

March 15, 1960

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2,928,337

AUTOMATIC MAIL CANCELLING APPARATUS

Filed Dec. 5, 1957

3 Sheets-Sheet 1

Fig. 1.

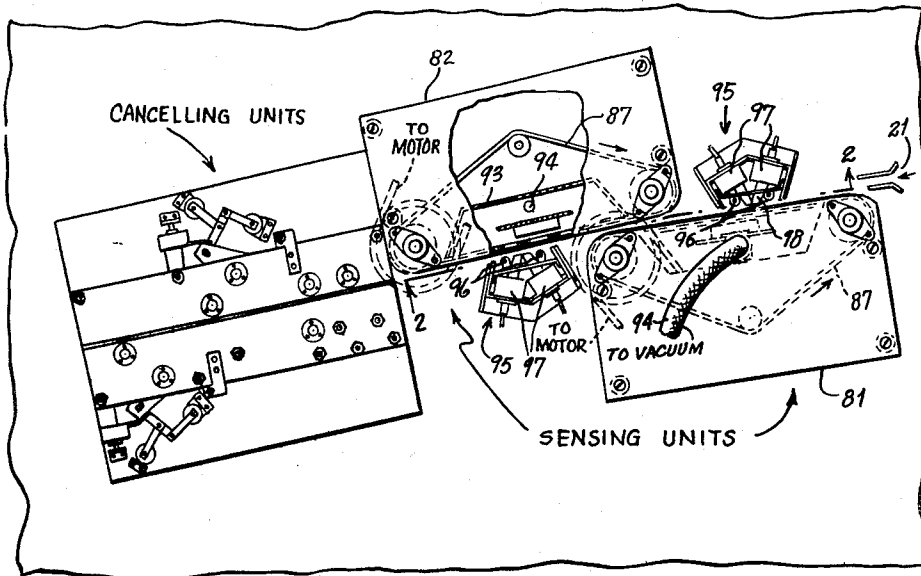


Fig. 2.

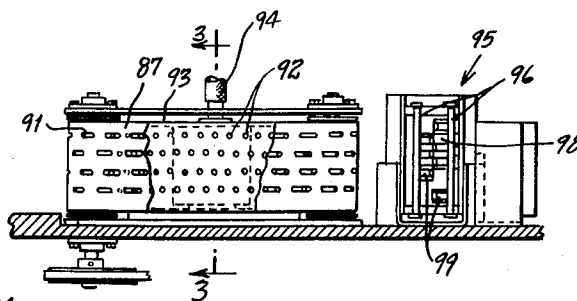
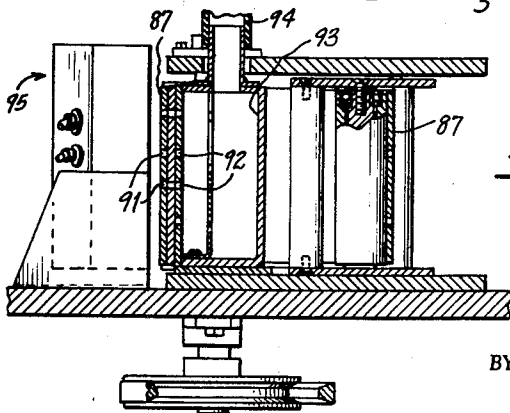


Fig. 3.

