consequent frequent breakage, particularly so when used on high speed rotary presses.

One of the primary objects of the present invention therefore is to provide an improved vibrating mechanism which shall be particularly adapted for use in inking mechanism of printing presses that are operated at higher than the average speeds heretofore attained, and which shall produce a slow lateral reciprocating motion from a high speed rotary motion.

Another object of the invention is the production of vibrating mechanism for ink distributing rollers and the like which is devoid of any switching mechanism for reversing the direction of vibration at the end of each reciprocating stroke of a roller.

A further object is to provide an improved mechanism in which all of the operating parts are completely inclosed and effectively sealed to protect them against grit and other foreign matter that might cause undue wear of said parts.

A still further object of the invention resides in the provision of means whereby the vibrating mechanism may be conveniently and effectively lubricated while in operation.

These and other objects of the present invention will become more fully apparent from the following description and accompanying drawings, in which:

Figure 1 is a diagrammatic view in side elevation of the roller arrangement in an inking mechanism of a printing press in which vibrating mechanism embodying the present invention may be used;

Figure 2 is a longitudinal section of a roller showing one form of the improved vibrating mechanism housed therein;

Figure 3 is a cross section taken along line 3—3 of the roller illustrated in Figure 2;

Figures 4 and 5 are partial longitudinal sections of the roller illustrated in Figure 2, showing the parts of the vibrating mechanism in different positions; and

Figures 6 and 7 represent a modified form of vibrating mechanism with the roller shown in longitudinal section and the parts of the vibrating mechanism located in positions similar to those illustrated in Figures 4 and 5.

Referring now more particularly to Figure 1 of the drawings, the ink distributing rollers 10, 11, to which this invention may be readily applied, are shown in rolling contact with the rider rollers 12, 13 and form rollers 14, 15 respectively.

Preferably such distributing rollers derive their rotation merely by friction due to their peripheral contact with the other rollers, which latter, however, are driven positively by gearing. The inking mechanism shown is of a conventional type frequently used on planographic printing presses, the ink being fed to the distributing roller unit by means of a ductor roller 16, which alternately contacts with the fountain roller 17 and the rider roller 18. After the printing ink has been thoroughly distributed by the cooperation of the rider rollers, vibrator roller 10 and ink distributing drum 19, the film of ink is transferred from said drum to the form rollers by distributing rollers 20, 21, 22, 23, 24, and 25, and then applied to the printing form on the cylinder 26 by said form rollers.

According to the particular form of vibrating mechanism shown in Figure 2, the shaft 27 is mounted stationary in any suitable bearings such as indicated at 28. This shaft supports the roller shell 29 so that it can freely rotate on and move axially of said shaft. Preferably I provide bearing heads 30 at each end of the shell 29 to rotate therewith, and which heads are formed with an internal groove to retain a sealing washer 31.

The shell 29, which as indicated above, derives its rotary motion by frictional contact with other rollers of the inking mechanism, has secured to its inner wall a driver 32 which operates within a longitudinal slot 33, formed in a follower 34 to thereby rotate the latter about the stationary shaft 27. In order to reduce friction between the driver 32 and the walls of the slot 33 in the follower 34, I preferably provide a roller 35 mounted on anti-friction bearings 36. At one end of the follower is provided an internal gear 37 which meshes with a pinion 38 that is mounted to rotate on an eccentric bearing sleeve 39 rigidly secured to the shaft 27 in any suitable manner such as by means of a taper pin 40.

Said shaft also carries a rotary cam member 41 formed with a cam groove 42 within which operates a cam roller 43 secured to the inner wall of the shell 29 and preferably mounted on an anti-friction bearing 44.

