

March 22, 1932.

S. M. LANGSTON ET AL

1,850,801

PRINTER AND SLOTTER

Original Filed Nov. 12, 1930 2 Sheets-Sheet 1

FIG. 1.

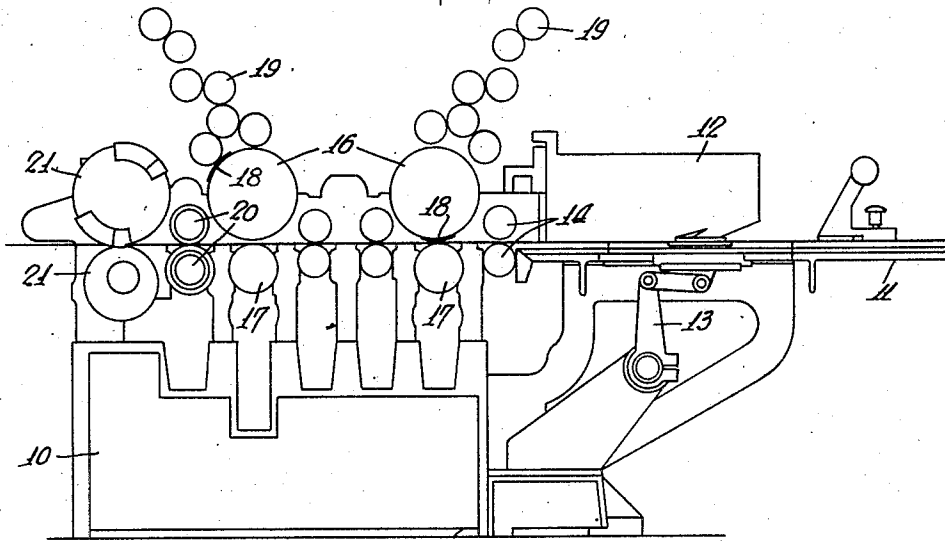
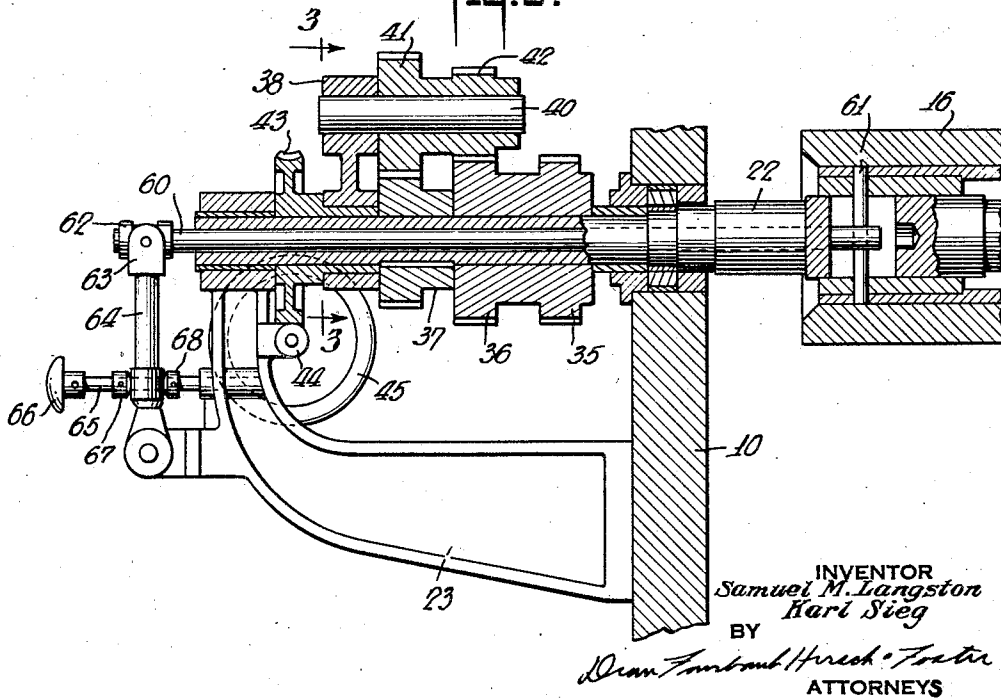


FIG. 2.



