March 28, 1950 H. M. BARBER 2,501,836

FOLDING, CUTTING, AND DELIVERING MECHANISM

Original Filed Feb. 7, 1945 4 Sheets-Sheet 1

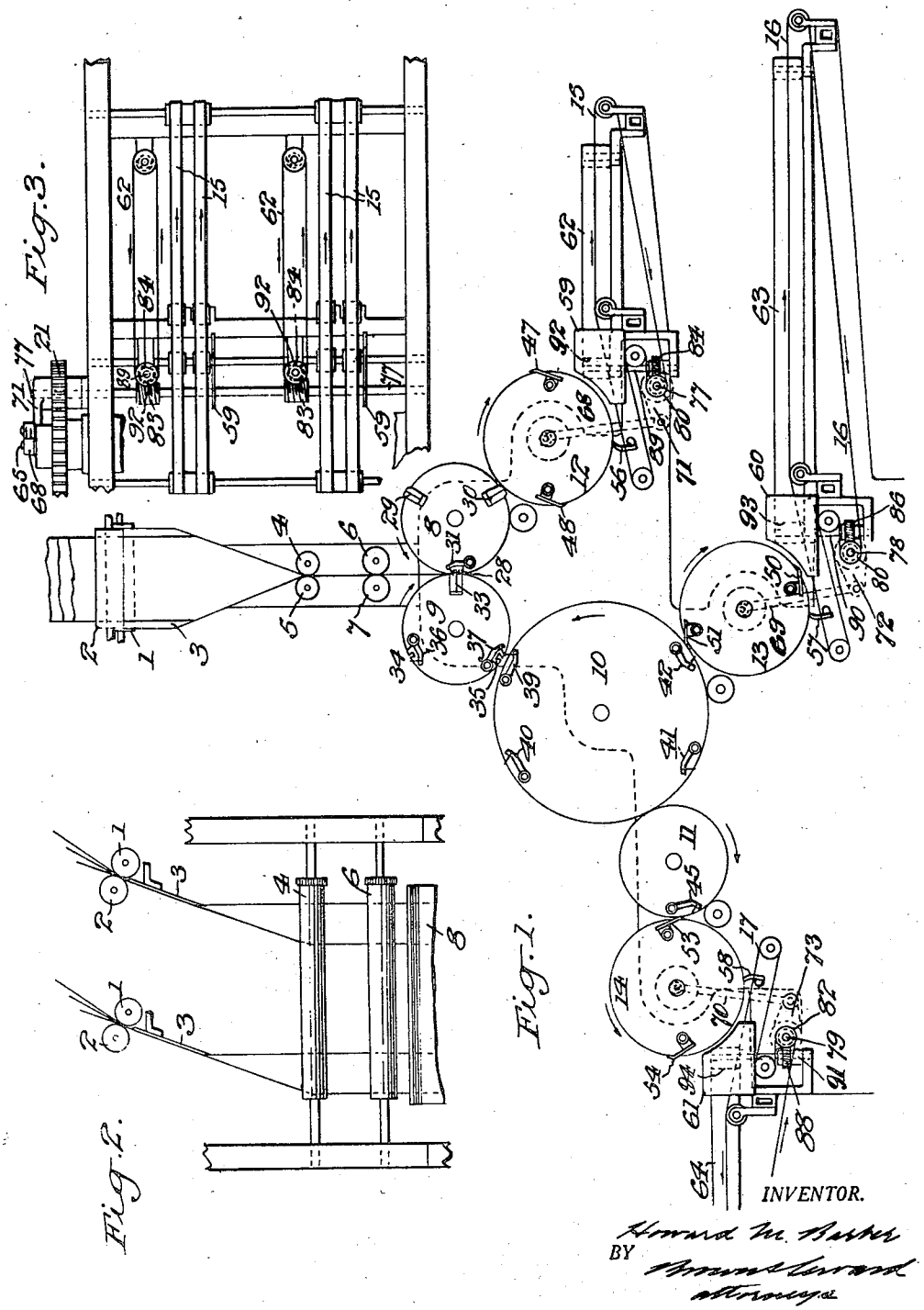


Fig. 1.