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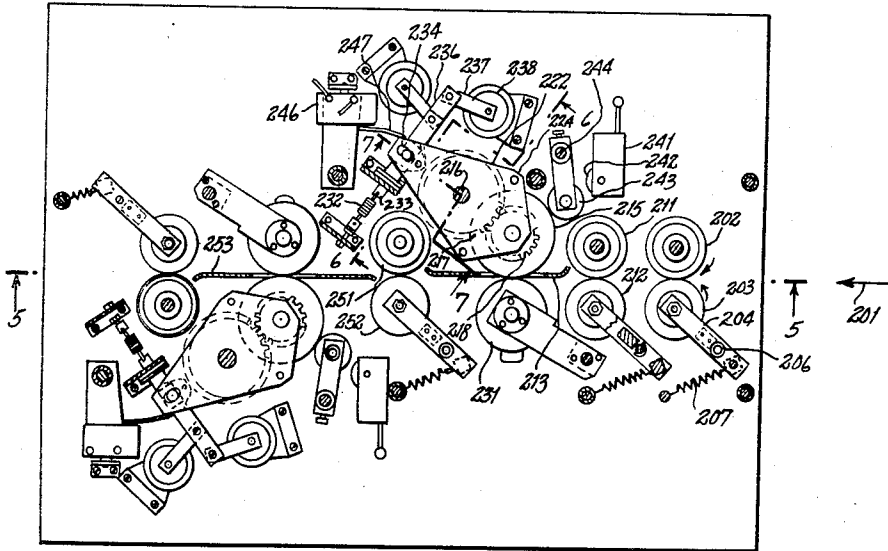


Fig. 4.

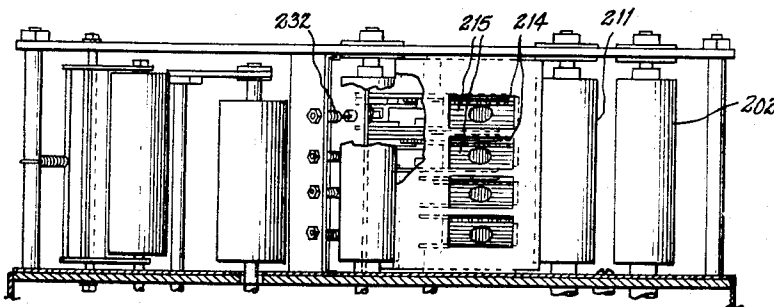


Fig. 5.