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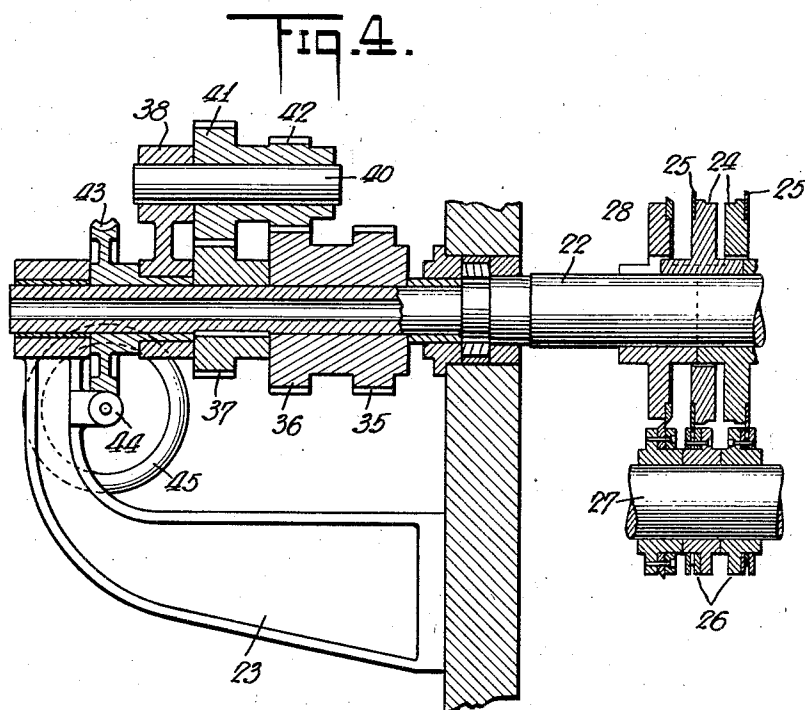
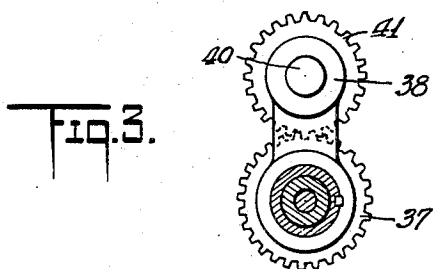
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PRINTER AND SLOTTED

Original Filed Nov. 12, 1930 2 Sheets-Sheet 2



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PRINTER AND SLOTTER

Original application filed November 12, 1930, Serial No. 495,158. Divided and this application filed July 30, 1931. Serial No. 553,980.

The present invention is a division of our copending application Serial No. 495,158, filed November 12, 1930, and relates to machines for use in the treatment of advancing sheet material, where two or more operating mechanisms must be relatively so adjusted, that the desired registration of operations on the sheet is obtained.

In many types of machines of this general character, it is necessary to make frequent changes or readjustments of the operating members in accordance with the specific character of the product to be produced. For instance, in mechanisms for slotting and creasing or scoring sheet material to form box blanks, it is common to provide a pair of rotary members between which the sheet passes to score or crease the same along a fold line, and a second pair of coacting rotary members between which the sheet also passes to slot it on one or both ends of the crease or creases to separate adjacent portions which are later folded to form the ends or end flaps of the box. The position of each slot bears a definite relationship to the crease or score line in the sheet, and the length of the slots depends upon the size of the box being constructed. The adjustment of the relative lengths of the slots at opposite edges is effected through the circumferential adjustment of the slotting heads with respect to the feeding mechanism or drive.

Another machine of this type in which it is necessary to make frequent changes or readjustments of the operating members in accordance with the specific character of the product being produced, is a printing mechanism containing a printing cylinder which carries a type plate for printing on one or more panels of the blank. Such printing cylinder must be circumferentially adjusted, so that the printing comes in predetermined position on the blank. In cases where the printing is to be in more than one color, it is customary in these machines to provide two or more of these printing cylinders operating in succession on the blank. These printing cylinders must be relatively adjusted to obtain the proper registration of imprints on the blank being operated on.

It is also common in certain types of machines for making box blanks, to combine a sheet feeding mechanism, slotting and scoring mechanisms, and one or more printing cylinders for successive operations on the sheets. In such machines, the relative position of the slotting mechanism and the printing mechanism must be varied both axially and circumferentially for box blanks of different sizes and proportions, and adjustments must be made in accordance with different printing or different position of the printing on the blank, so that this printing will be disposed in proper relationship with the scored lines on which the blanks are folded in making up the boxes.