Fig. 2.

Fig. 3.

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Original Filed Feb. 7, 1945 4 Sheets-Sheet 2

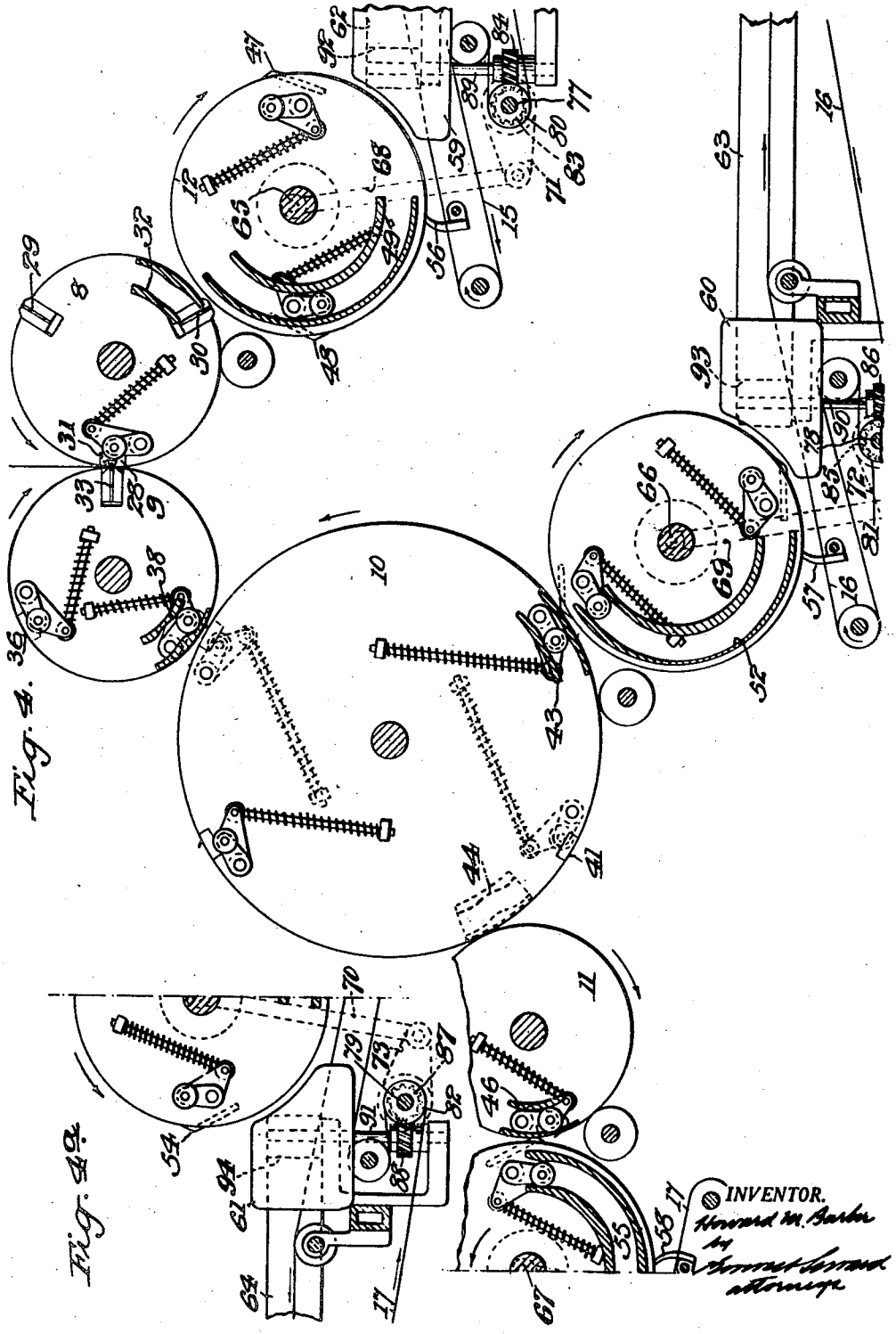


Fig. 4.

