

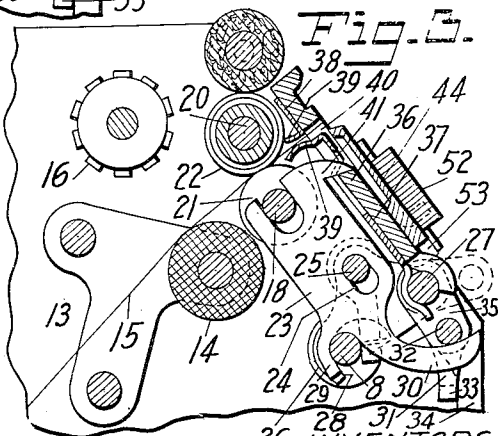
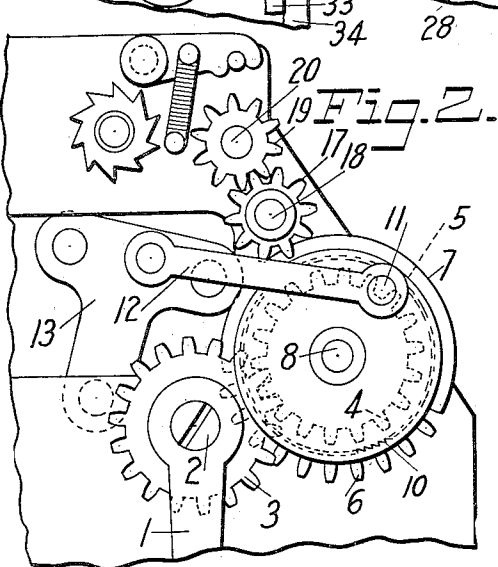
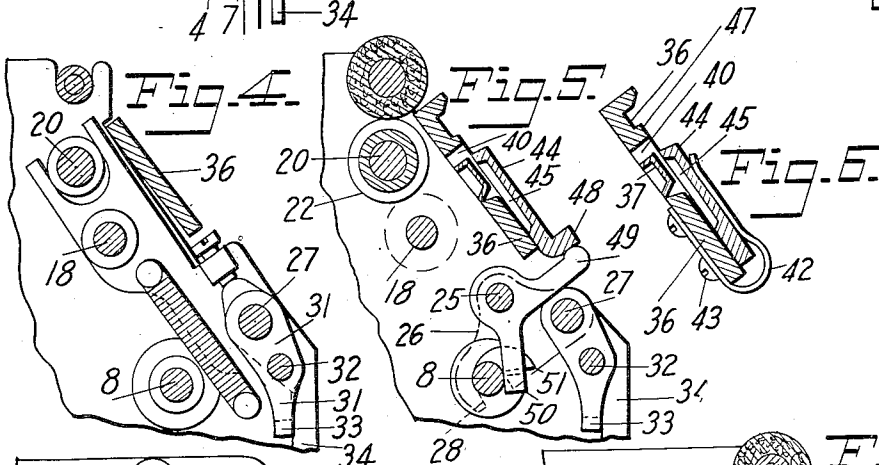
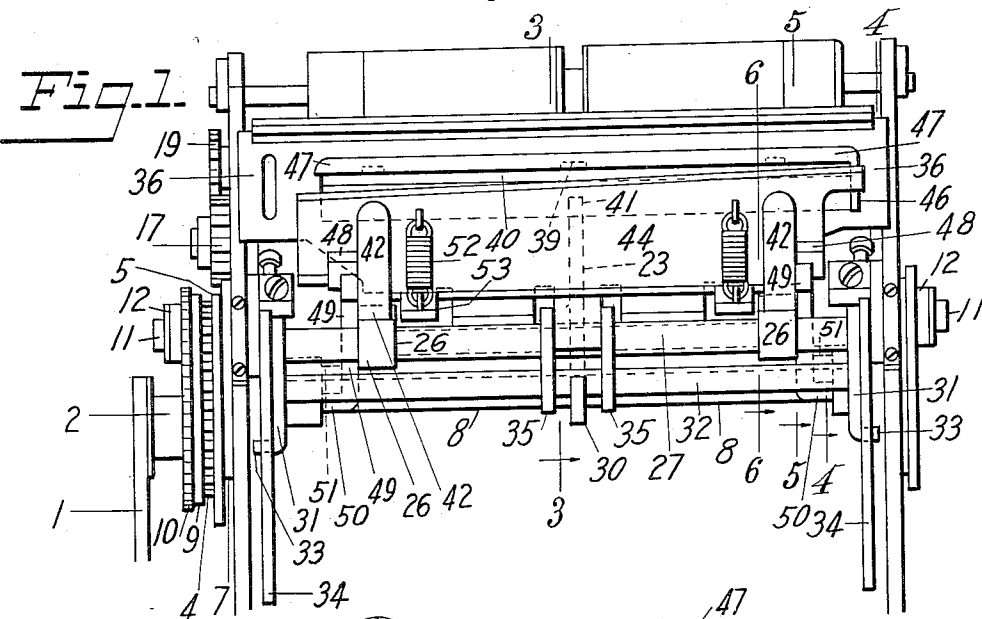
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KNIFE CONSTRUCTION