In order to absorb end thrust to which the member 41 is subjected, as will be readily understood from the following description, end thrust bearings 45 are mounted at each end of said member. The inner end of the cam member 41 is provided with an internal gear 46 which also meshes with said pinion 38; however, this gear in the preferred form of mechanism illustrated has a larger number of teeth than the gear 37, for the purpose of producing a differential motion between the follower 34 and the cam member 41, as will be explained later. A similar result would be obtained, however, by providing less teeth on the gear 46 than on the gear 37. While the difference in the number of teeth on said gears may vary, depending on the ratio of reciprocation of the roller required to the number of its revolutions, I have found that for high speed rotary presses the best result is obtained by giving 19 teeth to the gear 37 and 20 teeth to the gear 46. It will be understood that the diameter of both gears remains the same and that gear 46 may be a standard gear, while the gear 37 must be a generated gear, or vice versa, because they both mesh with the one pinion 38.

The follower 34, cam member 41 and pinion 38 are held in cooperative relation on the shaft 27 by means of retaining collars 47 and 48, the former abutting against the outer thrust bearing 45 on the member 41 and the latter bearing against the free end of the follower 34. Said collars may be secured to the shaft 27 in any suitable manner such as by set screws 49.

In order to assure effective lubrication of the various parts mounted on the shaft 27, I provide a bore 50 in said shaft and a number of oil ducts 51, which latter lead to the various points that require lubrication. The outer end of said bore is closed by means of a plug 52. The oil cup 53 is provided in the bearing 28 of the shaft 27 at an accessible point so that all parts of the vibrating mechanism may be conveniently lubricated during the operation of the roller.

The enlarged cross sectional view illustrated in Figure 3 shows the pinion 38 in engagement with the internal gear 46 of the cam member 41, the pinion being assumed to be driven in the direction indicated by the arrow in Figure 3, due to its meshing engagement with the internal gear 37, see Figure 2, which follows the direction of rotation of the shell 29 indicated by the arrow in Figure 2, it being understood, however, that if the rotation of the shell 29 were in the other direction, the function of the respective parts would be the same.

In Figures 4 and 5, the shell 29 is shown in section longitudinally of its axis and the follower 34, driver 35, cam member 41 and cam roller 43 are shown in different operative positions to illustrate the operation of these parts, which is as follows:

Referring more particularly to Figure 4, and assuming that the shell 29 rotates in the direction indicated by the arrow, the driver 35 will rotate the follower 34 on the shaft 27 in the same direction. This rotation, due to the meshing engagement of the internal gear 37 with the pinion 38 will also rotate the latter in the same direction about its eccentric bearing sleeve 39, see Figures 2 and 3, the eccentric mounting of said pinion producing the equivalent of a crank action. The rotation of said pinion is thus transmitted to the internal gear 46, however, the rate of rotation of the latter gear is slower than that of the internal gear 37, due to the gear 46 having more teeth than the gear 37.

As illustrated in Figure 2, the driver 32, as well as the cam roller 43, are both rigidly mounted on the shell 29, therefore, due to the differential speed of rotation at which the follower 34 and the cam member 41 travel, the roller 43 in this particular instance will ride against the surface 54 of the cam groove 42, see Figures 4 and 5, and consequently the sleeve 29 will move to the left until the roller 43 has reached the apex 55 of the cam groove 42.

Upon continuation of the rotation of shell 29, the cam roller 43 will bear against the surface 56 of the cam groove 42, and as a result the shell 29 will be moved in the opposite direction, namely to the left, as viewed in Figures 4 and 5, the driver 35 of course following this movement within the slot 33 of the follower 34, until the driver 35 and roller 43 have reached the positions indicated in broken lines in Figure 5, thereby completing one cycle of oscillation of the shell 29.

Figures 6 and 7 illustrate a modification of the vibrating mechanism shown in the preceding figures, and, as will be seen, instead of providing one single follower 34 and one single cam member 41, as illustrated in Figures 4 and 5, I provide two cam members 57 and 58 which alternately function as a cam and a follower, the purpose of this modification being to provide a cam groove, the angle of which will be less acute than the angle of the cam groove 42 in the cam member 41 of the mechanism hereinbefore described, in this manner the friction between the cam rollers and their respective cam grooves will be appreciably reduced.