Fig. 4a.

March 28, 1950 H. M. BARBER 2,501,836

FOLDING, CUTTING, AND DELIVERING MECHANISM

Original Filed Feb. 7, 1945 4 Sheets-Sheet 3

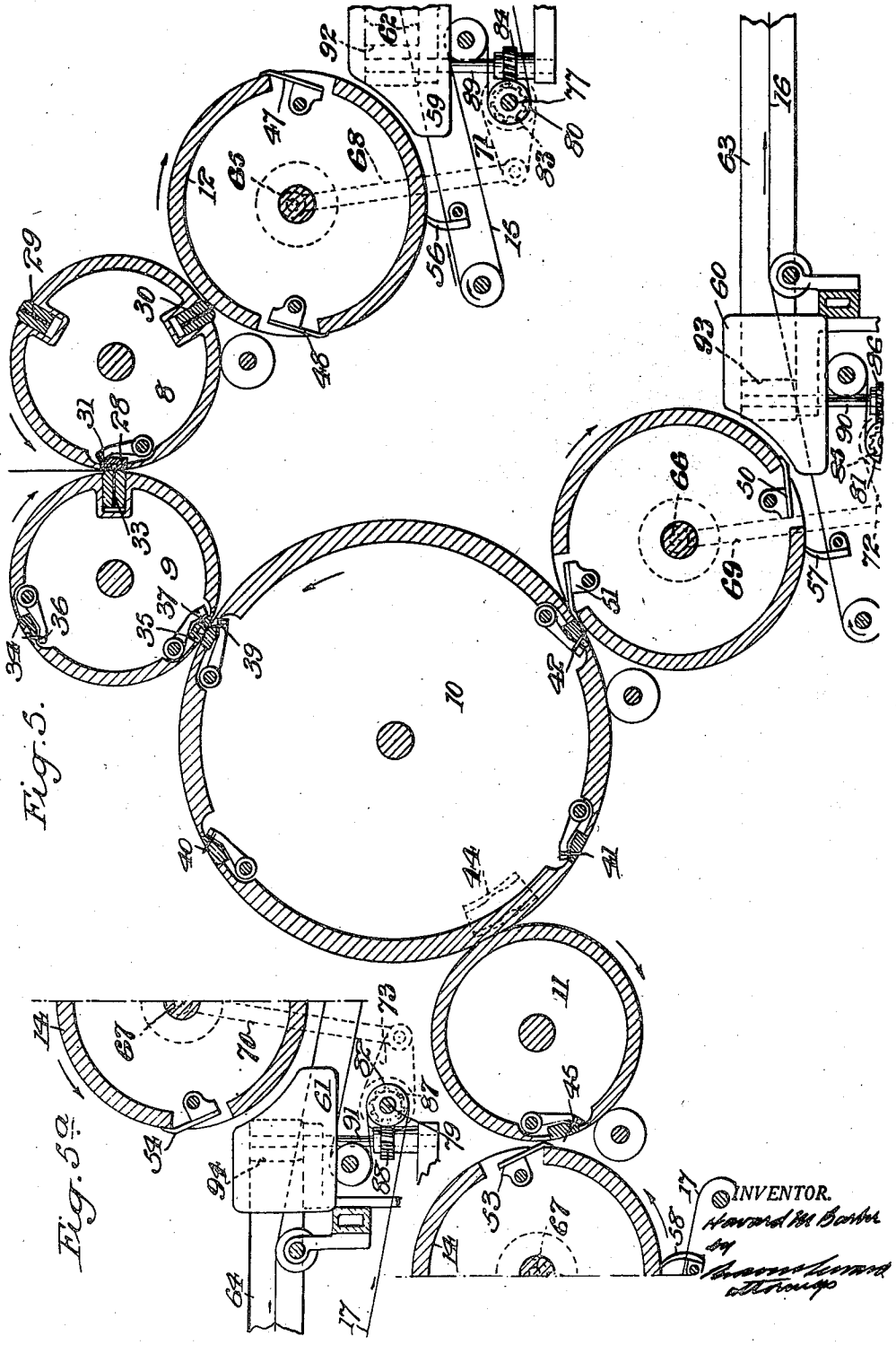


Fig. 5.