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KNIFE CONSTRUCTION

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13 Claims. (Cl. 164—57)

This invention relates to a unitary knife construction. It is common in cash registers, ticket-issuing machines of various kinds as well as many other kinds of machines to provide wheels which print on a strip of paper which is thereafter issued to the customer or passenger. Some such machines provide a serrated knife blade against which the paper is pressed and torn, but this makes a very unsightly ticket or receipt. It is considered advisable to provide a knife which will automatically completely sever the ticket or receipt so that there will be no ragged edges. Considerable difficulty has been experienced in the past, however, in regard to such knife constructions. Among the many difficulties which have presented themselves might be mentioned that knives readily become dull or that the movable knife does not have a true shearing action. Another difficulty which has been experienced is that the movable knife blade may not press against the stationary knife blade at all points with the result that the ticket or receipt may be severed at certain points and not at others. This is especially true when either of the knife blades are not straight lines. The object of this invention is to overcome all such difficulties and at the same time make a unitary construction which may be readily removed from the machine or inserted therein.

Another object of the invention is to make such a unitary knife construction readily interchangeable from one machine to another.

When knife constructions are assembled piece by piece in the machine it is impossible to secure that accuracy of construction that is possible when the entire cutting mechanism is assembled outside of the machine where all of the parts are fully accessible and where accurate adjustments can be made. One of the particular objects of this invention is to make such a knife construction that can be assembled separate and apart from the machine and may then be readily inserted in the machine without employing the use of any screws.

Another object of the invention is to make such a knife construction so that there will be a true shearing action and in which each part of the movable blade will be successively brought into direct contact with the stationary blade, being pressed thereagainst by spring action.

The attached drawing shows the preferred embodiment of such a knife construction by way of illustration only for it is fully realized that many changes may be made in the specific construction herein shown.

Fig. 1 is a front elevational view of the improved knife construction showing so much of the machine disclosed in the application of Albert S. Wheelbarger and Grover C. Coil, filed October 29, 1925, Serial No. 65,532, as is necessary to understand the operation.

Fig. 2 is an elevational view of the right hand side of the machine shown in Fig. 1.

Fig. 3 is a cross sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a cross sectional elevational view on the line 4—4 of Fig. 1.

Fig. 5 is a cross sectional elevational view on the line 5—5 of Fig. 1, and

Fig. 6 is a cross sectional detail view on the line 6—6 of Fig. 1.