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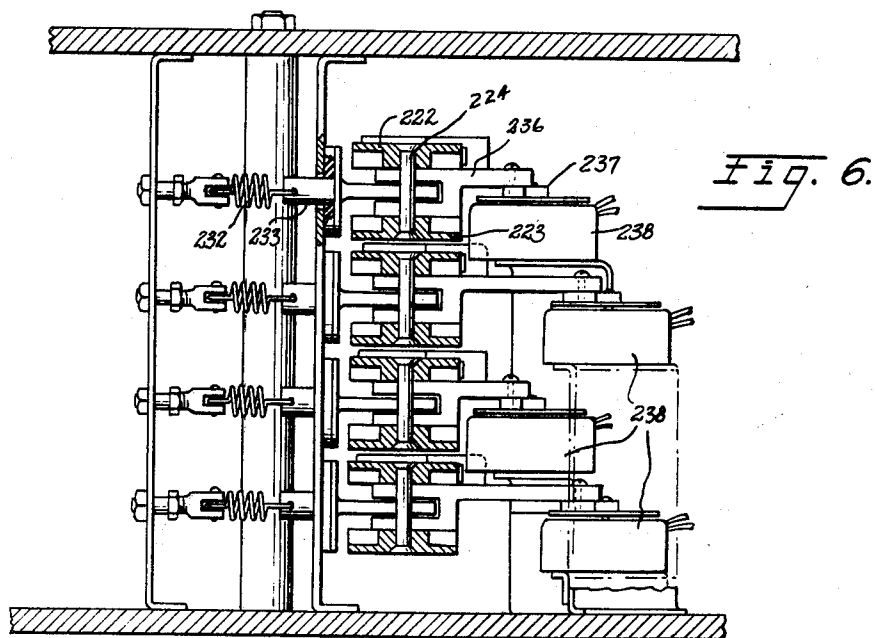
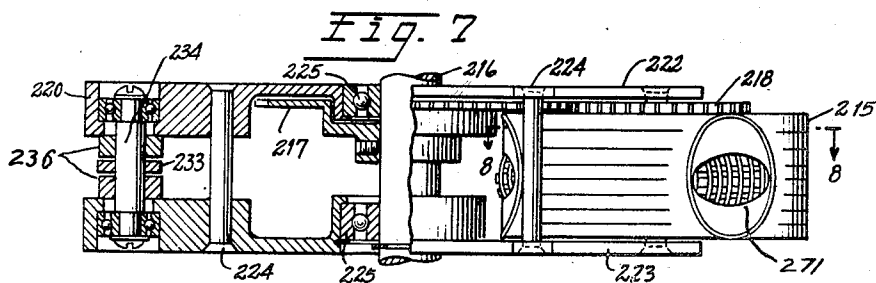
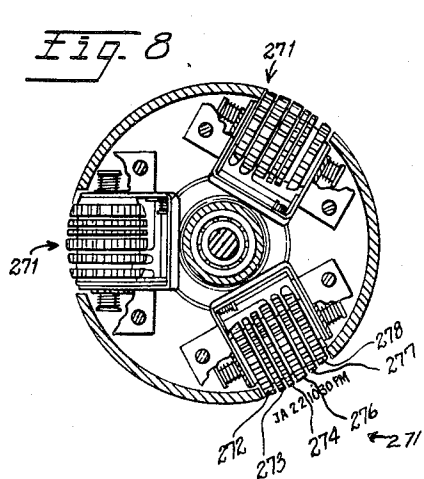
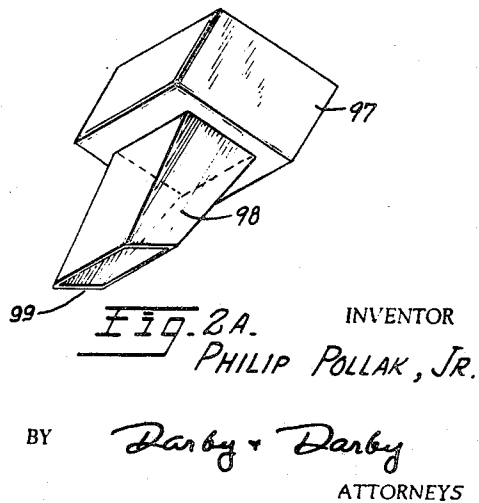
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AUTOMATIC MAIL CANCELLING APPARATUS

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2,928,337

AUTOMATIC MAIL CANCELLING APPARATUS

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Application December 5, 1957, Serial No. 700,860

3 Claims. (Cl. 101-91)

The present invention relates to the art of letter mail processing and is more particularly concerned with cancellation of postage stamps on such letter mail at high rates of speed.

The tremendous volume of letter mail currently being transported, processed and delivered has far exceeded the capacity of post offices generally and particularly of large metropolitan post offices handling millions of mail pieces per day. One particularly important problem has been the expeditious application of proper cancellation marks to the postage stamps affixed to such letter mail.

A system for automatically applying such cancellation marks is disclosed and described in copending application Serial No. 686,529 for "Automatic Mail Cancellation Apparatus" filed on September 26, 1957, in the names of R. F. Blake, S. I. Goodman and J. J. Rudigier and assigned to the same assignee as the present application.

This prior Blake et al. application discloses a system to which is supplied a continuous stream of letter mail in single file. A sensing unit responds to the presence and position of a postage stamp on the letter envelope to create a signal pulse which is thereafter utilized to apply a cancellation mark to the same envelope and postage stamp at a subsequent point of its travel in response to such an electrical signal and without interruption of the flow of letter pieces, which may be at a high speed of the order of 150 inches per second with a flow rate of the order of 30,000 pieces per hour.

The present invention is directed toward the specific apparatus for applying this cancellation mark, which is disclosed but not claimed in said Blake et al. application.

It is accordingly a principal object of the present invention to provide apparatus useful in a completely automatic mail cancelling system for applying a cancellation mark to a letter passing at uniform speed and without interruption of or effect on the flow of such letters.

