June 13, 1933. G. G. GOING 1,913,753

TYPEWRITING MACHINE

Filed June 9, 1931 3 Sheets-Sheet 1

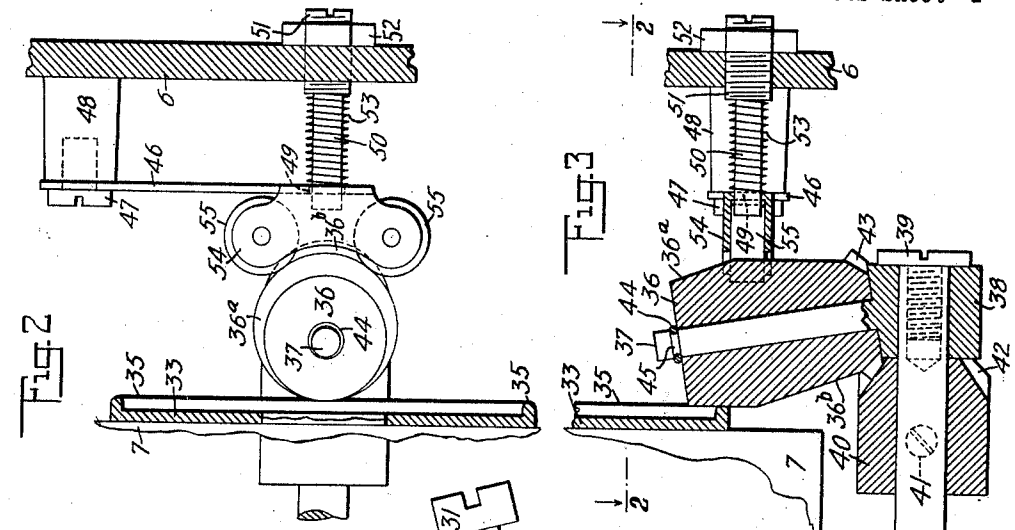


Fig. 2

Fig. 3

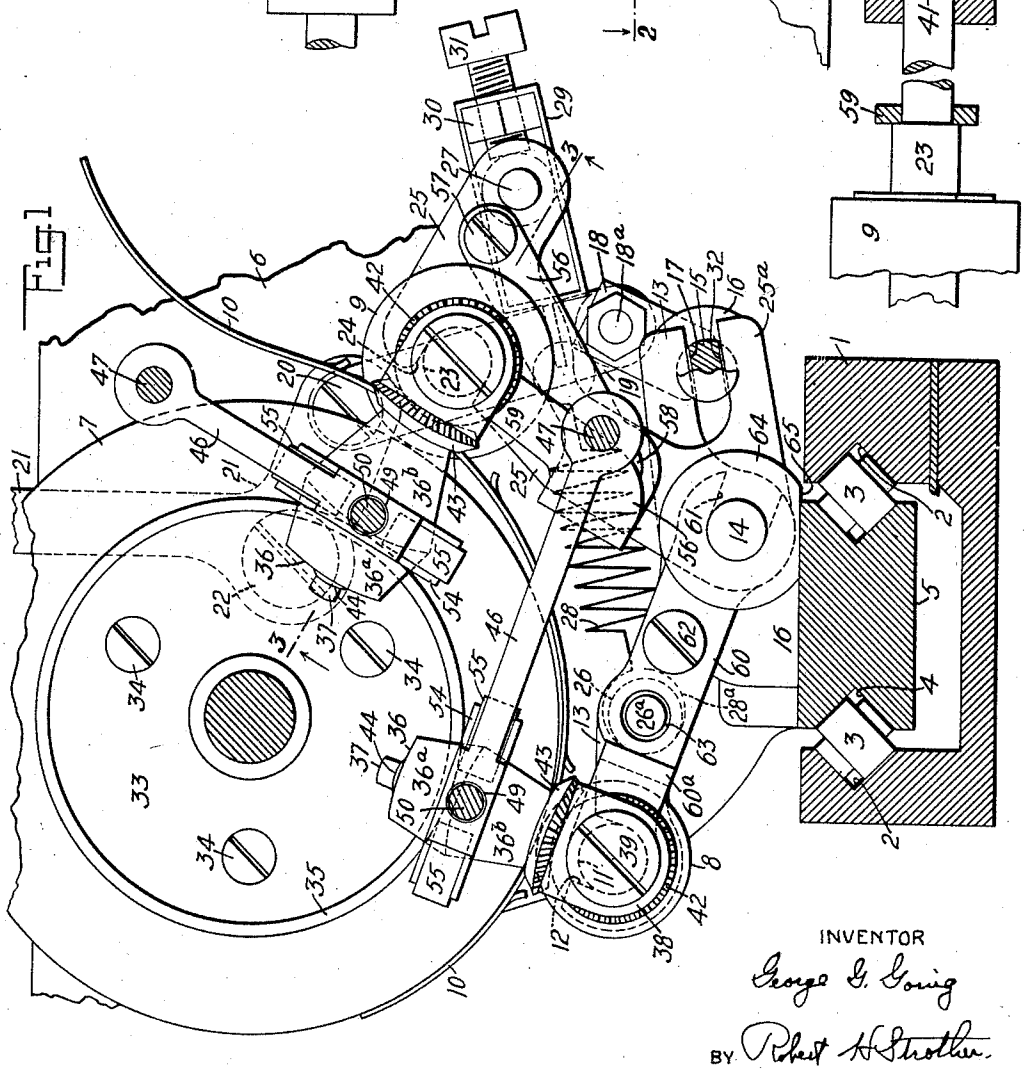


Fig. 1

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TYPEWRITING MACHINE

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Fig. 4

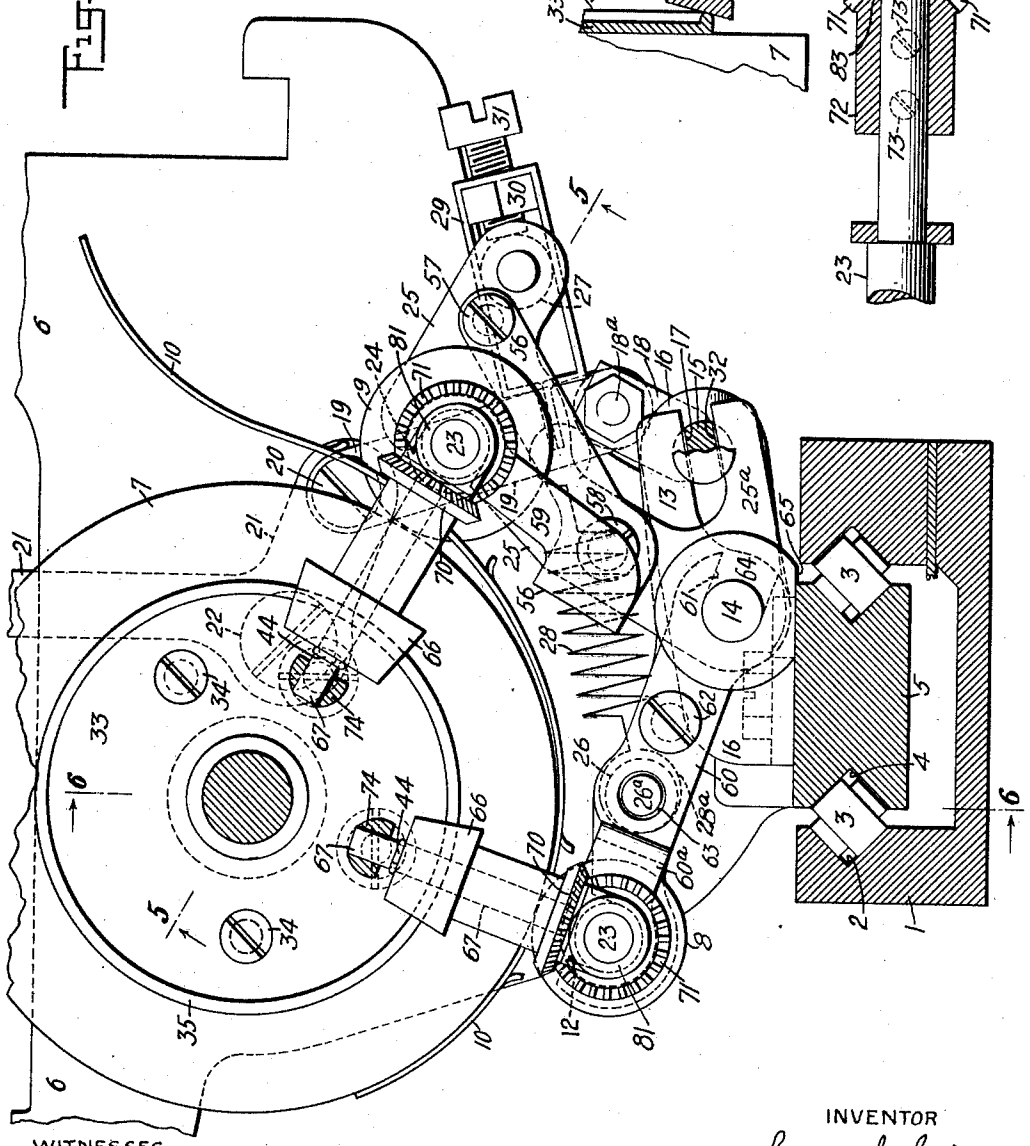


Fig. 5

WITNESSES

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TYPEWRITING MACHINE

Filed June 9, 1931 3 Sheets-Sheet 3

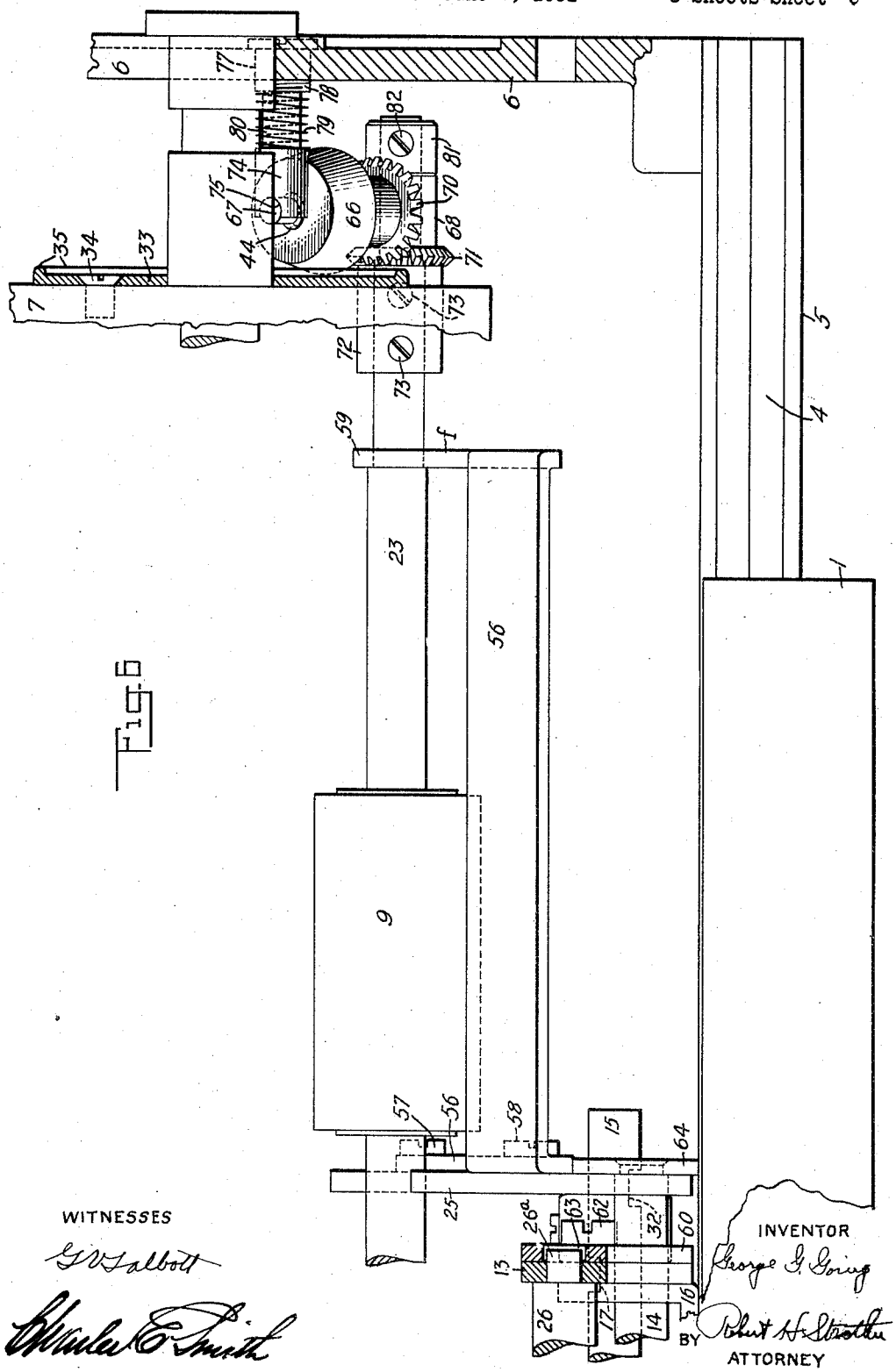


FIG 6

WITNESSES

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UNITED STATES PATENT OFFICE

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TYPEWRITING MACHINE

Application filed June 9, 1931. Serial No. 543,057.

My invention relates to typewriting and like machines and more particularly to paper feed mechanism therefor.

Much difficulty has been experienced heretofore in providing an efficient paper feed mechanism due to the fact that one or more of the outer sheets are apt to creep or slip relatively to one or more sheets nearer the platen when a plurality of work sheets with interposed carbon sheets are fed together. It has been found that the ordinary loosely mounted feed rollers apparently will turn freely and sometimes advance the outermost work sheets relatively to the underlying sheets nearer the platen. Various means have been proposed to overcome these difficulties. When an increased pressure is exerted on the feed rollers, aside from the question of the effectiveness of this method of overcoming the difficulties, "tracking" from the carbon sheets is apt to result, especially when soft carbons are employed.

It is one of the main objects of my present invention to overcome the above mentioned difficulties and to provide paper feed mechanism which will be highly efficient under the varying conditions of use and to properly feed the paper without creeping and without "tracking", whether a single sheet or a large number of sheets with interposed carbons be employed.

A further object of my invention is to provide means whereby the paper feed rollers will be driven from the platen through intermediate driving connections at a rate of surface speed corresponding to that of the work sheet with which the feed rollers contact, whether a single sheet or a large number of sheets with interposed carbons be employed.