While this invention applies to any and all kinds of printing machines, the specific embodiment herein shown is indicated as attached to a machine of the type shown in the application of Wheelbarger and Coil above mentioned, in which there is an operating handle 1 secured to a shaft 2 which carries a gear 3 which meshes with a gear 4 attached to a disk 5 provided with teeth 6 for a portion of its circumference forming a segmental gear. The disk 5 is attached to a disk 7 which has a radius equal to the pitch radius of the segmental gear 6. The gear 4, disk 5 and disk 7 are rotatably mounted on the shaft 8 but are operatively connected with a disk 9 and ratchet 10 which form a full stroke mechanism as fully described in the above mentioned application of Wheelbarger and Coil. The ratchet 10 is secured to the shaft 8. If the full stroke mechanism comprising the disk 9, ratchet 10 and associated mechanism is not desired, the gear 4 may be directly secured to the shaft 8.

The ratchet 10 is provided with a stud pin 11 which operates a pitman 12 which actuates an oscillating printing carrier 13, which carries platens 14, one of which is shown in Fig. 3, which press a strip of paper 15 against type wheels 16. The disk 5, segmental gear 6 and disk 7 cooperate with a Geneva pinion 17 attached to a shaft 18, which pinion drives a pinion 19 on a shaft 20. The shafts 18 and 20 are provided with feed rollers 21 and 22 respectively between which the paper strip 15 is fed after being printed, from whence it passes through the knife mechanism hereinafter to be described where the printed ticket or receipt is sheared from the paper strip 15 and delivered to the customer or passenger.

The lower feed roller 21 is cut away at approximately its mid point. A locking plate 23 is bifurcated at its upper end, receiving the shaft 18

in the bifurcation. It is provided with a slot 24, which receives a crossbar 25 mounted on standards 26 secured to a crossbar 27. The standards 26 are provided with cutaway portions 28 which receive the rotatable shaft 8. The lower end of the locking plate 23 is provided with a rearwardly and downwardly extending arm 29 which engages the shaft 8 and serves as a stop for the locking plate. The locking plate 23 is also provided with a downwardly and forwardly extending arm 30. Arms 31 are rotatably mounted on the cross bar 27, which arms carry a rod 32. The arms 31 are provided with outwardly extending lugs 33 which may be engaged by levers 34 mounted on the crossbar 27. Arms 35 also connect the cross bar 27 and the rod 32 so as to give rigidity to the said rod 32.

The stationary knife 36 has secured thereto plates 37 and 38 having rearwardly extending guides 39 for the paper. It is also provided with an aperture 40 through which the paper is fed. The upper end of the locking plate 23 is provided with a forwardly and downwardly extending lug 41 which engages the stationary knife 36 immediately below the aperture 40, locking the knife mechanism in position.

To insert the knife mechanism, the levers 34 are raised so as to disengage the lugs 33 on the arms 31. The rod 32 is then swung outward and the locking plate 23 is manually raised. The lower end of the stationary knife 36 and the lower end of the plate 37 are curved oppositely forming an opening which receives the cross bar 27. The plate 37 is made of resilient metal so as to resiliently clamp the cross bar 27 between the lower end of the stationary knife and the plate 37. The knife construction is then pressed rearwardly so that the lug 41 of the locking plate 23 is received in the aperture 40. The rod 32 is then moved rearwardly so as to engage the forward arm 30 of the locking plate 23 clamping the lug 41 to the stationary knife. The levers 34 are then moved downwardly. The knife mechanism may be readily removed by reversing the above mentioned operation.

Substantially U-shaped springs 42 are secured to the stationary knife 36 by any convenient means such as by screws 43, which springs extend forwardly of the knife and press the movable knife 44 toward the stationary knife. There are two such springs 42 near the opposite ends of the movable knife. The movable knife 44 is provided with a channel 45 extending throughout the length thereof and from a point shortly beneath the top or cutting edge thereof to near the bottom. The stationary knife 36 is provided with an upwardly extending guide 46 and a horizontal guide 47, which guides 46 and 47 form the guiding plate of the movable knife but there is no similar guide on the left hand side of the knife. From Fig. 1 it will be noticed that the upper or cutting edge of the movable knife is not parallel to the lower edge of the guide 47 which forms the cutting edge of the stationary knife. Furthermore, since the springs 42 press the movable knife toward the stationary knife and since the guide 46 supports one end of the movable knife but there is nothing to support the other end thereof, the plane of the movable knife is not in the same plane as the stationary knife when the shearing action is commenced but as the shearing action progresses the movable knife is raised, traveling along the guide 46 and each successive point of the cutting edge of the movable knife engages the cutting edge of the