It is another object of the present invention to provide improved apparatus for applying cancellation imprints to letters bearing postage stamps and travelling continuously at high rates of speed.

Other objects and advantages of the present invention will become more clearly apparent from a consideration of the following description of a preferred form thereof taken in conjunction with the appended drawings, in which:

Fig. 1 is a plan view of a part of a general system incorporating the present invention, including sensing units for determining the existence and location of postage stamps and cancelling units according to the present invention;

Fig. 2 is a fragmentary elevation cross-sectional view of the apparatus of Fig. 1 taken along line 2-2 thereof;

Fig. 2A is a perspective view of a photocell hood as used in Fig. 2.

Fig. 3 is a fragmentary elevation cross-sectional view of the apparatus of Fig. 2 taken along line 3-3 thereof;

Fig. 4 is an enlarged plan view of a canceller apparatus

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according to the present invention, with the covers removed;

Fig. 5 is an elevation cross-sectional view of the apparatus of Fig. 4 taken along line 5-5 thereof;

Fig. 6 is a further elevation cross-sectional view of the apparatus of Fig. 4 taken along line 6-6 thereof;

Fig. 7 is a further elevation cross-sectional view of the apparatus of Fig. 4 taken along line 7-7 thereof; and

Fig. 8 is a fragmentary horizontal cross-sectional view of a canceller head taken along line 8-8 of Fig. 7.

Figs. 1 to 8 show the structure of both the sensing and cancelling portions of the system. It is to be understood that the sensing structure forms no part of the present invention, which is directed toward the cancelling apparatus illustrated in the drawings and described below.

The input to the sensing unit is supplied between guides 21 of Fig. 1 in the form of a high constant speed flow of single mail pieces standing on edge with a predetermined minimum spacing between pieces. As described in the above mentioned Blake et al. application, the orientation of the envelope is immaterial except that it should preferably pass through the apparatus with its long axis horizontal. In this condition each envelope passes two sensing units 81 and 82, the latter cooperating with the forward face of each letter and the former with the rearward face, as viewed from the bottom of the figure. Each of these sensing units produces electrical signals corresponding to stamp information appearing on each letter as it passes the sensing unit, as described in more detail in the said Blake et al. application. The two sensing units are the same and accordingly only unit 81 need be described. For present purposes, the structure of the sensing units need not be described in detail, reference being made to the Blake et al. application therefor, and the functioning thereof being now described.

A vacuum transport belt arrangement of the type described and claimed in copending patent application Serial No. 696,393, for "Mail Handling Apparatus," filed November 14, 1957, now U.S. Patent No. 2,905,309, in the name of C. G. Makrides (Case 2) and assigned to the same assignee as the present invention, forms a part of the sensing unit. As each letter enters unit 81 by way of guides 21, its leading edge is immediately attracted to the vacuum belt 87 and it is transported leftward by belt 87 at the same constant rate of speed which it had as it entered. Belt 87 is essentially a transporting device. Its function is to assure that each letter is carried past the sensing unit at a constant rate of speed determined solely by the belt 87 itself, eliminating any other influence such as inertia, acceleration or the like. For this purpose, as seen most clearly in Fig. 2, belt 87 is supplied with a plurality of horizontal rows of closely spaced short slots 91 which successively register with corresponding rows of apertures or ports 92 of a manifold 93 to which vacuum pressure is applied by a tube or pipe 94. Each belt slot 91 is made long enough to straddle or cover each successive pair of the manifold ports 92 so that at all times at least one manifold port 92 will be in registry with a belt slot 91 along the working face of the unit 81.

