June 15, 1926. 1,588,955

A. L. EWERS

PAPER FEED AND PRINTING MECHANISM FOR CIGARETTE MACHINES, ETC

Filed June 26, 1924 4 Sheets-Sheet 1

Fig. 1.

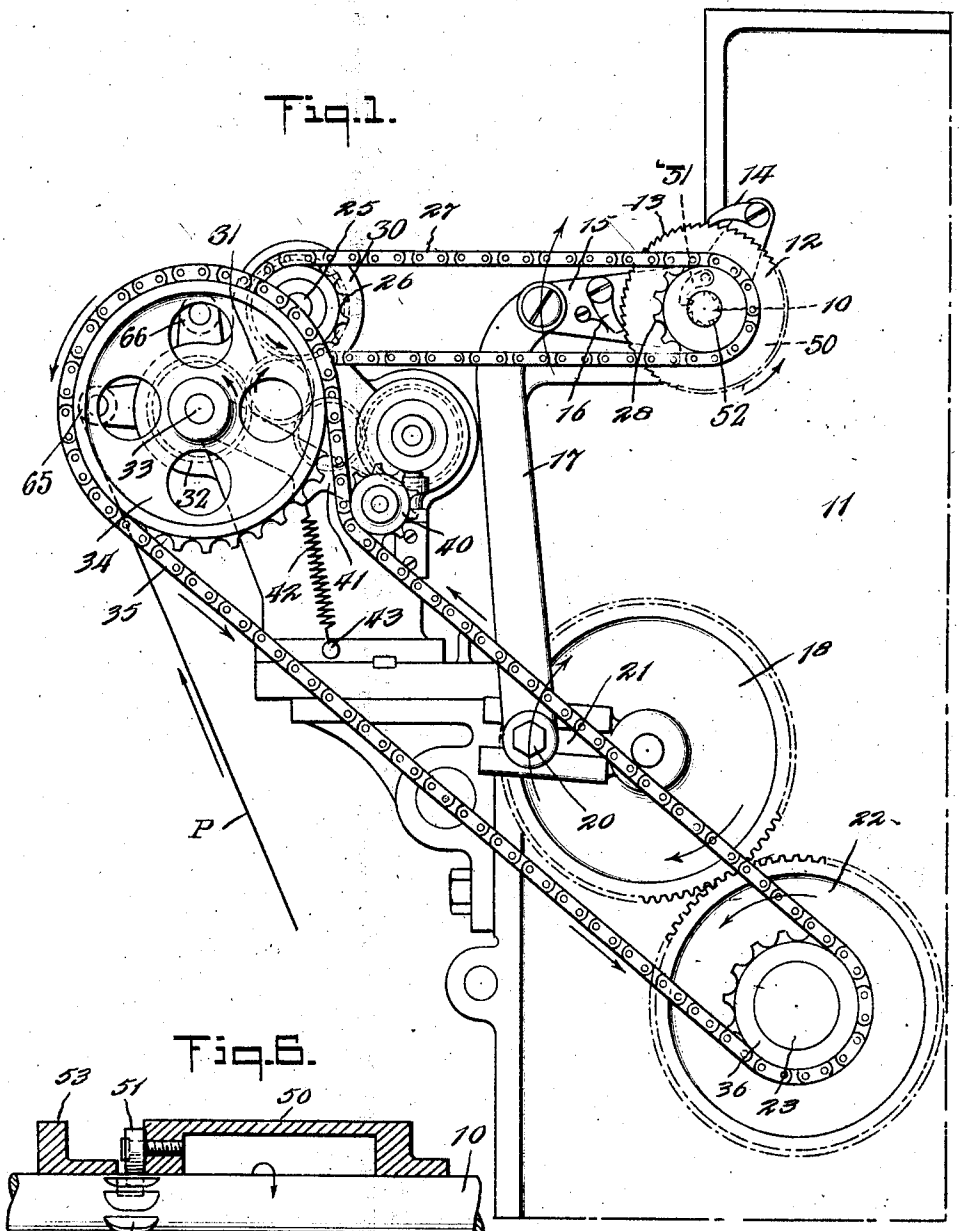


Fig. 6.