guide 47 of the stationary knife so that when the action of shearing is completed the two knife edges lie in the same plane. When the knife is in its lower position the knife edges are not in the same plane. As a matter of fact, they form something of a V with the point of the V on the guide 46. This is caused by the guide 46 holding out the right-hand edge (Fig. 1) of the movable knife while the left-hand spring 42 presses the left-hand end thereof inwardly. However, as the knife is raised the right-hand end of the movable knife remains supported either by the guides 46 or 47 while the left-hand end thereof is gradually raised by the guide 47 against the tension of the left-hand spring 42 so that at the end of the cutting stroke the left-hand edge of the movable knife has been moved outwardly just as far as the right-hand edge thereof. In this position both the right-hand end and the left-hand end of the movable knife rest on the guide 47 and the two edges which are pressed together lie in the same plane.

This action brings each and every point of the movable knife edge into contact with the corresponding point of the stationary knife edge so that almost the entire force of the springs 42 is successively exerted on the succeeding portions of the paper so that the knife edges will sever the same even though the knife edges might not be perfectly straight or might be warped slightly. Furthermore, as the knife travels upwardly, as soon as the cutting edge of the movable knife has moved over the horizontal guide 47 of the stationary knife the channel 45 will be adjacent or over-lie that portion of the horizontal guide 47 to the right of the cutting edge as viewed in Fig. 1 so that if there were any imperfection in the guide 47, that is if it were warped so as not to form a true plane, any bulge thereon would be received in the channel 45 thereby preventing any tendency of that part of the movable knife which has completed the severing operation from holding that part which has not completed the same away from the stationary knife. This construction also insures that each of the knife edges will sharpen the other knife edge.

The lower extremity of the movable knife is provided with outstanding lugs 48 which engage levers 49 pivoted on the shaft 25, which levers 49 are provided with lugs 50 which extend into the path of the movement of the cams 51. The gearing arrangement heretofore mentioned is such that the shaft 8 makes one complete revolution on each complete operation of the machine so that after the ticket or receipt is printed the cams 51 engage the lugs 50 actuating the levers 49 and raising the movable knife, shearing the printed ticket or receipt. After the cams 51 pass beyond the lugs 50 the movable knife is returned to initial position by means of the springs 52 secured to the movable knife and to lugs 53 of the stationary knife.

In practice it is found that this preferred embodiment of the invention eliminates the ragged edges formed by improperly cut paper which have heretofore given considerable difficulty in the operation of such machines by causing the paper to improperly feed, thereby clogging the machine.

It is desired that this invention cover not only in the specific embodiment herein shown by way of example but in any and all embodiments which may fairly fall within the scope of the appended claims.

We claim:

1. In a knife construction, a fixed knife, an off-set guide extending across said knife forming a cutting edge, a second guide in the same plane as said first mentioned guide but extending at an angle thereto, a movable knife having an inclined edge, one end of which is adapted to normally rest on said second mentioned guide, means whereby said movable knife is actuated so as to move said knife along said second mentioned guide and to successively bring each part of the edge of the movable knife into shearing contact with the cutting edge of said first mentioned guide.

2. In a knife construction, a fixed knife, an off-set guide extending across said knife forming a cutting edge, a second guide in the same plane as said first mentioned guide but extending at an angle thereto, a movable knife having an inclined edge, one end of which is adapted to normally rest on said second mentioned guide, means whereby said movable knife is actuated so as to move said knife along said second mentioned guide and to successively bring each part of the edge of the movable knife into shearing contact with the cutting edge of said first mentioned guide, and means whereby said movable knife is returned to normal position after the shearing action is completed.