Fig. 5a.

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FOLDING, CUTTING, AND DELIVERING MECHANISM

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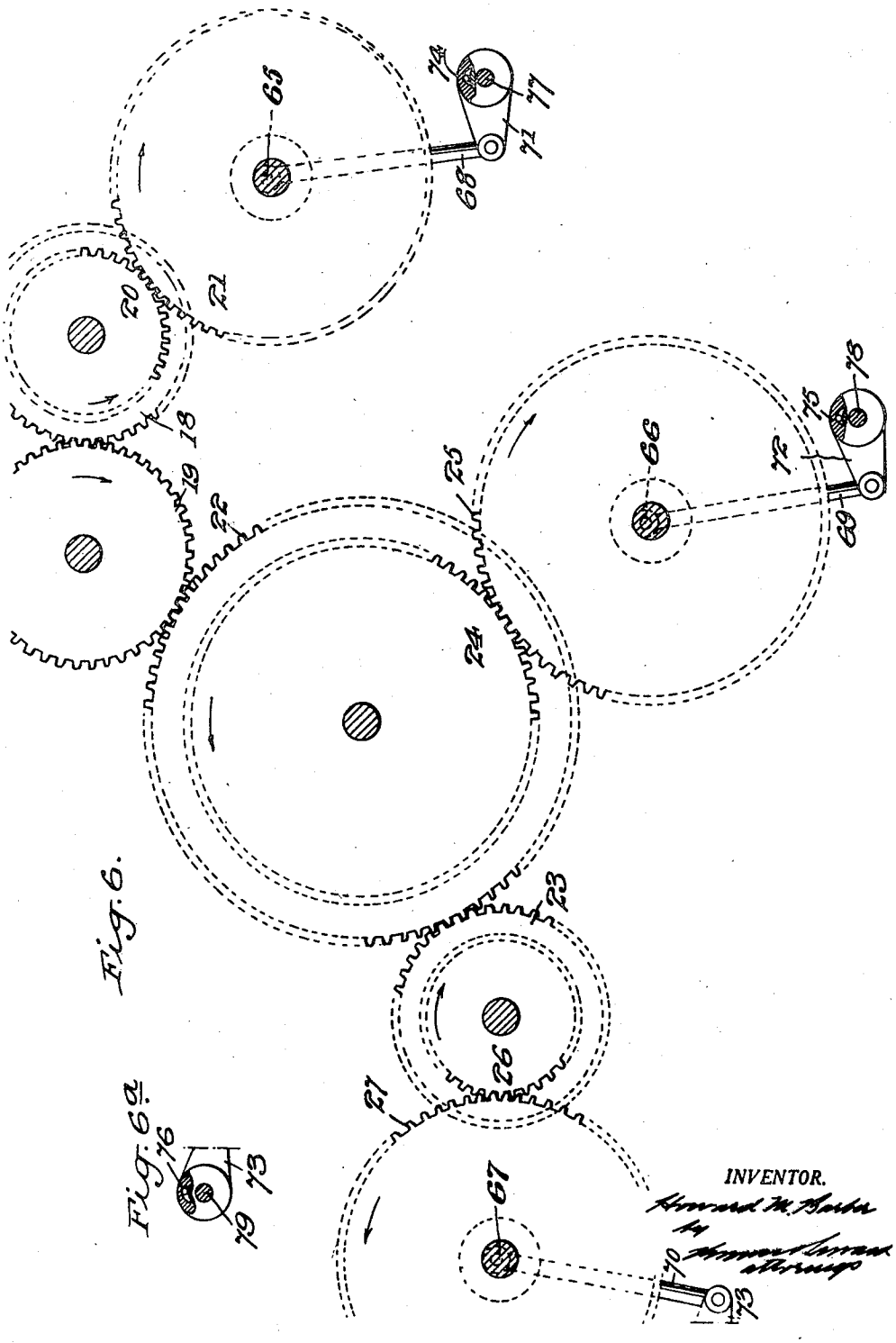