INVENTOR
Alexander L. Ewers
BY
J. Frank Mayer
ATTORNEY

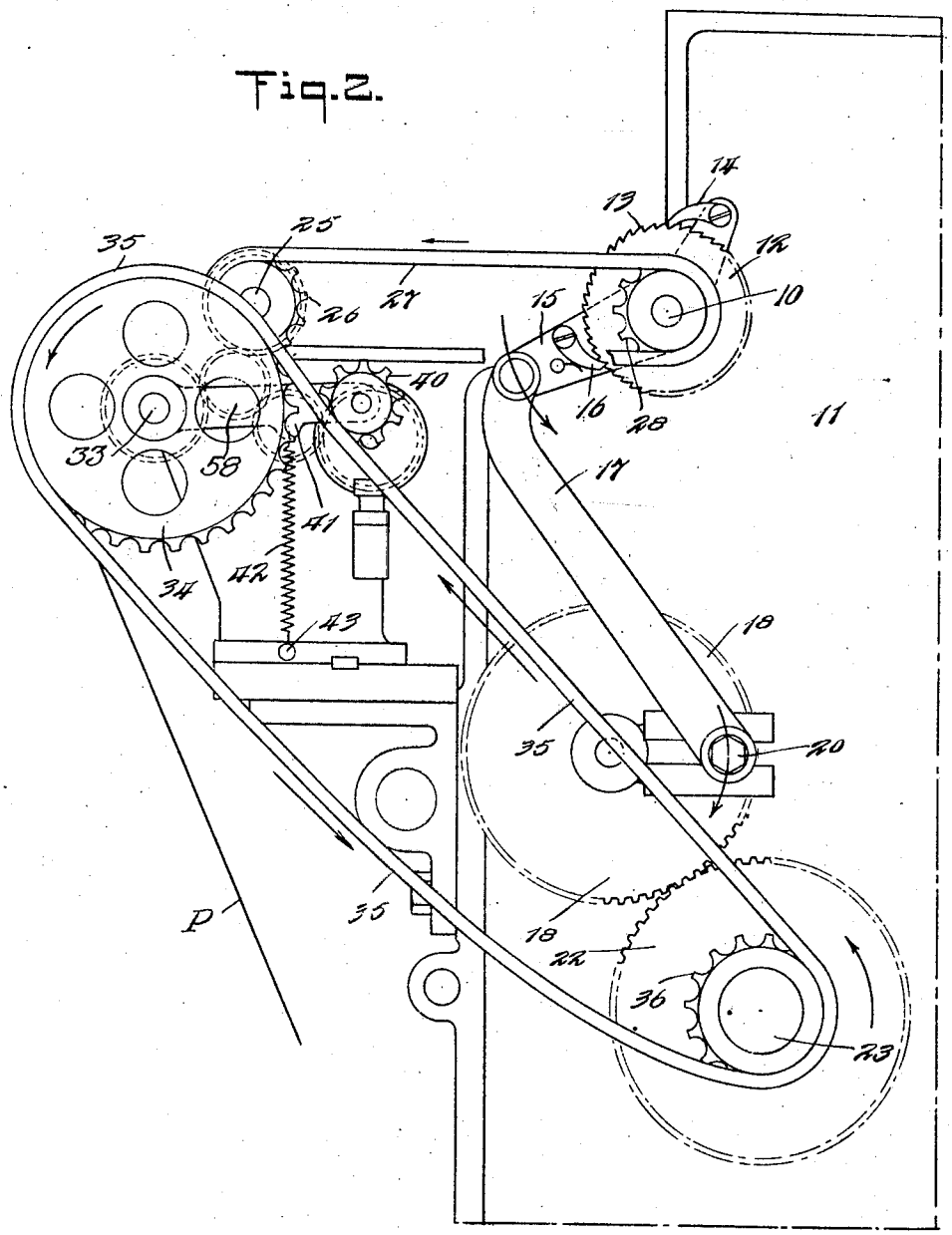
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A. L. EWERS

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Fig. 2.



INVENTOR
Alexander L. Ewers
BY
J. Granville Meyer
ATTORNEY

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A. L. EWERS

PAPER FEED AND PRINTING MECHANISM FOR CIGARETTE MACHINES, ETC

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Fig. 3.