A still further object of my invention is to provide variable speed transmission devices in the driving connections between the feed rollers and the platen that will automatically vary the speed at which the feed rollers are driven from the platen, depending on the number of sheets being fed together between the feed rollers and the platen.

Another object of my invention is to provide such a construction as that referred to above in which the feed rollers may be moved at will by hand into and out of contact with the platen (or a paper thereon) without interference from said variable speed transmission devices.

Still another object of my invention is to provide two independent sets of feed rollers with separate and distinct driving connections of the character referred to above between each set of feed rollers and the platen, a single feed roller releasing device being effective nevertheless to simultaneously release both sets of feed rollers.

To the above and other ends which will hereinafter appear my invention consists of the features of construction, arrangements of parts and combinations of devices set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings, wherein like reference characters indicate corresponding parts in the different views,—

Fig. 1 is an enlarged, detail, fragmentary, end elevation with parts in section of the carriage of a typewriting machine equipped with the devices of my invention.

Fig. 2 is an enlarged, detail, fragmentary, sectional view of the same, the section being taken on the line 2—2 of Fig. 3 and looking in the direction of the arrows at said line.

Fig. 3 is a like fragmentary, detail, sectional view of the construction, the section being taken on the line 3—3 of Fig. 1 and looking in the direction of the arrows at said line.

Fig. 4 is a view corresponding to Fig. 1 but showing a modified form of construction.

Fig. 5 is an enlarged, detail, fragmentary, sectional view of a portion of the construction shown in Fig. 4, the section being taken on the line 5—5 of Fig. 4 and looking in the direction of the arrows at said line.

Fig. 6 is an enlarged, detail, fragmentary, front elevation, partly in section, of a portion of the modified form of construction illustrated in Fig. 4.

In the present instance I have shown my invention embodied in the carriage of a No. 6 Remington Noiseless typewriting machine, although it should be understood that the in-

vention may be embodied in various types of typewriting and like machines.

In the accompanying drawings 1 represents the usual carriage support of the No. 6 Remington Noiseless machine provided with grooved raceways 2 in which crossed antifriction rollers 3 are received. These rollers are likewise received in grooved raceways 4 in a supporting or cross bar 5 of the carriage. The carriage is thus supported for traveling movement across the top plate from side to side of the machine. Carriage end plates 6 are fixedly secured to the supporting bar 5 near the ends thereof and are provided with bearings to support a cylindrical platen 7.

In the present instance I have illustrated two sets of main paper feed rollers, the forward feed rollers 8 and the rear feed rollers 9. These feed rollers extend through openings in a combined paper table and apron 10 carried by the carriage in the usual manner, the rollers bearing against and coacting with the platen or the work sheets thereon. I prefer to make the rear feed rollers 9 of larger diameter than the front feed rollers 8. The forward feed rollers are fixedly mounted on a shaft 11 which is received in open mouthed bearings 12 in a pair of supporting arms 13 pivoted on a supporting rod or pivot 14 for pivotal movement. Each of the arms 13 extend rearward beyond the pivot rod 14 and overlies a rock shaft 15 supported in bracket arms 16 secured to the cross bar 5 of the carriage. A flat face 17 on the rock shaft coacts with each of the rearwardly extended arms 13 to cam the latter and move the feed rollers 8 away from the platen when the shaft 15 is rocked. One end of the shaft 15 is extended upward to provide a crank arm 18 to which a link 19 is pivoted at 18^a, the upper end of said link being pivoted at 20 to one arm of an angular releasing lever 21 pivoted at 22 on an end plate 6 of the carriage. The upright arm of the angular lever 21 is provided with a finger piece by which said lever may be actuated to rock the shaft 15 and effect a release of the feed rollers.

The rear feed rollers 9 are fixedly mounted on a shaft 23 received in open mouthed bearings 24 in a pair of angular levers 25 supported for pivotal movement on the pivot rod 14.

A cross bar 26 unites the supporting arms 13, and a corresponding cross bar 27 unites the levers 25 by which the rear feed rollers 9 are supported. These two cross bars 26 and 27 are connected intermediate their ends by a coiled contractile spring 28. The connection between the coiled spring 28 and the cross bar 26 is effected by merely looping the forward end of the spring, as indicated at 28^a, around said cross bar. Connection between the rear end of the spring 28 and the cross bar 27 is effected by passing the looped rear end of the spring through openings in a yoke-like member 29 that surrounds the rod 27 and receives a nut 30 between the arms of the yoke. A screw 31 is threaded into the nut 30 and bears at its forward free end against the cross bar 27, thus providing adjusting means for varying the tension of the spring 28 and of course providing an adjustable connection between the cross bar 27 and the spring. This construction is similar to that employed in the No. 6 Remington Noiseless machine and has all of the advantages of such construction.