The axial adjustment of the slotting and scoring mechanisms is comparatively easily effected through the manipulation of readily accessible adjusting members when the machine is at rest, as disclosed in the Langston Patent 1,567,656, and this adjustment is not usually changed during the operation of the machine.

Circumferential adjustment of the slotting heads, and both the circumferential and axial adjustment of the printing cylinders, particularly if two color printing is to be done, present a much more serious problem. The back lash in the driving gears is ordinarily such that proper and accurate adjustment cannot be made in the first setting of the parts. It is necessary to make a first or approximate setting, then run the machine to produce a few blanks or other sheet products, stop the machine, readjust the parts, and start again. Sometimes, several such stoppings and readjustment are necessary before the machine will produce perfect results.

One object of the present invention is to provide a smooth running, well balanced mechanism, by means of which a wide range of circumferential adjustment of the operating parts with respect to the drive, may be easily and accurately effected while the machine is running, and without the necessity of stopping the machine or altering its speed.

As one important feature of the present invention, there is provided a differential gearing for effecting the circumferential ad-

justment of the operating parts in respect to the drive, the gearing being so designed and so mounted that in normal running, the rotating parts are symmetrical, and evenly balanced, whereby smooth operation and the minimum of wear and vibration are produced.

In our improved construction, the differential gearing includes an intermediate or idler shaft normally in a fixed position while the machine is operating, so that the only rotating parts are the gears and their shafts. Means are provided for moving this differential or intermediate shaft and its gearing bodily about the axis of the gears transmitting power to and from the gears on said shaft to effect a differential rotation between the driving and driven gears, and a corresponding circumferential adjustment of the rotatable operating member with respect to the drive. Means are provided for effecting this bodily movement in either direction, irrespective of whether the machine be at rest or running at full speed, and by the operation of a hand wheel or other part which is at rest except during adjusting movement.

If the rotatable member is a printing cylinder, it is advantageous to provide means for effecting the axial adjustment of said printing cylinder while the machine is operating. For that purpose, a second adjusting member is provided at the same side of the machine as the above mentioned member, and which may be shifted to effect axial adjustment of the cylinder while the machine is running or at rest.

In the accompanying drawings, there are shown for purposes of illustration, certain of many forms which the present invention may assume, and in which

Fig. 1 is a somewhat diagrammatic side elevation of a machine, showing several operating members which may be adjusted.

Fig. 2 is a transverse section showing a form of the present invention adapted to effect the circumferential and axial adjustment of a printing cylinder.

Fig. 3 is a section taken on line 3—3 of Fig. 2, and

Fig. 4 is a transverse section showing part of a slotting mechanism with circumferential adjusting means therefor.

Like reference characters denote like parts in the several figures of the drawings.

In the specific form of machine which has been selected for purposes of illustration and to which the invention may be applied, there is provided the usual frame structure 10 which carries a feed table 11 upon which may be stacked a plurality of superposed sheets between guide members 12. These sheets are successively fed into the machine by a feed mechanism operated by an oscillating lever 13. This mechanism may be of the type shown in the Langston Patent 1,150,210,

or may be of any other suitable construction, and therefore the details thereof are here omitted for the sake of simplicity.

The sheets pass between a pair of feed rollers 14 and between two pairs of printing units, each of which includes an upper printing cylinder 16 and a lower pressure cylinder 17. Each upper printing cylinder 16 carries a type plate 18 which is inked by ink fountain rolls 19. Different inks are supplied to the type plates of the different printing cylinders, and these plates and their cylinders are capable of being so positioned that, as the cylinders operate in succession, the two printings produced thereby will be in desired registered relationship. The sheets that have been printed pass through a scoring unit 20, and then through a slotting mechanism 21 for forming slots extending a predetermined distance from the edges of the blank, to form end-closure flaps.

In carrying out our invention, means are provided for effecting the circumferential adjustment of either the printing cylinders or the slotting heads, or both, with respect to the drive. In Fig. 2, there is shown an adaptation of the present invention for the circumferential and axial adjustment of a printing cylinder 16. For that purpose, a shaft 22 is provided, one end of which is splined to the printing cylinder by a key, so as to rotate therewith. This shaft 22 is journaled in the frame structure 10, and the end of a bracket 23. The peripheral portion of the cylinder 16 may be made of wood, so that type plates may be tacked thereon in any selective position.