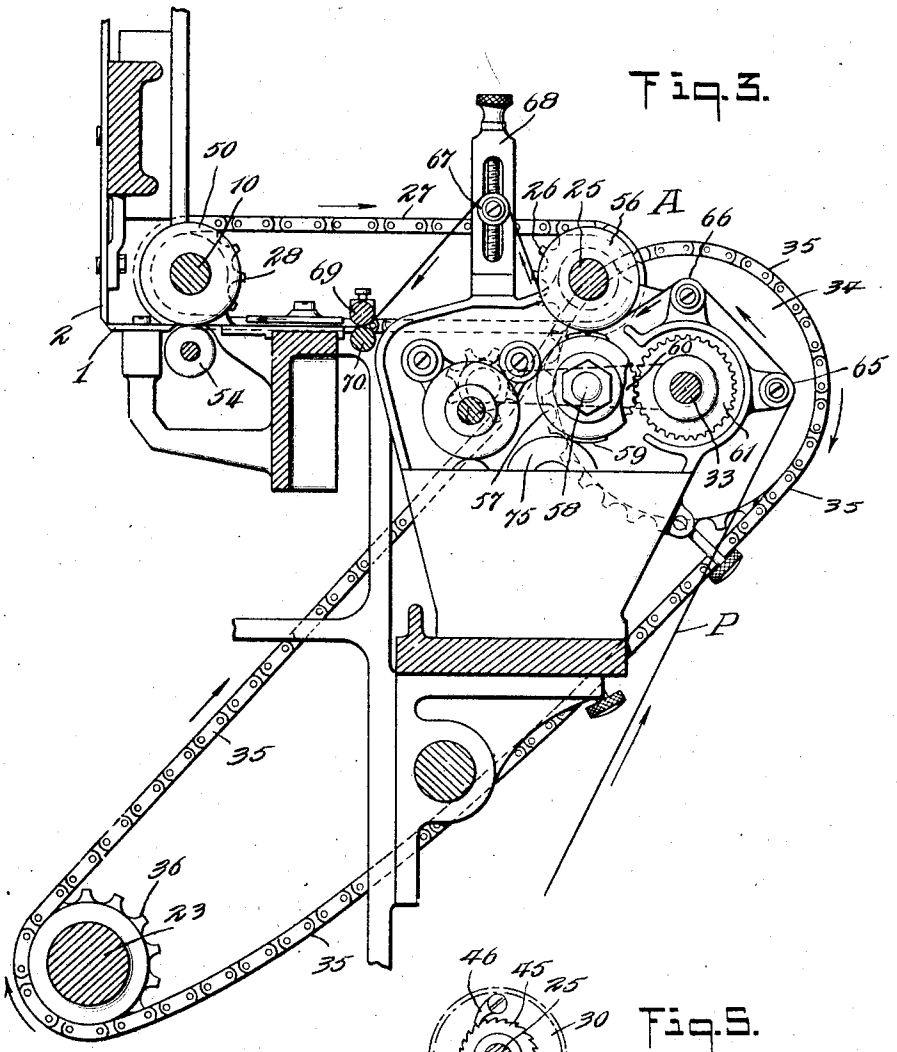
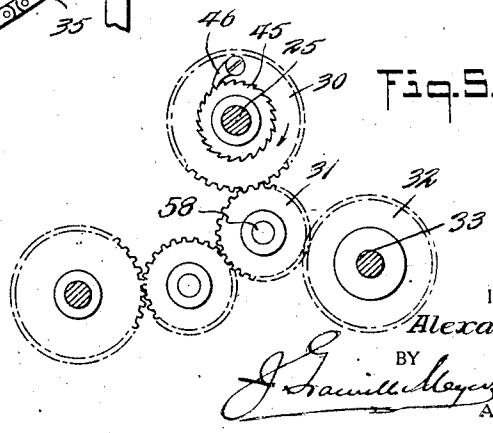


Fig. 5.