Each of the angular levers 25 is provided with a rearwardly extending arm 25^a at the lower end thereof. Each of these arms 25^a underlies the rock shaft 15 and co-acts with a flattened face 32 thereon so that when said shaft is rocked both sets of feed rollers will be moved away from the platen. It will be understood from the foregoing that the single spring 28 is effective to move both sets of feed rollers 8 and 9 against the platen with a balanced pressure.

I will now describe the means for driving the rear set of feed rollers 9 from the platen through intermediate driving connections that include variable speed transmission devices.

At each end of the platen there is secured a disk 33 by means of screws 34. Each disk is concentric with the platen and is provided at the edge thereof with a laterally projecting flange 35 that constitutes a driving member for the feed rollers. The contact surface of each flange 35 coacts with a driven member or cone designated as a whole by the reference numeral 36. As best illustrated in Fig. 3 the driving member 36 in each instance is a double cone wheel comprising an inner section 36^a and an outer section 36^b. Each driven member 36 is loosely mounted on an inclined stub shaft 37 which projects radially towards the axis of the platen from a hub 38 loosely mounted on the shaft 23 on which the feed rollers 9 are fixedly mounted. A headed screw 39 is received in a tapped opening in each end of the shaft 23 and holds the associated hub 38 against outward axial movement on the shaft 23. Movement of each hub in the opposite direction along the shaft is prevented by a bevel gear 40 fixed on the shaft 23 by a set screw 41. The teeth 42 of each bevel gear 40 mesh with teeth 43 provided at the lower end of the associated driven member 36, said teeth 43 constituting a bevel gear that forms part of said member. A spring-pressed split ring 44 is received in a peripheral groove 45 in each stub shaft 37 to prevent accidental upward displacement of the companion member 36 on said stub shaft. By inclining each shaft 37 in the manner shown in Fig. 3, I am enabled to bring the contact face of the upper section 36^a of the associated driven cone, which coacts with a driving member 35 on

the platen, parallel therewith. When, therefore, each member 36 receives a bodily radial movement relatively to the platen, as it does when the feed rollers 9 are moved towards and from the platen, the associated driving flange 35 will act at a higher or lower point on the cone wheel without, however, disturbing the relation thereof laterally with reference to the contact surface of the associated flange 35. It will be understood of course that these variable speed transmission devices at both ends of the platen vary the speed of the feed rollers 9 depending on the distance of the feed rollers from the surface of the platen. Rotative movement of the platen is transmitted to each member 36, and through the companion bevel gears 43, 40 to the shaft 23 to turn the feed rollers 9. The parts are so proportioned that the driving of the feed rollers 9 in this manner will be at a rate of surface speed corresponding to the outermost work sheet employed on the platen. If but a single sheet be employed, the surface speed of the rollers 9 will correspond substantially to that of the platen, whereas if a number of work sheets with interposed carbons are employed, the variable speed transmission devices will automatically determine the rate of surface speed of the feed rollers 9 so that it will accord with the surface speed of the outermost work sheet, or the increased diameter of the platen brought about by the employment of such stack of work sheets and interposed carbons.

In order to prevent cones 36 from being carried along with the driving devices 35 and to maintain the shafts 37 against displacement around the axis of the shaft 23, I provide for each cone a spring pressed retaining device which comprises a flexible arm 46 held by a screw 47 to a post 48 on a side plate 6 of the carriage. In order to prevent a pivotal movement of each flexible arm 46 around the screw 47 I aperture each member 46 at 49 to receive a pin 50. Each pin has an enlarged threaded end portion 51 received in a tapped opening in the associated side plate 6 of the carriage, and a lock nut 52 is threaded onto the portion 51 of each pin 50 to secure it in any position of axial adjustment it may receive. A coiled expansion spring 53 surrounds each pin 50 and bears at one end against the enlarged threaded portion 51 of said pin, and at its other end against the companion flexible arm 46. The lower end of each member 46 is bent to form a yoke-like supporting portion 54 between the arms of which are pivoted two anti-friction rollers 55. These rollers, as will be understood from an inspection of Fig. 2, bear against and embrace the cone section or portion 36^b of the companion member 36 on opposite sides of the stub shaft 37. The pressure of each spring 53 is therefore not only exerted on the associated cone to maintain an effective driving connection between it and the driving surface of the flange 35, but also maintains contactive engagement between the rollers 55 and the cone to hold the latter against turning movement around the axis of the shaft 23 as a center.

In order that each member 36 may effectively partake of the movement of the shaft 23 towards and away from the surface of the platen, I provide a bracket member 56 (see Fig. 6) associated with each supporting lever 25 and secured thereto by screws 57 and 58. An arm 59 on each bracket 56 is apertured to provide a bearing in which a reduced portion of the shaft 23 is received. This provides an outwardly extending support from each lever 25 to connect the outer end portion of the shaft 23 thereto, and provides an efficient connection at these points for supporting said shaft and carrying the driving gear connections between the shaft and the cones 36 together with the latter in the movement of the feed rollers 9 towards and from the platen.