Each sensing unit contains a photoelectric sensing assembly indicated at 95, having a light source exemplified by a pair of strip lights 96 which illuminate a very narrow area of the belt 87 along the entire width thereof. If desired a suitable slit formed in a baffle interposed between lights 96 and belt 87 may be used to delineate the width of the illuminated area. A set of photocells 97 is arranged in two interleaved stacks adjacent the light sources 96. In one illustrative example there might be seven such photoelectric cells. Each photocell 97 has a shield or hood 98 of tapered form terminating in a

very narrow rectangular opening 99, these openings being in vertical alignment closely adjacent the belt 87 so as to permit the photocells 97 to respond to light from sources 96 reflected from respective levels of the belt, envelope or stamp, as the case may be.

As described in the Blake et al. application, seven photocells 97 may be distributed along the illustrative 6 inch width allotted to the letter pieces, and the sensing unit 81 includes circuitry coupled to the photocells 97 which provides signals indicative of the presence and location of stamps on the rear face of letters, and belt 87 then passes these letters on to the second sensing unit 82. Sensing unit 82 has a similar vacuum transport belt 87 operating to accept and transport letters as they are released by the vacuum belt 87 of sensing unit 81. The two belts are driven at the same speed so that each of the letters is continuously transported at uniform speed by the two sensing units in succession. The sensing unit 82 then provides similar signals in response to stamps on the front face of the letters moving by.

After being sensed by the sensing units 81 and 82, the letters are transported to the cancelling unit of the present invention shown more particularly in Figs. 4 to 8. The uniform stream of letters leaving the sensing units 81 and 82 of Fig. 1 is passed through the cancelling unit of Fig. 4, the arrow 201 indicating the entrance of this stream of letters. These letters are transported at the same uniform speed through the cancelling unit by means of a plurality of pairs of rollers. The letters first engage a pair of rollers 202, 203. Roller 202 is continuously driven at a peripheral speed equal to the letter speed, and frictionally drives roller 203 which is mounted on an arm 204 pivoted to the table or frame at 206 and urged by a spring 207 against roller 202. This resilient mounting for roller 203 permits letters of varying thicknesses, such as up to 1/4 inch illustratively, to pass by the rollers 202, 203, without loss of speed. Preferably rollers 202, 203 are located close to the last sensing unit 82 so that they grasp the leading edge of each envelope prior to the time that its trailing edge is relinquished by the vacuum belt 87 of sensing unit 82. As the envelope passes through rollers 202, 203, it is grasped by a second and similar pair of rollers 211, 212 which are separated from rollers 202, 203 by no more than the minimum length of the envelope, so as again to assure positive transport of each letter through the system.

The letter is transported in this way to slide along the smooth surface of a plate 213 having a series of four rectangular apertures 214 arranged transversely of the letter axes, as shown in Fig. 5, through which one or more of the cancelling drums or heads 215 may apply a cancellation to the letter as it flies by. Illustratively four separate cancelling drums or heads 215 may be distributed across the width of the letter. As described in said Blake et al. application, these canceller heads 215 are actuated by different ones of the seven photocells. A driven back-up drum or roller 231 transports the letters past the heads 215.

The actuating mechanism for the canceller heads 215 is indicated more specifically in Figs. 4 to 8. A shaft 216 is continuously rotated at a constant speed by suitable motor means. Connected to the shaft 216 are four gears 217, one of which is shown in Fig. 7, which continuously rotate and engage corresponding respective gears 218 each fixed to a respective one of the cancelling heads 215. Each cancelling head 215 is pivotally mounted on an arm 220 formed by a pair of plates 222, 223 suitably held together as by struts 224, and pivotally mounted coaxially with shaft 216 as by bearings 225. Accordingly, arm 220 may pivot about the axis of shaft 216 without affecting the continuous rotation of the cancelling heads 215 whose gears 218 remain in engagement with the gears 217 at all times independently of any such pivoting.