INVENTOR
Alexander L. Ewers
BY
J. Frank McMeyers
ATTORNEY

June 15, 1926. 1,588,955

A. L. EWERS

PAPER FEED AND PRINTING MECHANISM FOR CIGARETTE MACHINES, ETC

Filed June 26, 1924 4 Sheets-Sheet 4

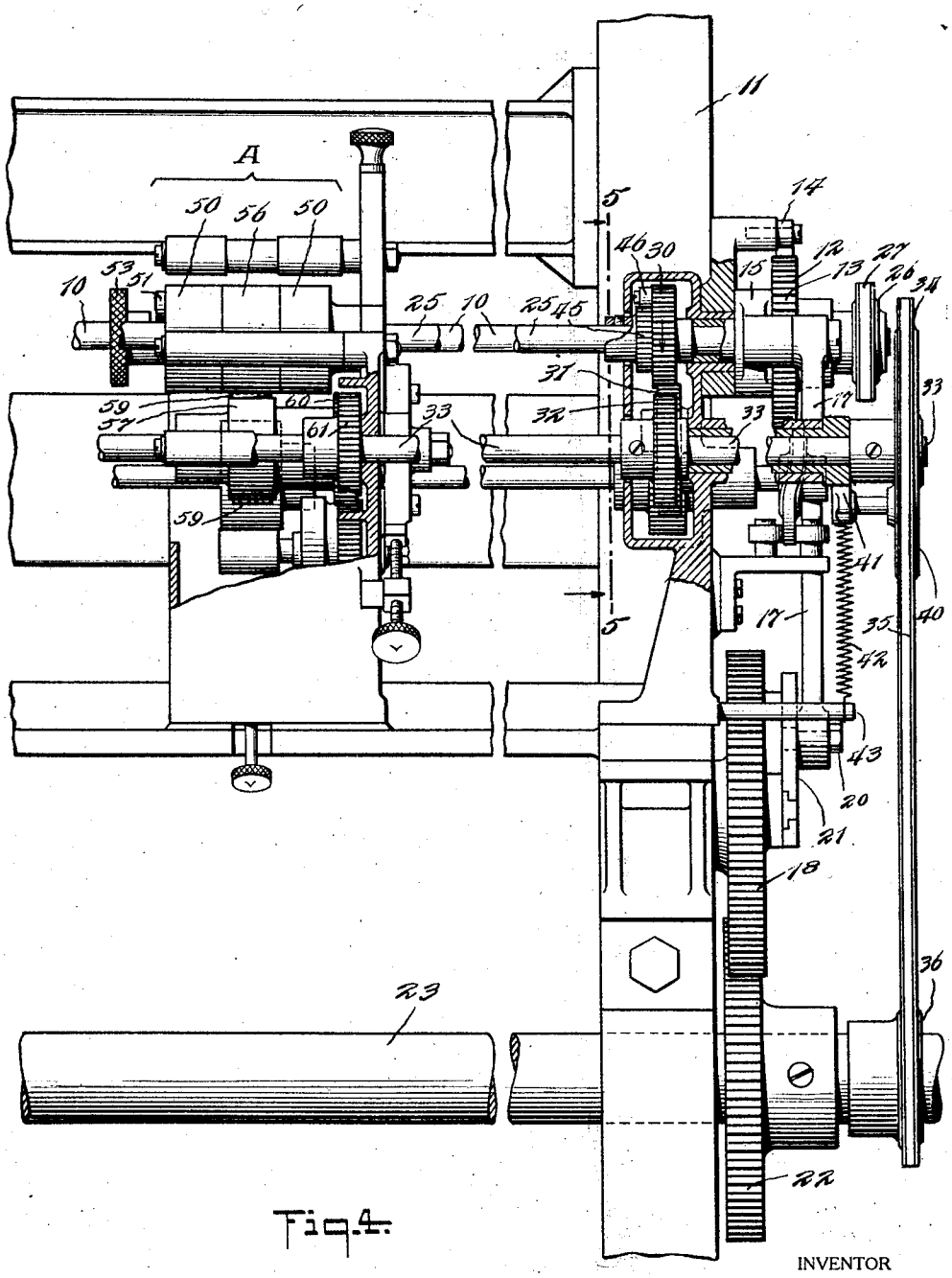


Fig. 4.

INVENTOR
Alexander L. Ewers.
BY
J. Granville Meyer
ATTORNEY

Patented June 15, 1926. 1,588,955

UNITED STATES PATENT OFFICE.