For reasons which will hereinafter more clearly appear, I prefer to employ separate driving connections between the platen and the rear feed rollers 9, and between the platen and the front feed rollers 8. When it is remembered that the feed rollers of these two sets are of different diameters it will be understood that the same driving connections between the feed rollers of one set and the platen could not be utilized for driving the feed rollers of the other set, especially when it is borne in mind that there are provided variable feed transmission devices in each instance.

The front feed rollers 8 are driven from the platen by the same character of means as hereinbefore described with reference to the rear feed rollers 9, and corresponding parts in both sets of driving connections will be designated by the same reference numerals. For effectively supporting the shaft 11 of the front set of feed rollers there is provided on each supporting arm 13 an additional bracket arm 60 that is bifurcated at its lower end 61 to straddle the pivot rod 14. A screw 62 fixedly connects each arm 60 to its companion supporting arm 13 by which the shaft 11 is carried. Each bracket arm 60 is off-set outwardly at 60^a and is provided with a closed bearing in which the shaft 11 is supported. Each arm 60 is apertured at 63 to receive the companion reduced end 26^a of the cross bar 26 therein. Preferably the pivot rod 14 has riveted to each end thereof a washer 64 flattened at its lower side, as indicated at 65, to receive a bearing on the supporting bar 5 of the carriage. From an inspection of Fig. 1 it will be understood that each of the flexible members 46 for the front feed rollers is inclined downward and rearward to the supporting post and screw 47

on which it is secured, whereas each of the flexible supporting members 46 for the rear feed rollers is inclined upward and rearward to its supporting post and screw 47. In each instance, however, the axial movement of the cone 36 is radial of the platen towards and from the axis thereof. This movement of course, in both instances, is brought about by the increase or decrease of the number of work sheets and interposed carbons employed.

In the modified form of the construction disclosed in Figs. 4, 5 and 6 the principal distinction is in the cones and the manner of mounting and controlling the same. Referring more particularly to Fig. 5 it will be seen that each of the driven members for the shaft 23 of the rear set of feed rollers 9 is in the nature of a single cone 66 mounted on a stub shaft 67 that projects from a hub 68 towards the axis of the platen. Each hub 68 surrounds a reduced end portion of the shaft 23 and is provided with a rocker bearing 69 that enables the hub to receive a slight rocking motion on the shaft to facilitate the movement of the companion stub shaft 67 towards and from the adjacent end of the platen. This is in order to afford a slight rocking motion of the stub shafts 67 on the shaft 23 as the face of each cone moves on its flange 35 during the movement of the feed rollers 9 towards and from the face of the platen, and as the higher or lower portion of the cones contact with said flanges. The lower end of each driven member carrying a cone 66 is provided with a bevel gear 70 that meshes with another bevel gear 71, the hub 72 of which is fixed to a reduced portion of the shaft 23 by set screws 73. It will be understood that a meshing engagement is maintained between the bevel gears 70 and 71 irrespective of the slight teetering side motion of the cones as the latter are moved towards and from the axis of the platen.

In this modified construction each of the cones is maintained in effective contact with its flange 35 by a plunger 74 recessed at its inner end at 75 to form a seat for the upper end of the companion stub shaft 67 and to partly surround and embrace the latter. Each plunger 74 has a reduced stem 76 received in a guide sleeve 77, screw threaded at 78 where it is received in a tapped opening in the companion end plate 6 of the carriage. A coiled expansion spring 79 surrounds a reduced portion 80 of each guide sleeve 77 and bears at one end against the companion plunger 74. The force of each spring is exerted against the companion stub shaft 67, thus forcing the cone carried thereby into effective frictional contact with its flange 35. It will be understood that an adjustment of each guide sleeve 77 in its tapped opening will vary the force exerted by the companion spring 79 on its cone. It also will be understood that by seating the end of each stub shaft 67 in the recess in the associated plunger in the manner described, provision is made for preventing the companion stub shaft and the cone supported thereby from turning around the axis of the shaft 23. A collar 81 is secured to each end of the shaft 23 by a set screw 82 to prevent an outward displacement of the hubs 68 along the shaft. Each bevel gear 71 is recessed at 83 to permit a slight rocking motion of the companion hub 68 as its stub shaft is rocked towards and from the end of the platen.

From an inspection of Fig. 4 it will be seen that the same character of driving connections that are employed between the platen and the feed rollers 9, also are employed between the platen and the feed rollers 8, except that the gearing in each case is proportioned for properly driving either the feed rollers 9 or the smaller feed rollers 8. The remainder of this modified form of the construction is similar to that hereinbefore described and such description need not be repeated.

It will be understood of course that an operation of the release lever 21 is effective not only to release the feed rollers 9 in the manner hereinbefore indicated, but also will simultaneously effect a release of the forward set of feed rollers 8.

From certain aspects of my invention I prefer to employ the construction disclosed in Figs. 1, 2 and 3 inasmuch as the variation at which the feed rollers are driven may be brought about without rocking the stub shafts 37 as is necessary with the stub shafts 67 in the modified form of the construction. However, there are certain advantages inherent in the modified form of construction shown in Figs. 4, 5 and 6, in that the devices may be confined within a smaller space intermediate the end plates 6 of the carriage and the ends of the platen than is the case in the form of construction shown in Figs. 1, 2 and 3. In some machines this is an important factor.