Fig. 6.

Fig. 6a.

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FOLDING, CUTTING, AND DELIVERING MECHANISM

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Original application February 7, 1945, Serial No. 576,564. Divided and this application March 15, 1946, Serial No. 654,756

2 Claims. (Cl. 271—87)

1

One object of my invention is to provide novel means for cutting associated and longitudinally folded webs each cycle of the cutting means into an odd number of signatures and means for delivering the signatures to a corresponding odd number of different points, as, for instance, traveling endless tape carriers.

Another object is to provide means for materially reducing the speed of travel of the signatures so that each signature will not interfere with the leading edge of its next succeeding signature, and for improving the signature handling conditions at the several points of delivery.

Another object is to provide a traveling side guide for the signatures as they are conveyed by their respective endless tape carrier deliveries with the folded edges of the signatures disposed parallel to the direction of travel of the carriers; said traveling side guides being driven at the speed of the endless tape carriers and serving to overcome the tendency of the signatures to slide sideways off the tape carriers.

A practical embodiment of my invention is illustrated in the accompanying drawings in connection with means for cutting three signatures from the associated and folded webs each cycle of the cutting means and delivering the signatures under reduced speed to their respective first, second and third endless delivery carriers.

Fig. 1 represents a side view in diagram of the web associating, folding, cutting and signature delivery mechanisms.

Fig. 2 represents an end view in diagram of the web associating and folding mechanism.

Fig. 3 represents a detail plan view showing two first signature deliveries in diagram.

Figs. 4 and 4*a* represent a detail vertical section of the cutting and delivery mechanism on an enlarged scale taken inside the near side frame.

Figs. 5 and 5*a* represent a detail vertical central section of the same.

Figs. 6 and 6*a* represent a detail vertical section showing the geared connection for driving the cutting and delivery mechanism and including a portion of the means for driving the traveling endless tape carriers and their traveling side guides.

While I have shown a mechanism which is capable of simultaneously handling two sets of narrow webs the mechanism and its operation will be described in connection with one only of these two sets of webs.

The mechanism for associating and folding the narrow webs is shown as comprising a pair of

2

coacting web associating rollers 1, 2, a former 3, a pair of nipping rollers 4, 5 and a pair of feed rollers 6, 7. All of these rollers are driven at the same surface speed from any suitable source (not shown herein), to associate and longitudinally fold the webs and feed them to the mechanism for cutting three signatures therefrom each cycle of the cutting means and to deliver the three signatures to three different points.

The means for cutting the associating and folding webs into three signatures each cycle of the cutting means and the means for delivering the signatures to three different points are shown as comprising the following elements. The pair of coacting rotary cutters are denoted by 8, 9, the first and second transfer cylinders by 10, 11, the first, second and third delivery cylinders by 12, 13, 14 and their respective endless tape carriers by 15, 16 and 17.

The associated and folded webs, the rotary cutters 8, 9 and the transfer cylinders 10, 11 are all driven at the same surface speed and the three delivery cylinders 12, 13, 14 are all driven at a slower surface speed, in the present instance about six-tenths that of the associated and folded webs, the rotary cutters and the transfer cylinders.