ALEXANDER LEE EWERS, OF LYNCHBURG, VIRGINIA, ASSIGNOR TO UNITED CIGARETTE MACHINE COMPANY, OF LYNCHBURG, VIRGINIA, A CORPORATION OF VIRGINIA.

PAPER FEED AND PRINTING MECHANISM FOR CIGARETTE MACHINES, ETC.

Application filed June 26, 1924. Serial No. 722,478.

My invention relates to mechanism for feeding strips of paper and making imprints thereon at intervals, and is especially adapted for use in or attachment to cigarette machines, although in the broader aspect of the invention it is not limited as to its adaptations or uses.

While some or all features of the invention may be available for use in or may be adaptable to different types of cigarette machines, it is especially well adapted for use in or connection to machines for producing cigarettes of the so-called Spanish type, in which the cigarettes are produced individually, and are finished by tucking the ends of the individual wrappers, in distinction from "continuous" or rod machines, in which the rod is severed to produce the individual cigarettes. The invention is also especially well adapted to individual cigarette machines of the "Heckendorn" type in which the individual wrappers are placed over pockets of a rotary mold wheel, the tobacco charge is applied to each wrapper and depressed with the wrapper into the mold pocket, and the folding of the wrapper about the tobacco is accomplished during rotation of the mold wheel and by subsequent operations while the cigarette is held in other mold wheels to which it is transferred, and finally the projecting wrapper ends are folded or tucked in and the completed cigarette is discharged.

A general object of the present invention is to provide simple, durable and accurate mechanism for intermittently feeding one or more wrapper strips to a corresponding number of primary mold wheels, in proper relation to the usual cut off mechanism which severs the strip or strips after the feeding action to produce the individual wrappers; to print a suitable design, trademark or other indicia upon the wrapper strip at intervals corresponding to individual wrappers; to provide means for readily varying the length of wrapper strip which is advanced at each feed movement; and to provide in connection therewith printing means or devices of such character that the printing mechanism or devices readily conform to the feed variations.

A more particular object is to provide a rotary printing element carrying a printing die or dies of a standard form or size, and to so construct and arrange the feed mechanism that the same dies, or dies of the same sizes, will properly print the strip regardless of feed variations, within the reasonable range of adjustment of the mechanism.

The characteristics and advantages of the invention are further sufficiently explained in connection with the following detail description of the accompanying drawings, which show one exemplifying embodiment of the invention. After considering this embodiment, persons skilled in the art will understand that many variations may be made within the principles of the invention, and I contemplate the employment of any structures that are properly within the scope of the appended claims.

Figure 1 is a side elevation of the front or wrapper-feed end of a representative cigarette machine of the Spanish or Heckendorn type, with paper feed and printing mechanism which embodies the invention in one form, incorporated therein.

Figure 2 is a similar view showing a different paper feed position.

Figure 3 is a vertical section from a position opposite that of Figure 1, showing sufficiently one individual strip feed and printing mechanism in relation to the general driving or operating mechanism.

Figure 4 is a view mainly in front elevation, from the left of Figure 1, with some portions in section or broken away, showing the general driving or operating mechanism and one of the individual strip feed and printing mechanism.

Figure 5 is a diagrammatic explanatory view in the plane 5—5, Figure 4.

Figure 6 is a sectional detail of one of the individual adjustable strip feed rolls.

Figure 3 sufficiently shows any suitable or usual wrapper strip cut-off mechanism, such as employed in cigarette machines of the Heckendorn type, comprising a fixed cutter blade 1 and a vertical reciprocating cutter blade 2. The primary mold wheel is located to the left of the cut-off mechanism and in accordance with ordinary practice a continuous wrapper strip is advanced between the cutter blades when blade 2 is retracted, and positioned substantially over an uppermost pocket in the mold wheel; an individual wrapper is then severed by the

descending blade 2, which is again retracted, another length is fed for the next mold pocket, and so on.

