

Aug. 30, 1932.

L. K. ALDRICH

1,874,149

PAPER FEEDING MACHINE

Filed Feb. 24, 1931

2 Sheets-Sheet 1

Fig. 1.

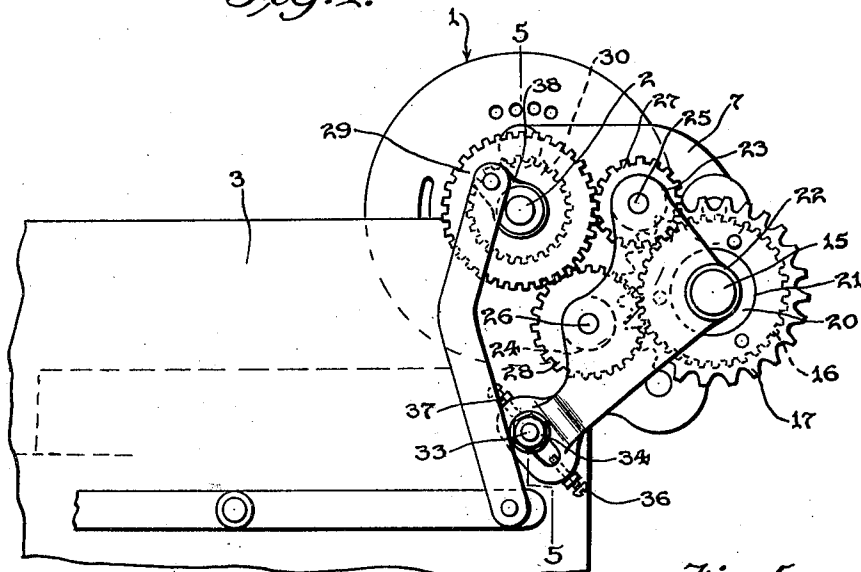


Fig. 2.

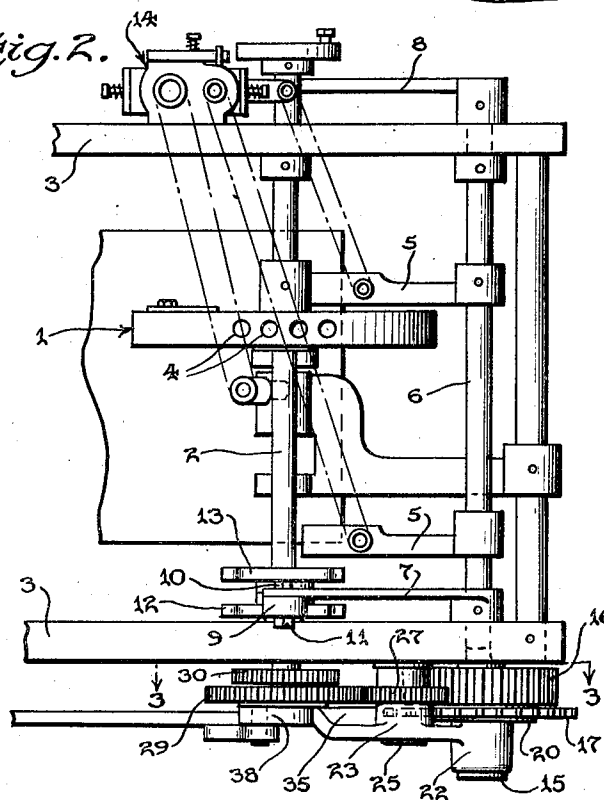
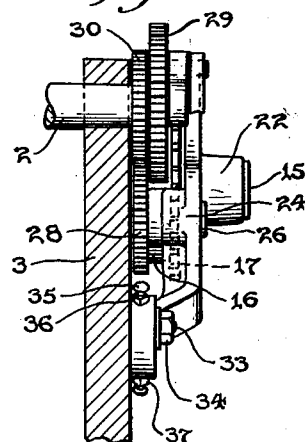


Fig. 5.