Fig. 4 shows the construction of the present invention as adapted for the circumferential adjustment of the upper slotting mechanism 21. For that purpose, the shaft 22 supports a series of slotting heads 24 carrying slotting blades 25, and cooperating with a corresponding series of lower slotting heads 26 mounted on a shaft 27. The details of the slotting mechanism 21 itself forms no part of the present invention, and may be of the general type disclosed in the Langston Patent 1,567,656. The shaft 22 may also carry trimming wheels 28 to trim the edges of the advancing blank, so that the slots made by the slotting mechanism will be disposed in a predetermined position with respect to the sides of the blank being operated upon.

In order to effect the circumferential adjustment of either the slotting heads or the printing cylinder, the shaft 22 has loosely mounted thereon double gears 35 and 36, and has keyed or otherwise rigidly connected thereto a gear 37 which has a different pitch diameter from the gear 36. Mounted for rotation around the shaft 22 is a bracket 38 carrying a stub shaft 40 on which is mounted double gears 41 and 42 of different pitch diameters. The gear 41 is larger than the gear

42 and meshes with the gear 37, and the gear 42 meshes with the gear 36. The gear 35 engages the drive of the machine. During normal operations, the bracket 38 is stationary, the printing cylinder or slotting mechanism being driven from gear 35 to gear 36, through the gears 42 and 41, and to the shaft 22 through gear 37.

In order to effect the circumferential adjustment of the printing cylinder or the slotting mechanism, the bracket 38 is keyed or otherwise connected to a worm wheel 43 which is rotatable on the shaft 22, and which meshes with a worm 44 mounted in stationary brackets, and connected to a hand wheel 45, or other operating handle. By swinging the bracket 38 about the shaft 22 as an axis, the two gears 41 and 42 will rotate at equal speeds around their own axis, so that they will cause the relative rotation of the gears 36 and 37, thereby causing the advancement or retardation of the gear 37 in respect to the gear 36, and a corresponding adjustment of the printing cylinder or slotting mechanism with respect to the drive.

The gear 35 will be locked with the drive, and the swinging of the bracket 38 will cause the rotation of the gear 37 and the printing cylinder or the slotting heads in respect to the drive, irrespective of whether the machine be operating or at rest. It is therefore seen that with this construction, the rapid circumferential adjustments of the members operating on the blank can be effected without disengaging said members from the drive. The parts are also so proportioned that the bracket 38 can be swung completely around the shaft 22, and may be stopped in any position. The amount of rotation of the printing cylinder or slotting heads with respect to the drive gear 35 for a given movement of the bracket 38, can be varied by properly selecting the relative sizes of the gears 41 and 42, and 36 and 37. By making a difference of only one tooth in the gears 41 and 42, a complete revolution of the bracket 38 around the shaft 22 will advance or retard the printing cylinder or slotting heads through an annular distance equal to the width of one tooth on the gear 36. Thus, a very delicate and accurate adjustment may be secured through the movement of the bracket through the desired distance.

While the machine is normally operating, the axis of the shaft 40 will be fixed with respect to the shaft 22, and will be locked in position by the engagement of the worm wheel with the worm. As the bracket is normally at rest, no rotating parts are eccentric or unbalanced, and smooth running operations with minimum vibration is effected. It is only during adjusting operations that the axis of the shaft 40 is moved with respect to the axis of rotation of the operating member, but this movement of the shaft 40 during

adjustment is not a part of the driving or power transmitting operation.

The independent axial adjustment of the separate slotting heads may be effected by means such as shown in the Langston Patent 1,567,656.

Once the axial position of the slotting heads has been adjusted, it is not necessary to change such adjustment during operations of the machine. However, if the invention is to be adapted for use in the adjustment of a printing cylinder, it is advantageous to provide for the axial adjustment of said cylinder while the machine is operating. For that purpose, the shaft 22 is made hollow, and a rod 60 (Fig. 2) is provided which passes through said shaft, and which has one end thereof connected to the cylinder 16 by a pin 61. The outer end of the rod 60 carries a grooved collar 62 engaging the pins of a yoke 63 on the end of a pivoted lever 64. A screw rod 65 having a hand wheel 66 at one end thereof has a threaded engagement with the bracket 23, and has a pair of collars 67 and 68 engaging opposite sides of the lever 64 to prevent axial movement of the lever with respect to said screw rod. By rotating the hand wheel 66, the lever 64 may be swung in either direction, and the rod 60 and the cylinder 16 moved endwise in either direction.