Usually the mold wheels are arranged with a plurality of sets of mold pockets so that a plurality of cigarettes may be formed simultaneously; and in conformity with this desired arrangement of the machine there is usually a plurality of the cutter mechanisms 1 and 2 and also a plurality of strip feed and printing mechanisms, each corresponding to one of the cutter mechanisms, and sufficiently represented here by a single strip feed and printing mechanism A, Figures 3 and 4. The individual feed and printing mechanism are driven and controlled by common mechanism or devices including the following:—

A main feed roll shaft 10 is mounted in suitable bearings in side frame members 11, only one of which is shown in the drawing. At the outside of the frame member is a drive disc 12 provided with ratchet teeth 13. A holding pawl 14 engages the teeth. A lever arm 15 is mounted for oscillation about the axis of shaft 10 and this lever carries a driving pawl 16, spring pressed in engagement with teeth 13. The lever is connected by a link or pitman 17, to a rotary driver, which is specifically a gear wheel 18. Desirably the pitman is adjustably connected by means of a T bolt 20 or similar device in a radial crank channel 21 on the gear wheel, so that by moving the point of connection of the pitman toward or from the gear axis the stroke of lever 15 and the amount of strip feed can be adjusted within the desired limits. Gear 18 engages a gear 22 of the same diameter fixed on a shaft 23 which, in this instance, is the main drive shaft of the cigarette machine.

In the same plane as shaft 10, and in front of it (to the left in Figure 1) is a printing platen shaft 25, on the end of which is a sprocket 26, connected by a chain 27 to sprocket 28 on shaft 10, so that shaft 25 is positively driven in the direction indicated by the arrow, Figure 1, whenever shaft 10 is rotated by its ratchet driving mechanism. A gear 30, Figures 4 and 5, is revolubly mounted on shaft 25 and this gear is continuously driven by an idler 31 engaging a gear 32 on a shaft 33, which extends across the machine and has suitable bearings in the side frame members; shaft 33 is in turn driven by a large sprocket 34 on its outer end and connected by a chain 35 to a sprocket 36 on main drive shaft 23 previously mentioned. Chain 35 is of sufficient length to provide a considerable amount of slack, and this slack is normally taken up by an idler sprocket 40 carried by an arm 41 mounted to oscillate about the axis of shaft 33, and a spring 42 stretched between the arm and a fixed point 43.

Fixed on shaft 25 is a ratchet disc 45 adjacent to the loose gear 30, and pivoted on the gear is a pawl 46 arranged in a trailing direction with relation to the direction of gear movement, and the teeth of the ratchet disc are correspondingly arranged so that the gear is normally driven at fixed speed through the connections described, while shaft 25 is stationary, the pawl 46 meantime running idly over the ratchet; but when shaft 25 during the feed action is driven in the same direction as the gear, and attains the gear speed, a tooth of the ratchet engages the pawl and then as the shaft moves still faster the gear is driven faster than its normal speed in the same direction and the connected parts including idler 31, gear 32, shaft 33 and chain 35, are driven correspondingly faster than their normal speeds, as and for reasons more fully explained hereafter. As soon as shaft 25 slows down toward the end of the feed action, gear 30 and connected parts resume their normal speed and pawl 36 then runs ahead again idly over its ratchet.

Each individual feed mechanism A, of which there may be one, two or more, in spaced relation across the machine, depending on the number of sets of pockets in the mold wheels, or the number of primary mold wheels in the machine, comprises a feed roll 50 mounted on shaft 10. In some cases the rolls may be fixed on the shaft, but preferably they are individually, rotatably adjustable, the adjustment means comprising for each roll a pawl 51 engaging ratchet teeth 52 cut in the shaft. The shaft, whenever it rotates as indicated by the arrow, Figure 6, drives all the feed rolls but the feed rolls may be individually moved ahead of the shaft to properly position the corresponding wrapper strip, by means of a knurled flange 53. The cooperating feed roll 54 is rotatably mounted below each of the main or driving feed rolls 50 and the paper strip P passes between the two rolls and over the fixed cutter blade 1. Each mechanism A also includes a printing platen or abutment roll 56 fixed on shaft 25, and below this platen is located the printing die roll 57 rotatably mounted on a shaft 58. The die roll carries two diametrically opposite projecting die surfaces 59 on which are formed or engraved any suitable indicia such as a design, monogram or trade-mark. Each die body carries a gear 60 meshing with a gear 61 on shaft 33. In this way the printing roll and its integral dies are at all times driven in accordance with the movement of shaft 33. The strip or web P of suitable cigarette wrapper paper is drawn from a roll conveniently located (not shown) over guide rolls 65 and 66, between platen 56 and printing roll 57 over a suitable guide and tension roll 67 adjustably mounted on a

standard 68, and then between cooperating guide rolls 69 and 70, to and between the main and auxiliary feed rolls 50 and 54. Each of the individual mechainsms A also includes suitable inking mechanism, including a roll 75 for supplying ink to the surfaces of dies 59. The details of the inking mechanism do not form a part of the present invention.