The sequence of operation is such that the first signature cut from the associated and folded webs during one cycle of the rotary cutters is delivered to the first endless tape carrier 15; the second signature cut during the same cycle of the rotary cutters is delivered to the second endless tape carrier 16, and the third signature cut during the same cycle of the rotary cutters is delivered to the third endless tape carrier 17, the cutting of the three signatures completing the cycle of the rotary cutters.

The driving connection between the rotary cutters, the transfer cylinders and the delivery cylinders is such that two successive groups of three signatures are delivered during one cycle of the delivery cylinders and two cycles of the rotary cutters.

This driving connection is shown as comprising the coacting gears 18, 19 on the shafts of the rotary cutters 8, 9; the coacting gears 20, 21 on the shafts of the gear 8 and delivery cylinder 12; the gear 22 on the shaft of the first transfer cylinder 10 which coacts with the gear 19 on the shaft of the rotary cutter 9 and also with the gear 23 on the shaft of the second transfer cylinder 11; the coacting gears 24, 25 on the shafts of the first transfer cylinder 10 and second delivery cylinder 13; and the coacting gears 26, 27 on the

shafts of the second transfer cylinder 11 and third delivery cylinder 14.

It will be understood that the three delivery cylinders are driven at a considerably lesser surface speed than that of the rotary cutters. This is shown as being accomplished as follows. The three delivery cylinders have a materially greater diameter than that of the rotary cutters and the ratio between the gears is as follows. The ratio between the coacting gears 18, 19 is one to one; between the gears 20, 21 is one to two; between the gears 19 and 22 is one to two; between the gears 22 and 23 is two to one; between the gears 24 and 25 is one to one; and between the gears 26 and 27 is one to two.

The devices on the rotary cutters and various cylinders which operate to cut and deliver the signatures will now be described.

The rotary cutter 8 is shown as provided with a knife box 28 and two knives 29, 30 equally spaced apart around the periphery of the cutter, and also one set of cam operated impaling pins 31 located at the knife block 28 to engage the first signature. A fixed cam 32 is located in position to withdraw these pins 31 to permit the first signature to be transferred from the rotary cutter 8 to the delivery cylinder 12.

The rotary cutter 9 is shown as provided with a knife 33 and two knife boxes 34, 35 equally spaced apart around the periphery of the cutter, and two sets of cam operated impaling pins 36, 37 located at the knife boxes 34, 35. A fixed cam 38 is located in position to withdraw these impaling pins 36, 37 to permit the second and third signatures to be transferred from the rotary cutter 9 to the first transfer cylinder 10.

The first transfer cylinder 10 is shown as twice the diameter of the rotary cutters 8, 9 and it is provided with four sets of cam operated impaling pins 39, 40 and 41, 42 spaced apart around the periphery of the transfer cylinder as follows. The impaling pins 40 are spaced one-sixth of the periphery from the impaling pins 39; the impaling pins 41 are spaced two-sixths of the periphery from the impaling pins 40; the impaling pins 42 are spaced one-sixth of the periphery from the impaling pins 41; and the impaling pins 39 are spaced two-sixths of the periphery from the impaling pins 42. A fixed cam 43 is located at one end of the first transfer cylinder in position to withdraw impaling pins 42 to transfer the second signature to the second delivery cylinder 13 during the first cycle of the rotary cutters and the impaling pins 40 during the second cycle of the rotary cutters. A second fixed cam 44 is located at the other end of the first transfer cylinder in position to withdraw impaling pins 41 to transfer the third signature from the first transfer cylinder 10 to the second transfer cylinder 11 during the first cycle of the rotary cutters 8, 9 and the impaling pins 39 during the second cycle of the rotary cutters.

The second transfer cylinder 11 is shown as one-half the size of the first transfer cylinder 10 and as provided with one set of cam operated impaling pins 45 on its periphery. A fixed cam 46 is located in position to withdraw the impaling pins 45 to permit the transfer of the third signature from the second transfer cylinder to the third delivery cylinder 14.