As illustrated in Figures 6 and 7, the cam groove 59 in the member 57 and the cam groove 60 in the member 58 are provided with a linear portion 61 and 62 respectively so that when the rollers 63 or 64 travel within said linear portion of the cam groove in the respective cam member, the latter will function as a follower.

In the position of the rollers 63 and 64 shown in Figure 6, and assuming that the shell 29 rotates in the direction indicated by the arrow, the roller 64 will enter the linear portion 62 of the cam groove because as explained above, the internal gear 37 which has a smaller number of teeth than the internal gear 46 will rotate at a faster rate of speed so that the cam member 57 will overtake the roller 63, and the latter will then enter the cam groove 59 and ride against the cam surface 65, whereby the shell 29 will be moved to the left as viewed in Figure 6.

In Figure 7 the rollers 63 and 64 are shown midway of their travel through the cam grooves 59 and 60, the roller 64 acting as a driver against the face 66 of the linear portion 62 in the cam groove 60.

In Figure 6 the position of the rollers 63 and 64, when they have reached the end position of one reciprocating stroke of the shell 29, is shown in broken lines.

The direction of rotation remaining the same as indicated by the arrow, then upon continued rotation of the shell 29, and therewith of the rollers 63 and 64, the cam member 57 i. e. its face 67, due to the greater speed of said cam member as compared with that of the cam member 58, will bear against the roller 63, whereas the roller 64 will enter the cam groove 60 and by the latter roller bearing against the face 68 of the cam

groove 60, the roller 63, while bearing against the face 67 of the linear portion of the cam groove 59, will be moved to the right and therewith the shell 29 will be moved to the right, the cam member 57, due to the roller 63 traveling in the linear portion 61 of the groove 59, then acting as a follower during the reciprocation of the sleeve 29 in the direction to the right as viewed in Figures 6 and 7. The mechanism will have completed one cycle when the rollers 63 and 64 have again reached their position indicated in full lines in Figure 6.

It will be understood that, without departing from the principle of the invention, various other forms of mechanism may be readily used, for instance, instead of providing a differential gearing such as is comprised by the internal gears 36 and 37 and the pinion 38, a reduction gearing comprising for example a worm gear mounted on the stationary shaft to rotate with the roller shell and cooperating with worm wheels, and pinions suitably arranged so that a similar reduction of the speed and reciprocation of the shell may be accomplished. In this form of construction, the cam member would be mounted rigid on the stationary shaft, and the cam roller would be carried by a sleeve arranged to rotate within the shell but secured against lateral displacement relative to the shell, so that the latter will follow the lateral reciprocation of said sleeve.

I claim:

1. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a supported rotary member, and differential gears for imparting a lateral reciprocating motion to said rotary member.

2. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a supported rotary member, and differential mechanism for imparting a lateral motion to said rotary member.

3. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation, and differential speed means for imparting lateral motion to said shell.

4. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation, and differential speed means for imparting lateral reciprocating motion to said shell during its rotation.

5. In vibrating mechanism for ink distributing rollers or the like, the combination of a supported rotary member having closed ends, and differential speed means within said member for imparting a lateral motion thereto.

6. In vibrating mechanism for ink distributing rollers or the like, the combination of a shaft, a closed shell on said shaft mounted for rotation, and differential speed means within said shell including a train of gears for imparting lateral reciprocating motion to said shell during its rotation.

7. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation, a cam member, and differential speed means cooperating with said cam member for imparting a lateral reciprocating motion to said shell.

8. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation, a cam member, and differential speed means within said shell cooperating with said cam member and including a train of gears for imparting a lateral reciprocating motion to said shell.

9. In vibrating mechanism for ink distributing rollers or the like, the combination of a closed supported rotary member, and differential speed means within said member for moving it longitudinally of its support at a predetermined ratio to the peripheral speed of said member.

10. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation, and differential speed means within said shell including a train of gears for moving said shell longitudinally of said shaft at a predetermined ratio to the peripheral speed of said shell.

11. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation, a cam member, and differential speed means within said shell cooperating with said cam member and including a train of gears for moving said shell longitudinally of said shaft at a predetermined ratio to the peripheral speed of said member.

12. In vibrating mechanism for ink distributing rollers or the like, the combination of a shaft, a closed shell on said shaft mounted for rotation, and differential speed means within said shell and including a train of gears for imparting a lateral reciprocating motion to said shell during its rotation.

13. In vibrating mechanism for ink distributing rollers or the like, the combination of a shaft, a closed shell on said shaft mounted for rotation, and means provided within said shell, including reduction gearing actuated by the rotation of said shell for imparting a lateral reciprocating motion thereto during its rotation.

14. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a closed shell on said shaft mounted for rotation, a cam within said shell, and reduction gearing operatively associated with said cam for imparting a lateral reciprocating motion to said shell during its rotation.

15. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a closed shell on said shaft mounted for rotation, and means provided within said shell and including differential gearing for imparting a lateral reciprocating motion to said shell during its rotation.

16. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a closed shell on said shaft mounted for rotation and driven by rollers in contact therewith, a cam and gearing operatively associated within said shell for imparting a lateral reciprocating motion to said shell during its rotation.

17. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell mounted to rotate on and move longitudinally of said shaft, a cam mounted for rotation on said shaft, a follower, and differential gearing operatively associated with said cam and follower for imparting a lateral reciprocating motion to said shell during its rotation.

18. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell mounted to rotate on and move longitudinally of said shaft, a cam mounted for rotation on said shaft, a follower driven by said shell and carried by said shaft, and differential gearing operatively associated with said cam and

follower for imparting a lateral reciprocating motion to said shell during its rotation.

19. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell mounted to rotate on and move longitudinally of said shaft, a cam mounted for rotation on said shaft, a follower driven by said shell and carried by said shaft to rotate thereon, means to prevent movement of said cam and follower longitudinally of said shaft, and differential gearing operatively associated with said cam and follower for imparting a lateral reciprocating motion to said shell during its rotation.

20. In vibrating mechanism for ink distributing rollers or the like, the combination of a shaft, a shell on said shaft mounted for rotation, a rotary cam and follower within said shell, a gear on said cam, a gear on said follower, and a pinion eccentrically mounted for rotation on said shaft and meshing with said gears for imparting differential motion to said cam and follower and to thereby laterally reciprocate said shell during its rotation.

21. In vibrating mechanism for ink distributing rollers or the like, the combination of a shaft, a shell on said shaft mounted for rotation, a rotary cam and follower within said shell, an internal gear on said cam, an internal gear on said follower, having a different number of teeth than said first mentioned gear, and a pinion eccentrically mounted for rotation on said shaft and meshing with said gears for imparting differential motion to said cam and follower and to thereby laterally reciprocate said shell during its rotation.

22. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell mounted to rotate on and move longitudinally of said shaft, a rotary cam and follower mounted for rotation on said shaft, a gear on said cam, a gear on said follower, and a pinion eccentrically mounted for rotation on said shaft and meshing with said gears for imparting differential motion to said cam and follower and to thereby laterally reciprocate said shell during its rotation.

23. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell mounted to rotate on and move longitudinally of said shaft, a rotary cam and follower mounted for rotation on said shaft, a gear on said cam, a gear on said follower having a different number of teeth than the gear on said cam, and a pinion eccentrically mounted for rotation on said shaft and meshing with said gears for imparting differential motion to said cam and follower and to thereby laterally reciprocate said shell during its rotation.

24. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation and driven by rollers in contact therewith, and means provided within said shell and including reduction gearing operative to move said shell longitudinally of said shaft at a predetermined ratio to the peripheral speed of said shell.

25. In vibrating mechanism for ink distributing rollers or the like, the combination of a stationary shaft, a shell on said shaft mounted for rotation and driven by rollers in contact therewith, and means provided within said shell and including differential gearing operative to move said shell longitudinally of said shaft at a predetermined ratio to the peripheral speed of said shell.

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