Figure 1 shows the strip feed mechanism in idle condition, the feed rolls 50 and 54 being stationary while cigarette forming operations are proceeding in the main machine. Pitman 17 and lever arm 15 are moving upward, with pawl 16 riding idly over the teeth of ratchet disc 12. The disc and connected parts are prevented from reverse movement by the holding pawl 14. Chain 27 is stationary and so is shaft 25 with the platen rolls 56 located on it. Chain 35 is driven by sprocket 36 which rotates at a constant speed, slack is taken up in the upper stretch of the chain by idler sprocket 40, sprocket 34 is running at normal speed which is half the speed of its driving sprocket 36, and shaft 33, by its gear 32, and idler 31 are driving gear 30 which rotates on shaft 25, with pawl 46 running idly over the teeth of ratchet 45. Through gears 61 on shaft 33 all of the printing rolls 57 are being driven at normal speed. Two dies are preferably provided on each die roll, and the die roll is driven at one-half the speed of the drive shaft 23, for convenient cooperation with the paper feed mechanism, as will shortly appear. The described driving of the die rolls is for the purpose of bringing one of the dies 59 up to the point of approximate contact with the paper and in cooperation with the platen roll at about the time that the paper feed action commences. The die being so positioned, the gear 18 has rotated to such a position that pitman 17 commences to move downward, and thereupon pawl 16 drives ratchet disc 12, shaft 10, and all of the strip feed rolls 50, and the paper strip commences to advance between the cutters 1 and 2. Somewhat before the parts reach the position indicated in Figure 2, shaft 25 driven by chain 27 from shaft 10 moves at a speed equal to the normal speed of gear 30, and thereupon ratchet 45 engages pawl 46 and as shaft 10 commences to move still faster, due to the changing angular position of connection 20 on gear 18, and shaft 25 is driven at the same increasing speed through chain 27, ratchet 45 through pawl 46 drives gear 30, idler 31, gear 32 and shaft 33 at the same increasing speed, faster than their normal speed and in this way the die from the moment of contact with the paper strip moves at the exact speed of the strip, as it is fed forward by feed rolls 50 and 54, the platen or abutment rolls 56 being, of course, also driven at the same speed. This increase in the speed of the said parts including sprocket 34, which is fixed on shaft 33, is compensated for by the slack in chain 35, the upper stretch of the chain straightening out with acompanying yielding of the idler sprocket 40, and the slack being transferred to the lower stretch of the chain, as shown in Figure 2. As the gear 18 rotates somewhat beyond the position of Figure 2, the feeding action slows down and somewhat after the die surface leaves contact with the wrapper strip the feed is discontinued by pitman 17 and arm 15 reaching their lowest point of movement. As soon as the movement of shaft 25 is slower than that of gear 30, the gear begins to again run ahead of the shaft, and slack in chain 36 is again taken up in its upper stretch by idler sprocket 40 under the urgency of spring 42.

An important advantage of the described structure and arrangement is that it avoids the necessity for providing a large number of sizes of die rolls, or die surfaces of different lengths (in the circular direction), and difficulty or complicated adjustments incident to such size variations, since the length of strip feed may be adjusted as desired within reasonable limits and the same size die rolls and die surfaces will cooperate properly with these different strip feeds, because the die roll and the platen are positively moved at the same rate as the paper movement during the period of printing contact.

While the feed and printing mechanism as described is practically incorporated in a standard cigarette machine of the type above mentioned, it may also be devised or arranged as a completely or approximately self-contained attachment, adaptable to such machines or to other styles or types of machines where conditions are more or less similar. I therefore contemplate many variations in structure and arrangement and do not limit myself to details except as claimed.