The first delivery cylinder 12 is shown as provided with two grippers 47, 48 equally spaced apart around its periphery. A fixed cam 49 is located in position to operate the grippers 47 to take the first signature in the first cycle of the rotary cutters from the rotary cutter 8 and the grippers 48 to take the first signature in the second cycle of the rotary cutters and to deposit the succeeding first signatures onto the endless tape carrier 15.

The second delivery cylinder 13 is shown as similarly provided with two grippers 50, 51 equally spaced apart around its periphery. A fixed cam 52 is located in position to operate the grippers 50 to take the second signature from the first transfer cylinder during the first cycle of the rotary cutters 8, 9 and to operate the grippers 51 to take the second signature from the first transfer cylinder 10 during the second cycle of the said rotary cutters.

The third delivery cylinder 14 is shown as similarly provided with two grippers 53, 54 equally spaced apart around its periphery. A fixed cam 55 is provided for operating the grippers 53 during the first cycle of the rotary cutters 8, 9 to take the third signature from the second transfer cylinder 11 and the grippers 54 for taking the third signature from the second transfer cylinder 11 during the second cycle of the rotary cutters 8, 9 and to deposit the signatures on the third endless delivery carrier 17.

Three stops 56, 57, 58 are provided for the signatures as they are deposited onto their respective endless tape carriers 15, 16, 17 by the signature delivery cylinders 12, 13, 14.

Stationary vertically disposed guide plates 59, 60, 61 are provided along the endless tape carriers 15, 16, 17 at the signature delivery cylinders 12, 13, 14 on the folded edge side of the signatures as they are deposited onto their respective endless tape carriers.

Because of the tendency of the signatures to move sideways off the endless tape carriers where the folded edges of the signatures are parallel with the travel of the endless tape carriers and the signatures are narrow, traveling endless belts 62, 63, 64 are provided along the sides of the endless tape carriers opposite the stationary guide plates 59, 60, 61.

Means are provided for driving these guide belts and endless tape carriers at the same slow speed, said means comprising the following elements. Crank pins 65, 66, 67 on the shafts of the signature delivery cylinders 12, 13, 14 are connected by links 68, 69, 70 to the rock arms 71, 72, 73 of one-way clutches 74, 75, 76 on the cross shafts 77, 78, 79 on which the pulleys 80, 81, 82 of the endless tape carriers are mounted. These cross shafts 77, 78, 79 drive through pairs of connecting gears 83, 84, 85, 86, 87, 88, the vertical shafts 89, 90, 91 which carry the belt driving pulleys 92, 93, 94.

The means for associating and folding the traveling webs shown and described but not claimed herein form the subject matter of my copending application filed February 7, 1945, Serial No. 576,564 of which this application is a division.

It is evident that various changes may be resorted to in the construction, form and arrangement of the several parts without departing from the spirit and scope of my invention, and hence I do not intend to be limited to the particular embodiment herein shown and described, but what I claim is:

1. Means for delivering associated and folded signatures, including an endless tape carrier, a delivery cylinder for depositing the folded signatures thereon with their folded line parallel to the travel of the tapes, a stationary vertically

disposed guide plate located along one side of the tape carrier at the delivery cylinder on the folded edge side of the signatures, an endless belt extending along the opposite side of the tape carrier parallel thereto and acting as a traveling side guide for the open edge side of the said folded signatures for overcoming the tendency of the signatures to slide sideways off their tape carrier, and means for driving both the belt and tape carrier at the same speed.

2. Means for delivering associated and folded signatures, including an endless tape carrier, a delivery cylinder for depositing the folded signatures thereon with their folded line parallel to the travel of the tapes, a stationary vertically disposed guide plate located along one side of the tape carrier at the delivery cylinder on the folded edge side of the signatures, an endless belt extending along the opposite side of the tape carrier parallel thereto and acting as a traveling side guide for the open edge side of the said

folded signatures for overcoming the tendency of the signatures to slide sideways off their tape carrier, and means operated by the delivery cylinder for driving both the belt and tape carrier at the same speed.

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