Equally spaced around the periphery of the cancelling head 215 are mounted a set of printing wheel assemblies

271 (illustratively shown as three in number). Each printing wheel assembly 271 is mounted in a U-shaped bracket and its outer surface is maintained flush with the peripheral surface of cancelling head 215 so as to form effectively a continuation thereof. The printing wheel assembly 271 includes six printing wheels, 272, 273, 274, 276, 277 and 278 all individually rotatably mounted and each having characters engraved around its periphery, these sets of characters taken together, indicating the month, date and time of day, as indicated in Fig. 8. Accordingly, as shown, a complete cancellation is repeated three times around the periphery of cancelling head 215. In addition, the head periphery between the sets of time and date printing wheels may carry fixed engravings to imprint suitable legends in addition to the date and time. It will be understood that the printing wheels 271 must be periodically reset to show changes in time as may be required. This may be done manually; however a desirable arrangement for automatically resetting these printing wheels at periodic intervals is described in a co-pending application, Serial No. 700,861 filed December 5, 1957, in the names of Philip Pollak, Jr., and Edward James Lopes.

Each cancelling head 215 is normally maintained out of engagement with its back-up drum 231 by means of a spring 232 coupled to a rod 233 engaging a pin 234 pivotally mounted in the arm 220. A second forked rod 236 also engages pin 234 from the opposite side thereof and is connected to the actuating arm 237 of a rotary solenoid 238.

As viewed in Fig. 4, upon energization of a solenoid 238, its arm 237 moves clockwise to pull rod 236 to overcome the tension of spring 232 and thereby rotate the cancelling head arm 220 in a clockwise direction about the axis of shaft 216, thereby pressing the cancelling head 215 against back-up roller 231, in which position it is shown in Fig. 4. A suitable inking reservoir 241 is provided having an inking roller 242 which in the unenergized position of each cancelling head 215 engages a respective ink transfer roller 243 which is pivoted at 244 so as to ink each cancelling head 215 while it is out of engagement with its back-up roller 231, to assure that each cancelling head 215 has a continuous supply of ink for cancelling purposes.

It will be understood that, as shown in Figs. 5 and 6, each of the four cancelling heads 215 is provided with a similar independent actuating mechanism, the respective actuating solenoids 238 being located in staggered fashion for conservation of space. A limit switch 246 may be mounted with a feeler 247 in engagement with the arm 220 of a respective cancelling head 215 to provide an electrical pulse upon each actuation of the cancelling head, which can then serve to actuate a suitable counter circuit or mechanism for counting the number of letters cancelled.

After leaving the cancelling station just described, the letters are passed through a further pair of drive rollers 251, 252 similar to rollers 202, 203 and thereby are passed by a subsequent plate 253 similar to plate 213. As will be observed, the letters passing plate 213 have their rear sides facing the cancelling heads 215, while the letters passing plate 253 have their front faces facing another set of similar cancelling heads. The canceller head actuating mechanism just described is duplicated on the other side of plate 253.

In this way, first any stamp on the rear face of a letter may be cancelled at an appropriate position along the width of the letter by an appropriate one or more of the first set of four cancellers, and thereafter the letter will be passed through the subsequent canceller unit which will do the same for the front face. The structure of the second half of the cancelling unit is essentially the same as that of the first half, merely operating upon the opposite face of the letter passing therethrough.

The respective solenoids 238 are actuated by signals

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from photocells 97 in the manner described in said Blake et al. application. In general, the first set of photocells 97 of-senser unit 81 will actuate the solenoids 238 of the first canceller unit, and similarly the second set of photocells of the second senser unit 82 will actuate only the second set of solenoids. Thus, a letter having a stamp on its rear face will be cancelled by the first set of canceller heads, while one with a stamp on the front face will be cancelled by the second set of canceller heads.

The arrangement for driving the various rollers and shafts of the cancelling unit will be obvious from the foregoing explanation, it being understood that the various driven rollers 202, 211, 231, and the four gears 218 of the four cancelling heads 215 (and correspondingly in the second canceller unit) are all driven so as to have the same linear peripheral speed as the letter fed to the cancelling unit. Any desired drive arrangement can readily be devised by anyone skilled in the art.