It will be understood that in accordance with the present invention it is possible to materially reduce the spring force ordinarily exerted on the feed rollers and yet effectively drive the feed rollers from the platen always at the same surface speed as the outermost sheet irrespective of the number of work sheets and interposed carbon sheets employed. The effect of this is to reduce to a minimum, or in fact to eliminate entirely, "tracking," and at the same time produce a more effective feed than is possible with the mere loosely mounted feed rollers.

By the present invention I am enabled to provide an effective feed of the paper under all the varying conditions of use. For example, aside from what has been hereinbe-

fore pointed out, the operator is enabled to turn back the platen for correction with the assurance that there will be no slipping of the work sheets one on another and that the paper will be accurately returned to the proper position during the forward or return feed of the platen. The fact that the feed rollers are at all times in geared connection with the platen enables such feed rollers to counteract any tendency of the outermost work sheet or sheets to slip or creep, it being understood that such tendency is greatest at the outermost sheet or sheets. Moreover, due to the same geared connection the feed rollers cannot spin freely as in the ordinary construction wherein loosely disposed feed rollers are employed, but are always held to a surface speed which corresponds to that of the sheet with which they cooperate whether one or a large number of sheets be employed in the machine.

In practice I prefer to employ the driving connections for the paper feed rollers at both ends of the platen, not alone because a more effective drive of the rollers is provided by such connections, but because an oppositely disposed balanced pressure is exerted by the springs 53 or 79 against the platen, whereas if the force of such springs be exerted on one end only of the platen they would tend to force the platen axially in one direction against its bearings with undue force and render the platen harder to turn.

Various changes may be made in the construction, and certain features thereof may be employed without others, without departing from my invention as it is defined in the accompanying claims.

What I claim as new and desire to secure by Letters Patent, is:

1. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including means for varying the speed at which said feed rollers are driven from the platen in accordance with the variation in the diameter of the platen due to the increased or decreased thickness or number of the work sheets on the platen.

2. The combination of a cylindrical platen, paper feed rollers, intermediate driving connections between the platen and said feed rollers including automatically operating means for varying the speed at which said feed rollers are driven from the platen in accordance with the variation in the diameter of the platen due to the increased or decreased thickness or number of the work sheets on the platen, and hand actuated controlling means operable at will for shifting said feed rollers into and out of contact with the platen or the work sheets thereon without interference from said intermediate driving connections.

3. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices shiftable by a movement of said feed rollers to and from the platen to vary the speed of the feed rollers depending on the distance of the feed rollers from the platen.

4. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element on the platen, a cone wheel cooperative therewith, means for turning said feed rollers from said cone wheel, and means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen.

5. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element on the platen, a cone wheel cooperative therewith, toothed gearing between said cone wheel and feed rollers for driving the latter from said cone wheel, and means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen.

6. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element on the platen, a cone wheel cooperative therewith, means for turning said feed rollers from said cone wheel, means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen, and spring means for maintaining a cooperative engagement between said cone wheel and driving element irrespective of the variation in the position of the cone wheel relatively to said driving element.

7. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including a circular driving member on one end of the platen disposed concentrically with the axis thereof, a driven member disposed radially of the platen and having a cone wheel carried thereby which coacts with said driving member, driving connections between said driven member and feed rollers, and means for mounting said driven member and feed rollers for bodily movement together as the feed rollers move towards and from the platen, whereby the speed at which the feed rollers are driven from the platen will vary depending on the position of the feed rollers relatively to the platen.

8. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed

rollers including a circular driving member on one end of the platen disposed concentrically with the axis thereof and having a frictional contact face, a driven member disposed radially of the platen and having a friction cone wheel carried thereby which coacts with the friction surface of said driving member, driving connections between said driven member and feed rollers, means for mounting said driven member and feed rollers and driving connections for bodily movement together as the feed rollers move towards and from the platen, and spring means for maintaining said cone wheel and driving member in frictional engagement, whereby the speed at which the feed rollers are driven from the platen will vary depending on the position of the feed rollers relatively to the platen.

9. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including a circular driving member on one end of the platen disposed concentrically with the axis thereof, a driven member disposed radially of the platen and having a cone wheel carried thereby which coacts with said driving member, means for mounting said driven member for longitudinal and also for lateral movement, spring means bearing against said driven member to press it laterally and maintain an effective driving engagement between said cone wheel and the circular driving member, driving connections between said driven member and feed rollers, and means by which a movement of the feed rollers to and from the platen will shift said driven member longitudinally and vary the speed at which the feed rollers are driven from the platen depending on the movement of the feed rollers to and from the platen.

10. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including a circular driving member on one end of the platen disposed concentrically with the axis thereof, a driven member disposed radially of the platen and having a cone wheel carried thereby which coacts with said driving member, means for mounting said driven member for longitudinal and also for lateral movement, spring means bearing against said driven member to press it laterally and maintain an effective driving engagement between said cone wheel and the circular driving member, bevel gearing between said driven member and feed rollers, and means for mounting said feed rollers, driven member and bevel gearing for movement together in the movement of the feed rollers to and from the platen, whereby the speed at which the feed rollers are driven from the platen will vary depending on the position of the feed rollers relatively to the platen.

11. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including means for varying the speed at which said feed rollers are driven from the platen in accordance with the variation in the diameter of the platen due to the increased or decreased thickness or the number of the work sheets on the platen; a second set of feed rollers; and like independently operable driving connections between said second set of feed rollers and the platen.

12. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including means for varying the speed at which said feed rollers are driven from the platen in accordance with the variation in the diameter of the platen due to the increased or decreased thickness or the number of the work sheets on the platen; a second set of feed rollers; like independently operable driving connections between said second set of feed rollers and the platen; and hand actuated controlling means operable at will for shifting all of said feed rollers into and out of contact with the platen or the paper thereon without interference from said intermediate driving connections.

13. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including variable speed transmission devices shiftable by a movement of said feed rollers to and from the platen to vary the speed of the feed rollers depending on the distance of the feed rollers from the platen; a second set of feed rollers; and like separate and distinct variable speed transmission devices between said second set of feed rollers and the platen.

14. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including variable speed transmission devices shiftable by a movement of said feed rollers to and from the platen to vary the speed of the feed rollers depending on the distance of the feed rollers from the platen; a second set of feed rollers; like separate and distinct variable speed transmission devices between said second set of feed rollers and the platen; and hand actuated controlling means operable at will for shifting all of said feed rollers into and out of contact with the platen or the paper thereon without interference from said variable speed transmission devices.

15. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element

on the platen, a cone wheel cooperative therewith, means for turning said feed rollers from said cone wheel, and means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen; a second set of paper feed rollers; and like separate and distinct variable speed transmission devices between said second set of feed rollers and the platen.

16. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including a circular driving member on one end of the platen disposed concentrically with the axis thereof, a driven member disposed radially of the platen and having a cone wheel carried thereby which coacts with said driving member, driving connections between said driven member and feed rollers, and means for mounting said driven member and feed rollers for bodily movement together as the feed rollers move towards and from the platen, whereby the speed at which the feed rollers are driven from the platen will vary depending on the position of the feed rollers relatively to the platen; a second set of feed rollers; and like separate and distinct intermediate driving connections between said second set of feed rollers and said circular driving member.

17. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including a circular driving member on one end of the platen disposed concentrically with the axis thereof, a driven member disposed radially of the platen and having a cone wheel carried thereby which coacts with said driving member, means for mounting said driven member for longitudinal and also for lateral movement, spring means bearing against said driven member to press it laterally and maintain an effective driving engagement between said cone wheel and the circular driving member, driving connections between said driven member and feed rollers, and means by which a movement of the feed rollers to and from the platen will shift said driven member longitudinally and vary the speed at which the feed rollers are driven from the platen depending on the movement of the feed rollers to and from the platen; a second set of paper feed rollers; and like separate and distinct driving connections between said second set of feed rollers and said circular driving member.

18. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element on the platen, a cone wheel cooperative therewith, means for turning said feed rollers from said cone wheel, and means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen, the line of contact on said cone wheel being parallel with the plane of the contact face of said driving element with which the cone wheel coacts.

19. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element on the platen, a cone wheel cooperative therewith, means for turning said feed rollers from said cone wheel, means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen, spring means for maintaining a cooperative engagement between said cone wheel and driving element irrespective of the variation in the position of the cone wheel relatively to said driving element, and adjusting means for varying the force exerted by said spring means.

20. The combination of a cylindrical platen, paper feed rollers, and intermediate driving connections between the platen and said feed rollers including variable speed transmission devices comprising a driving element on the platen, a cone wheel cooperative therewith, means for turning said feed rollers from said cone wheel, means for varying the position of said cone wheel relatively to said driving element as the feed rollers move to and from the platen, spring means for maintaining a cooperative engagement between said cone wheel and driving element irrespective of the variation in the position of the cone wheel relatively to said driving element, and means associated with said spring means for holding said cone wheel against traveling movement with said driving element.

21. The combination of a cylindrical platen; paper feed rollers; intermediate driving connections between the platen and said feed rollers including means for varying the speed at which said feed rollers are driven from the platen in accordance with the variation in the diameter of the platen due to the increased or decreased thickness or the number of the work sheets on the platen; a second set of feed rollers that are of a different diameter from the first mentioned paper feed rollers; and like independently operable driving connections between said second set of feed rollers and the platen, the ratio of both sets of driving connections being such that the surface speed of the feed rollers of both sets will be the same.

Signed at Stamford in the county of Fairfield and State of Connecticut this 8th day of June, A. D. 1931.

GEORGE G. GOING.