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Aug. 30, 1932.

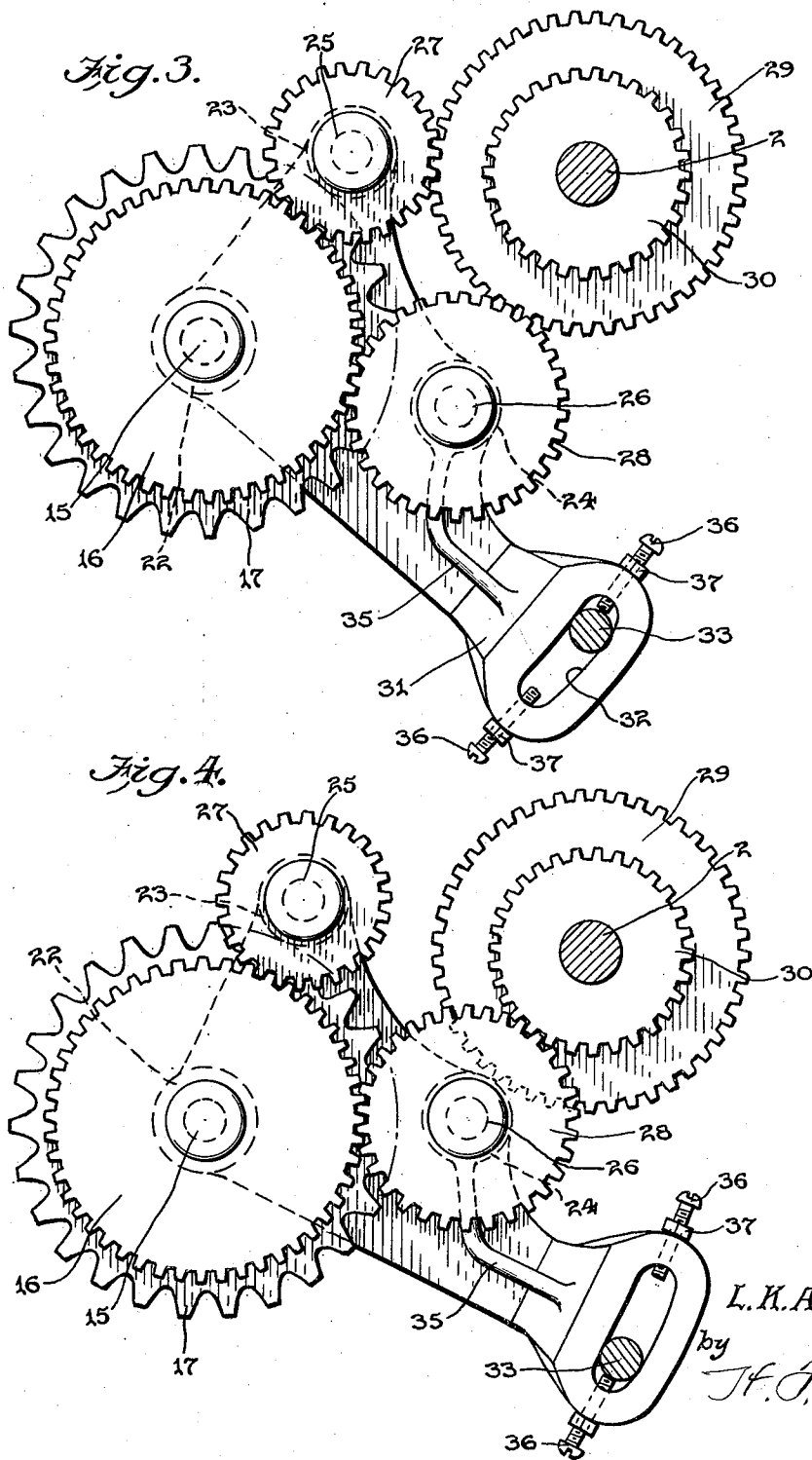
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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PAPER FEEDING MACHINE

Application filed February 24, 1931. Serial No. 517,961.