The operation of the present system has already been described in said Blake et al. application. The electrical signal produced in response to the passage of a stamp in front of a particular photocell or photocells is properly timed by the system of the Blake application to energize the proper solenoid of the canceller unit at the proper instant to cause the appropriate canceller head to swing into operative position just at the instant that the same letter which created that signal has its stamp passing the position of the canceller head. Each canceller head is continuously rotating with a peripheral linear speed matching that of the letter, so that as it moves into engagement with the letter the cancellation imprint will be marked upon the letter with no relative movement between the letter and canceller head so that smudging is avoided.

It will be understood that the particular solenoid arrangement shown for swinging the canceller heads into operative imprinting position is illustrative only, and that any suitable means for effecting this movement in response to electrical signals may be used.

Also, it will be understood that the present invention is not limited to use with the particular sensing unit or circuit described, since it can be used with any system providing a suitable electrical signal synchronized with the passage of a stamp-bearing envelope.

Since many apparently widely differing structures may be readily devised by those skilled in the art without departing from the scope of the present invention, it is understood that the foregoing is illustrative only, the scope of the invention being defined solely by the appended claims.

What is claimed is:

1. Apparatus for cancelling postage stamps on letters in a constant-velocity stream of single vertical pieces comprising means for transporting said letters at said constant velocity, a plurality of canceller heads vertically disposed at different distances across the transverse dimension of said letters and each bearing a cancellation imprinter, a shaft extending vertically transversely of the path of said letters, a plurality of arms pivotally mounted coaxially with said shaft, means rotatably supporting a canceller head on each of said arms and displaced from the axis of said shaft, a respective gear coaxially secured to each of said cancelling heads, a further set of gears secured to said shaft and respectively engaging said first gears, means for continuously rotating

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said shaft to rotate said canceller heads continuously at a peripheral speed equal to the linear speed of said letters, spring means normally urging all said canceller heads away from said letter path and to a position spaced from said path and respective solenoids coupled to said arms for selectively displacing said heads pivotally about said shaft toward the path of said letters in response to electrical signals supplied to said solenoids, whereby upon energization of one of said solenoids in timed relation to the passage of a letter a corresponding cancelling head is rotated into said letter path to place a cancellation imprint on said letter.

2. Apparatus for cancelling postage stamps on letters in a constant velocity stream of single vertical pieces comprising means for transporting said letters at said constant velocity, a plurality of canceller heads vertically disposed at different distances across the transverse dimension of said letters and each bearing a cancellation imprinter, a vertical shaft extending transversely of said letter path, a plurality of arms pivotally mounted coaxially with said shaft and each carrying a respective canceller head displaced from the axis of said shaft, a gear coaxially secured to each of said cancelling heads, a further set of gears mounted on said shaft and respectively engaging said first gears, means for continuously rotating said shaft for rotating said canceller heads continuously at a peripheral speed equal to the linear speed of said letters, means normally urging all said canceller heads away from the path of said letters and to a position spaced from said path, and means responsive to a signal representative of the occurrence and location of a postage stamp on one of said letters for selectively displacing a corresponding one of said heads pivotally about said shaft into the path of said letters in timed relation to the passage of said one letter, to place an imprint on said letter without effect upon the speed of said letter.

3. Apparatus for cancelling postage stamps on letters in a constant-velocity stream of single vertical pieces comprising means for transporting said letters at said constant velocity, a plurality of canceller heads vertically disposed at different distances across the transverse dimension of said letters and each bearing a cancellation imprinter, means for continuously rotating all said canceller heads at a peripheral speed equal to the linear speed of said letters, means normally urging all said canceller heads away from the path of said letters and to a position spaced from said path, and means responsive to a signal representative of the occurrence and position of a postage stamp on one of said letters for selectively displacing a corresponding one of said heads into the path of said letters in timed relation to the passage of said one letter, to place an imprint on the postage stamp of said one letter.

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