It will be noted that both the hand wheel 45 and the hand wheel 66 are normally at rest while the machine is running, and that they are closely adjacent to each other on the same side of the machine. Thus the machine operator may grasp one in one hand and the other in the other hand, and adjust the machine so as to secure an accurately formed or printed product while the machine is running at full speed, or make such adjustments as may be necessary from time to time as the speed of the machine may be varied, and the back lash, lost motion, torsion, or tension of any of the driving parts is varied.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. A machine for operating on advancing sheet material, including a rotatable member for imparting to the sheet a desired characteristic, a hollow shaft connected to said rotatable member for rotation therewith, a rod passing through said hollow shaft, and connected to said rotatable member, means for shifting said rod and said member axially, a drive gear mounted for rotation on said shaft, a gear connected to said shaft, differential means for driving said second gear from said first gear, and normally stationary means for moving said differential means bodily around the axis of said first mentioned gear for effecting the relative rotational movement of said driving gear and said member while the machine is running.

2. A machine for operating on advancing

- sheet material, including a rotatable member for imparting to the sheet a desired characteristic, a drive therefor, a hollow shaft connected to said rotatable member for rotation therewith, a rod passing through said hollow shaft, and connected to said rotatable member, means connected to said rod for shifting said rod and said rotatable member axially, a bracket mounted for rotation about said shaft, a differential gearing carried in part by said bracket, and for transmitting power to said shaft, and means normally locking said bracket against rotation, but operable to rotate the bracket and effect circumferential adjustment of the rotatable member with respect to the drive while the machine is operating.
3. A machine for operating on advancing sheet material, including a rotatable member for imparting to the sheet a desired characteristic, a hollow shaft connected to said rotatable member for rotation therewith, a rod passing through said hollow shaft and connected to said rotatable member, a lever having one end connected to said rod, a screw rod connected to said lever for swinging said lever to shift said rod and said member axially, a differential gearing for transmitting power to said shaft, and having a normally stationary support, and means for moving said support at will while the machine is running to effect circumferential adjustment of said member.
4. A rotary printing press having a printing cylinder, a hollow shaft therefor, a differential gearing for driving said shaft, and having an intermediate shaft, a support therefor, a rod extending through said shaft, and a pair of handles, one for moving said shaft to adjust said cylinder axially, and the other for moving said support around said hollow shaft to adjust said cylinder circumferentially.
5. A machine for operating on advancing sheet material, including a rotatable member for imparting to the sheet the desired characteristic, a hollow shaft connected to said rotatable member for rotation therewith, a pair of gears on said shaft, one secured to the shaft and the other serving as a drive and loose thereon, gearing having a normally stationary axis, for transmitting power between said gears, means for moving said axis around said shaft to rotatably adjust one of said gears in respect to the other, a rod passing through said hollow shaft and connected to said rotatable member, and means for shifting said rod and said rotatable member axially.
6. A machine for operating on advancing sheet material, including a rotatable member for imparting to the sheet the desired characteristic, a hollow shaft connected to said rotatable member for rotation therewith, a drive, a normally stationary member rotatable about the axis of said shaft, means carried thereby for rotatably adjusting said shaft in respect to said drive, a rod passing through said hollow shaft and connected to said rotatable member, and means for shifting said rotatable member axially.
7. A machine for operating on advancing sheet material, including a rotatable member for imparting to the sheet the desired characteristic, a hollow shaft connected to said rotatable member for rotation therewith, a drive, gearing for transmitting power from said drive to said shaft, means for moving a portion of said gearing bodily around said shaft, to circumferentially adjust said shaft with respect to said drive, a rod passing through said hollow shaft and connected to said rotatable member, and means for shifting said rod and said rotatable member axially.
- Signed at Camden, in the county of Camden and State of New Jersey, this 27th day of July, 1931.
- SAMUEL M. LANGSTON.
KARL SIEG.