This invention relates to a finger type paper feeding machine and is an improvement on the convertible single or double rotary feeder shown and described in Letters Patent No. 1,696,705, granted to me December 25, 1928, and equipped with single and double cams controlling the action of the pick up fingers.

The object of the present invention is to equip the paper feeding machine of the aforesaid patent with a simple, practical and efficient approximately quadrant-shaped gear assembly of strong, durable and comparatively inexpensive construction adapted to be readily applied to the paper feeding machine of said patent and capable of affording additional speeds to the rotary feeding disk in order to enable the machine to feed sheets at additional rates per hour to obtain increased production on certain sizes of sheets and on certain kinds of stock.

A further object of the invention is to provide an improvement in paper feeding machines of this character, particularly adapted though not limited to the feeding of sheets to paper folding machines wherein parallel folding only is being performed and no timing is required between the feeder and the folder so that the feeder may run at the highest practical speed depending upon the length and nature of the sheets being fed, as the shorter of the sheets, the more per minute can be fed without increasing the speed of the parallel rolls and tape speed of the register or take off mechanism which receives the sheets from the feeding machine.

A further object of the invention is to provide a quadrant transmission assembly adapted to provide two different speeds for the rotary feeding disk and capable of being easily operated to quickly change the rotary feeding disk from one speed to the other.

With these and other objects in view, the invention consists in the construction and novel combination and arrangement of parts hereinafter described, illustrated in the accompanying drawings and set forth in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction, within the

scope of the claims, may be resorted to without departing from the spirit of the invention or sacrificing any of the advantages thereof.

In the drawings:—

Figure 1 is a side elevation of a portion of a paper feeding machine of the aforesaid patent provided with the improvements of the present invention.

Fig. 2 is a plan view of the same.

Fig. 3 is an enlarged sectional view taken substantially on the line 3—3 of Fig. 2 showing the quadrant gearing assembly in one position of the same.

Fig. 4 is a similar view showing the quadrant gearing assembly in the other position of the same.

Fig. 5 is a sectional view through the gearing taken substantially on the line 5—5 of Fig. 1.

In the accompanying drawings in which is illustrated the preferred embodiment of the invention, 1 designates the double pull off nozzle of the said patent consisting of a continuously rotating disk suitably fixed to a rotary transverse shaft 2 journaled in suitable bearings of the sides of the frame 3 of the machine, and provided at its periphery with suction mouths arranged in two arcuate sets, as shown and described in the aforesaid patent, one set of suction mouths 4 being shown in plan view in Fig. 2 of the drawings. As the particular construction and operation of the rotary suction disk are illustrated and described in the said patent, a detail description and illustration are deemed unnecessary in the present application.

Cooperating with the rotary suction disks are the winding arms 5 which constitute pick up fingers and which first engage the uppermost sheet of the stack and then lift the latter and move the sheet backwardly to produce an undulation in the sheet for winding the same similar to the winding of a sheet by hand to separate the top sheet from the rest of the stack. The winding arms 5 are suitably mounted on a transverse pivot shaft 6 journaled in suitable bearings in the sides of the frame 3 of the machine and carrying a cam actuated lever 7 and a valve operating

arm 8. The winding arm or pick up finger, as shown and described in the aforesaid patent, has a hollow tubular portion, which forms a passage for the air and which provides a suction mouth at the lower end of the winding arm. The suction mouth is adapted to engage the uppermost sheet of the stack at the forward edge of the sheet and to lift and wind the same.