What I claim is:

1. Strip feed and printing mechanism comprising means for intermittently feeding a continuous strip of sheet material with speed varying continuously during each advance from zero to maximum and back to zero; a rotary printing element, means for rotating the printing element to the approximate point of printing contact at a relatively slow rate and means driven from the strip feeding means and then acting to accelerate the printing element and move it at strip speed during the period of printing contact.

2. Strip feed and printing mechanism comprising cooperating strip feed rolls, means for driving one of the rolls intermittently, a rotary printing element having a

die face and a cooperating platen anterior to the feed rolls, means for continuously driving the printing element at a speed lower than maximum strip speed, and means for accelerating the printing element and moving the die surface at strip speed during the strip feed movement.

3. Strip feed and printing mechanism comprising a strip feed roll, ratchet mechanism for driving one of the rolls intermittently, a rotary printing element having a die face and a cooperating platen between which the strip passes anterior to the feed rolls, means for continuously driving the printing element at a speed lower than maximum strip speed, and means for accelerating the printing element and moving the die surface at strip speed during feed movement.

4. In a cigarette machine, strip feed and printing mechanism comprising cooperating strip feed rolls, means for driving one of the rolls intermittently, a rotary printing element having a die face and a cooperating platen anterior to the feed rolls, means for continuously driving the printing element at a speed lower than maximum strip speed, and means for accelerating the printing element and moving the die surface at strip speed during the strip feed movement.

5. In a cigarette machine, strip feed and printing mechanism comprising a strip feed roll, ratchet mechanism for driving one of the rolls intermittently, a rotary printing element having a die face and a corresponding platen between when the strip passes anterior to the feed rolls, means for continuously driving the printing element at a speed lower than maximum strip speed, and means for accelerating the printing element and moving the die surface at strip speed during feed movement.

6. Strip feed and printing mechanism adapted to cooperate with a cigarette machine, comprising a main strip feed roll, a cooperating feed roll, means for intermittently driving the main feed roll, a printing cylinder having a die surface, a cooperating platen roll, a driving connection from said driving means and serving to drive the printing cylinder and platen at strip speed during the strip feed movement, means normally driving the printing cylinder at a speed slower than maximum strip speed during the period of of printing contact, and yielding means interposed in said last named driving means to permit variations in the speed of the printing cylinder.

7. A cigarette machine comprising a first drive shaft, a second shaft, driving means connecting said shafts, a third shaft, a gear rotatable thereon and having a driving connection with said second shaft, a platen roll on said third shaft, a printing roll co-operating with the platen roll and having a die surface, a driving connection from said second shaft to the printing roll, a fourth shaft, a strip feed roll thereon corresponding to the printing roll and platen roll, means driven from said first shaft for intermittently driving said fourth shaft, a positive driving connection from said fourth shaft to said third shaft, and a releasable connection between said third shaft and the gear rotatable thereon, acting to drive the gear, said second shaft and the printing roll faster than their normal speed during printing contact of the die surface with the strip, the first named driving means being constructed and arranged to permit the stated speed variation.

8. A cigarette machine comprising a first drive shaft, a second drive shaft, means for connecting said shafts to drive the second shaft at one-half the speed of the first shaft, a third shaft, a gear rotatable thereon and having a driving connection with said second shaft, a platen roll on said third shaft, a printing roll co-operating with the platen roll and having diametrically opposite die surfaces, a driving connection from said second shaft to the printing roll, a fourth shaft, a strip feed roll thereon corresponding to the printing roll and platen roll, means driven from said first shaft for intermittently driving said fourth shaft, a positive driving connection from said fourth shaft to said third shaft, and a ratchet connection between said third shaft and the gear rotatable thereon, acting to drive the gear, said second shaft and printing roll faster than their normal speed during printing contact of the die surfaces with the strip, the first named driving means being constructed and arranged to permit the stated speed variation.

9. Strip feed and printing means adapted for use in connection with cigarette machines or otherwise, comprising a roll drive shaft, means for driving the shaft in strip-advancing direction, a strip-feed roll on the shaft, and ratchet mechanism connecting the roll to the shaft and admitting adjustment of the roll in relation to the shaft in a forward direction with reference to strip feed.

Signed at Lynchburg, in the county of Bedford and State of Virginia this 20th day of June, A. D. 1924.

ALEXANDER LEE EWERS.