3. In a knife construction, a fixed knife, an off-set guide extending across said knife forming a cutting edge, a second guide in the same plane as said first mentioned guide but extending at an angle thereto, a movable knife, one end of which is adapted to normally rest on said second mentioned guide, means whereby said movable knife is actuated so as to move said knife along said second mentioned guide and to successively bring each part of the edge of the movable knife into shearing contact with the cutting edge of said first mentioned guide, and spring means whereby when said movable knife is being actuated each successive portion of the edge of said movable knife is pressed against corresponding portions of the edge of said fixed knife.

4. In a knife construction, a fixed knife, an off-set guide extending across said knife forming a cutting edge, a second guide in the same plane as said first mentioned guide but extending at an angle thereto, a movable knife, one end of which is adapted to normally rest on said second mentioned guide, means whereby said movable knife is actuated so as to move said knife along said second mentioned guide and to successively bring each part of the edge of the movable knife into shearing contact with the cutting edge of said first mentioned guide, said last mentioned means including a lever adapted to engage said movable knife and a cam whereby said lever is oscillated.

5. In a machine, a unit composed of movable and fixed knives, one of said knives being provided with an aperture, a slidable locking plate carried by said machine, a tongue forming a part of said locking plate, said tongue being of such size and so positioned that it will extend within said aperture when the unit is in normal position, and cam means to actuate said locking plate so that said tongue will engage one side of said aperture and lock said unit in position.

6. In a machine, a unit composed of movable and fixed knives, one of said knives being provided with an aperture, a slidable locking plate, a tongue carried by said locking plate adapted to extend within said aperture when the unit is in position within the machine, a camming arm carried by said locking plate, and means to engage

said camming arm to actuate said locking plate so that said tongue will be pressed into locking engagement with one side of said aperture.

7. In a machine, a unit composed of movable and fixed knives, one of said knives being provided with an aperture, a slidable locking plate, a tongue carried by said locking plate adapted to extend within said aperture when the unit is in position within the machine, a camming arm carried by said locking plate, a lever, a rod carried by said lever and adapted to engage said camming arm so as to lock said tongue carried by said locking plate against one side of said aperture.

8. In a knife construction, a cutter unit composed of movable and fixed knives, a machine frame adapted to removably support the cutter unit, said fixed knife having an aperture therein, a locking plate associated with said frame, a lug extending therefrom adapted to extend within said aperture and engage the fixed knife, and means whereby said locking plate may be secured in locking position so as to lock the unit to the frame.

9. In a knife construction, a cutter unit composed of movable and fixed knives, a machine frame adapted to removably support the cutter unit, a locking plate associated with said frame, means carried by said locking plate adapted to engage said fixed knife, and other means carried by said locking plate whereby the said plate is locked in engagement with said fixed knife.

10. In a knife construction, a cutter unit composed of movable and fixed knives, a machine frame adapted to removably support the cutter unit, said fixed knife having an aperture therein, a slidable locking plate associated with said frame, means carried by said plate adapted to engage said unit, an arm carried by said plate, and means adapted to engage said arm and lock said plate against movement.

11. In a knife construction, a cutter unit composed of movable and fixed knives, a machine frame adapted to removably support the cutter unit, one of said knives being provided with an aperture, a locking plate associated with said frame, a tongue on said locking plate adapted to extend within said aperture, and means to move said locking plate so as to lock said unit to said frame by means of said lug engaging one side of said aperture.

12. In a knife construction, a cutter unit composed of movable and fixed knives, a machine frame adapted to removably support the cutter unit, one of said knives being provided with an aperture, a slidable locking plate secured to said frame, a tongue on said locking plate adapted to extend within said aperture and lock said unit against removal from said frame, and means whereby said locking plate is held in locked position.

13. In a knife construction, a cutter unit composed of movable and fixed knives, a machine frame adapted to removably support the cutter unit, one of said knives being provided with an aperture, a slidable locking plate carried by said frame, a tongue forming a part of said locking plate, said tongue being of such size and so positioned that it will extend within said aperture when the unit is in normal position, and means to actuate said locking plate so that said tongue will engage one side of said aperture and lock said unit to said frame.

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