The cam actuated lever 7 is located at one side of the machine adjacent to the frame and is provided at its cam engaging end with a roll 9 detachably mounted on the cam actuated lever 7 by means of the journal 10 and lock nut 11, as described in the said patent to enable the roll to be transferred from one side of the cam engaging lever 7 to the opposite side thereof to arrange it in a position to cooperate with either of the cams 12 and 13. The cam 12, as explained in the said patent, is a single cam while the cam 13 is a double cam. These cams are suitable mounted on the rotary shaft 2 and provide for a single operation of the winding arms or pick up fingers during each revolution of the rotary suction disk or two operations during each revolution of the said suction disk which may be arranged as explained in the said patent to operate as a single rotary feed or a double rotary feed.

The valve operating arm 8 which is located at the opposite side of the machine from that at which the cam actuated arm 7 is arranged is connected with the air valve 14 of the aforesaid patent which is operated during each revolution of the rotary suction disk when the single cam is employed and the said air valve is operated twice during each revolution of the suction disk when the double cam is in operation. As the construction and operation of the air valve are the same as shown and described in the aforesaid patent, detail illustration of the air valve is deemed unnecessary in the present application.

Running loosely on a stationary stud 15 is a main wide faced gear 16 to which is attached the feeder driving sprocket 17. The stud which is suitably mounted on the adjacent side of the frame 3 of the machine extends outwardly therefrom and is preferably provided at its outer end with a head 18 for retaining on it a substantially quadrant shaped bracket 19. The feeder driving sprocket preferably consists of a ring detachably secured to the main wide faced gear at the outer side thereof by screws or other suitable fastening means. The wide faced gear is provided at its outer side with an extension 20 of less diameter than the teeth of the wide faced gear and provided at its outer face with a circumferential recess 21 forming a seat for the feeder driving sprocket 17.

The approximately quadrant shaped bracket is pivotally mounted on the fixed stud 15 and it is provided at one of its angles with

a bearing 22 consisting of an integral sleeve or tubular portion which fits against the head of the stationary stud and the outer face of the extension of the main wide faced gear 16. The quadrant shaped bracket is also provided at spaced points with integral bearings 23 and 24 projecting from the inner face of the quadrant shaped bracket and having mounted in them headed studs 25 and 26. The headed studs 25 and 26 form stub shafts or journals for a pair of gears 27 and 28 which are permanently meshed with the main broad faced gear 16, the teeth of the broad faced gear being of a width substantially equal to the combined width of the teeth of the gears 27 and 28. These gears 27 and 28 which may be mounted on the pivoted quadrant shaped bracket in any other suitable manner are adapted to be alternately carried into engagement with a pair of cooperating gears 29 and 30 suitably fixed to the rotary shaft on which the suction disk is mounted.

The shiftable gear 27 is of less diameter than the shiftable gear 28 and is adapted to be carried into and out of mesh with the gear 29 which is of greater diameter than the gear 30 so that the shaft 2 and the suction disk 1 will be rotated at a lower rate of speed when the gear 27 of the pivoted bracket is in mesh with the gear 29 of the shaft 2 than when the other gear 28 of the pivoted bracket is in mesh with the smaller gear 30 of the shaft 2. The pivoted bracket has an angular terminal portion 31 which preferably bears against the adjacent side of the frame of the machine and which is provided with an arcuate slot 32 for the reception of a fixed stud 33. The stud 33 which is suitably mounted on the frame of the machine extends through the arcuate slot and is provided with a clamping nut 34 for engaging the outer face of the angular terminal portion of the pivoted bracket for clamping the pivoted bracket in either of its positions to maintain either the gear 27 or the gear 28 of the pivoted bracket in mesh with one of the cooperating gears of the rotary shaft 2.

The terminal angle portion of the pivoted bracket is preferably braced by a central web 35 and the slotted end of the bracket is provided with adjustable stop screws 36 threaded through the end of the bracket at opposite ends of the slot 32 and adapted to project into the same for limiting the pivotal movement of the bracket so that the teeth of the shiftable gears will accurately mesh with the cooperating gears of the shaft 2. The adjustable stop screws are provided with lock nuts 37 for retaining the stop screws in their adjustment.

Either one sheet or two sheets can be fed per revolution of the feeding disk by means of the two sets of suction mouths on the disk in combination with the single and double

cams controlling the action of the pick up fingers or winding arms. The addition of the gearing imparts two speeds to the disk and will therefore result in four rates of feeding.

Thus, when the quadrant is in its lower position, equal gears are engaged by the intermediate shiftable gear and when in its upward position the speed of the disk is increased by one half with the gears illustrated in the accompanying drawings. For instance, when the low speed gears are engaged and the single lobed cam is used, and if it be assumed that the disk is feeding 3600 sheets per hour the four speeds will be as follows:

The low speed gears in combination with the single cam will feed 3600 sheets per hour and the high speed gears in combination with the single cam will feed 5400 sheets per hour. The low speed gears in combination with the double cam will feed 7200 sheets per hour and the high speed gears in combination with the double cam will feed 10,800 sheets per hour.

Since the periphery of the disk has two different rates of speed in lineal feet per minute, the following is an explanation of the relation of the lineal speeds of the disk to the lineal speed of the take off mechanism or register of the folder or other machine fed by the paper feeding machine:

The higher lineal speed of the disk is very slightly slower than the lineal speed of the register which is constant. Consequently, the lower lineal speed of the disk is about $\frac{2}{3}$ of the lineal speed of the register. Therefore, when the disk is running at low speed, as soon as the disk has delivered the front end of the sheet to the pull off rollers on the register, the rate of travel of the sheet is increased by one half. The effect of this is that when the disk is running at low speed, it is possible to run sheets longer than the circumference of the disk when the single lobed cam is used and longer than one half the circumference of the disk when the double lobed cam is used without interference with the pick up fingers or winding arms in their downward movement. For instance, assuming that the diameter of the disk be 10" and the circumference of the disk, therefore, 31.4" the maximum length of the sheets which can be fed under the different conditions are as follows:

Low speed with the single cam the sheets can be 32" and with the high speed and single cam the sheets may be 25". With the low speed and double cam the sheets may be 16" and with the high speed and double cam the sheets may be 11".

When the quadrant is in its lower position and the drive is through the gears 16, 27 and 29, the disk will revolve at low speed and when the quadrant is in its upper position, the drive will be through the gears 16, 28 and 30, and the feeding disk will revolve at high speed. Additional speeds may be provided

by means of additional change gears and while definite ratio of speeds has been explained, it will be clear that the gear ratio may be changed as desired to provide the required speeds. The gear 29 of the shaft 2 is preferably provided with an integral crank element 38 for operating the elevating mechanism as shown and described in the aforesaid patent.

What is claimed is:

1. A paper feeding machine of the class described including a continuously rotating pull off device for feeding the sheets from a stack, a main gear designed to be actuated by feeder driving mechanism, a plurality of relatively fixed gears connected with the pull off device for actuating the same, and a bracket pivoted at the axis of the main gear and provided with a plurality of shiftable gears each of which is adapted to be carried by the movement of the pivoted bracket into mesh with one of the said relatively fixed gears, whereby the speed of the continuously rotating pull off device may be changed, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

2. A paper feeding machine of the class described including a continuously rotating pull off device for feeding the sheets from a stack, a main wide faced gear designed to be connected with and actuated by feeder driving mechanism, a shiftable bracket pivoted at the axis of the main gear and provided with a plurality of shiftable gears in permanent mesh with the said wide faced gear in different planes of the same, and a plurality of gears connected with the pull off device for actuating the same and each adapted to be engaged by a shiftable gear of the bracket whereby the speed of the pull off device may be changed, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

3. A paper feeding machine of the class described including a continuously rotating pull off device for feeding the sheets from a stack, a wide faced main gear, a feed drive sprocket wheel connected with and actuating the wide faced gear, a shiftable bracket pivotally mounted at the axis of the wide faced gear, shiftable gears mounted on the bracket at spaced points and in different planes and permanently meshing with the wide faced gear, and a plurality of gears connected with the pull off device and arranged in the planes of the shiftable gears, each of the shiftable

gears being adapted to be carried into mesh with the gear of the pull off device by the pivotal movement of the bracket to change the speed of the pull off device, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

4. A paper feeding machine of the class described including a continuously rotating pull off device for feeding the sheets from a stack, a wide faced gear provided with an extension, a feed driving sprocket wheel mounted on the extension of the wide faced gear, a substantially quadrant shaped bracket pivotally mounted at the axis of the said gear, a plurality of gears of different sizes connected with the pull off device and arranged in different planes, and a plurality of shiftable gears mounted on the pivoted bracket at spaced points and arranged in permanent mesh with the wide faced gear in the planes of the gears of the pull off device, each of the shiftable gears being adaptable to be carried into mesh with one of the gears of the pull off device by the shifting of the bracket to change the speed of the pull off device, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

5. A paper feeding machine of the class described including a fixed projecting stud, a wide faced gear mounted on the said stud and adapted to be actuated by feed driving gearing, a substantially quadrant shaped bracket pivotally mounted on the said stud and provided at spaced points with shiftable gears in permanent mesh with the wide faced gear, a plurality of gears connected with the pull off device and arranged in the planes of the shiftable gears, each of the latter being arranged to be carried into mesh with one of the gears of the pull off device by the pivotal movement of the bracket to change the speed of the pull off device, and means for securing a substantially quadrant shaped bracket in the adjustment of the shiftable gears, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

6. A paper feeding machine of the class described including a fixed projecting stud, a wide faced main gear mounted on the stud and adapted to be rotated by feeder driving gearing, an approximately quadrant shaped bracket pivotally mounted at one end

on the stud and provided at the opposite end with a slot permitting pivotal movement of the bracket on the said stud, a fastening device operating in the slot for securing the bracket in its pivotal adjustment, a plurality of shiftable gears mounted on and carried by the bracket and permanently meshing with the main gear, and a plurality of gears connected with the pull off device, each of the shiftable gears being adapted to be carried into mesh with one of the gears of the pull off device by the pivotal movement of the bracket to change the speed of the pull off device, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

7. A paper feeding machine of the class described including a fixed projecting stud, a wide faced gear mounted on the stud, a feeder driving sprocket wheel connected to the wide faced gear, a substantially quadrant shaped bracket pivotally mounted at one end on the stud and having its other end angularly offset and provided with a slot, a fastening device operating in the slot for securing the bracket in its pivotal adjustment, a plurality of gears of different diameters connected with the pull off device, and a plurality of shiftable gears mounted at spaced points on the bracket and carried by the same, each of the shiftable gearings being adapted to be carried into mesh with one of the gears of the pull off device to change the speed thereof, the ratio of the gears being such that the higher lineal speed of the pull off device is less than that of the machine to be fed so that the speed of the fed sheets will be accelerated to enable sheets of greater length than circumference of the pull off device to be fed.

8. A paper feeding machine of the class described including a fixed projecting stud, a wide faced main gear mounted on the stud and adapted to be rotated by feeder driving gearing, an approximately quadrant shaped bracket pivotally mounted at one end on the stud and provided at the opposite end with a slot permitting pivotal movement of the bracket on the said stud, a fastening device operating in the slot for securing the bracket in its pivotal adjustment, a plurality of shiftable gears mounted on and carried by the bracket and permanently meshing with the main gear, adjustable stop screws located at opposite ends of the slot for limiting the pivotal movement of the bracket, and a plurality of gears connected with the pull off device, each of the shiftable gears being adapted to be carried into mesh with one of the gears of the pull off device by the pivotal movement of the bracket to change the

speed of the pull off device, the ratio of the
gears being such that the higher lineal speed
of the pull off device is less than that of the
machine to be fed so that the speed of the
fed sheets will be accelerated to enable sheets
5 of greater length than circumference of the
pull off device to be fed.

In testimony whereof I affix my signature.
LESTER KYLE ALDRICH.

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