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Dlugos et al.

[11] **3,770,945**

[45] **Nov. 6, 1973**

[54] **PARCEL POSTAGE METERING SYSTEM**

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[73] Assignee: **Pitney-Bowes, Inc.**, Stamford, Conn.

[22] Filed: **Apr. 10, 1972**

[21] Appl. No.: **242,851**

Related U.S. Application Data

[62] Division of Ser. No. 107,223, Jan. 18, 1971, Pat. No. 3,692,988.

[52] **U.S. Cl.** ... **235/92 EA**, 235/92 CA, 235/61.9 C, 101/93 C

[51] **Int. Cl.** **G06m 3/06**

[58] **Field of Search** ..... 235/92 EA, 92 CA, 235/92 H, 61.9 R, 92 MP; 101/93 C

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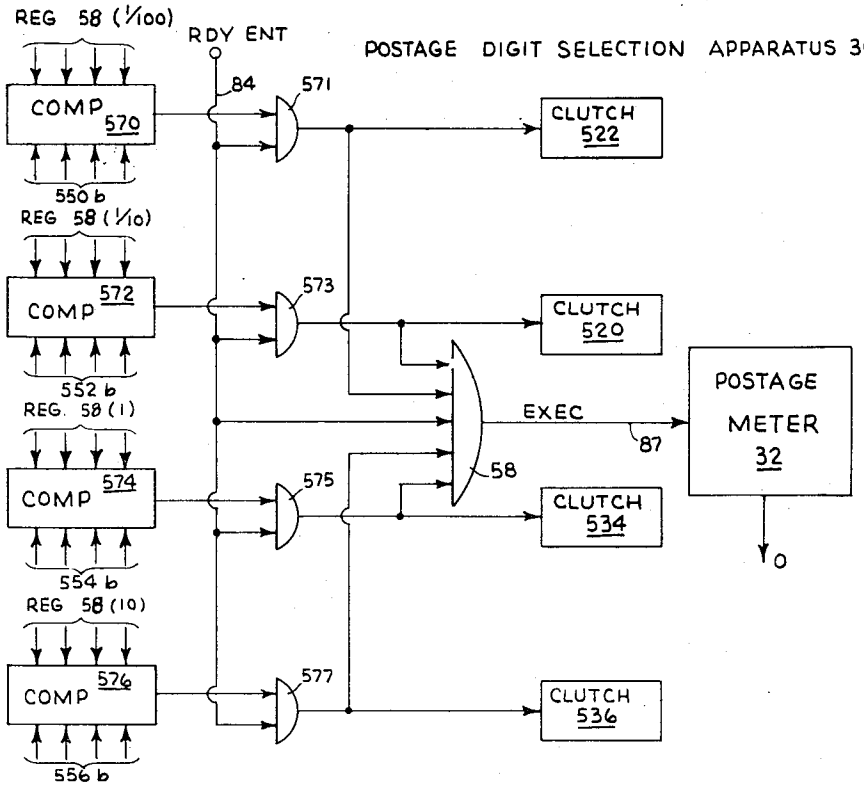
Primary Examiner—Thomas A. Robinson
Assistant Examiner—Joseph M. Thesz, Jr.
Attorney—Albert W. Scribner

[57] **ABSTRACT**

A parcel postage metering system includes electromechanical apparatus for positioning the various digit selector arms of a postage meter in accordance with the corresponding digits of the postage, held in an output register, applicable to a parcel as determined on the basis of its weight and destination. A motor drives the various digit selector arms through individual clutches, and the instantaneous digit positions of the arms are separately compared with the corresponding postage digits in the output register. As comparisons are achieved, the associated clutches are disengaged leaving the arms in appropriate postage digit selection positions.

4 Claims, 7 Drawing Figures



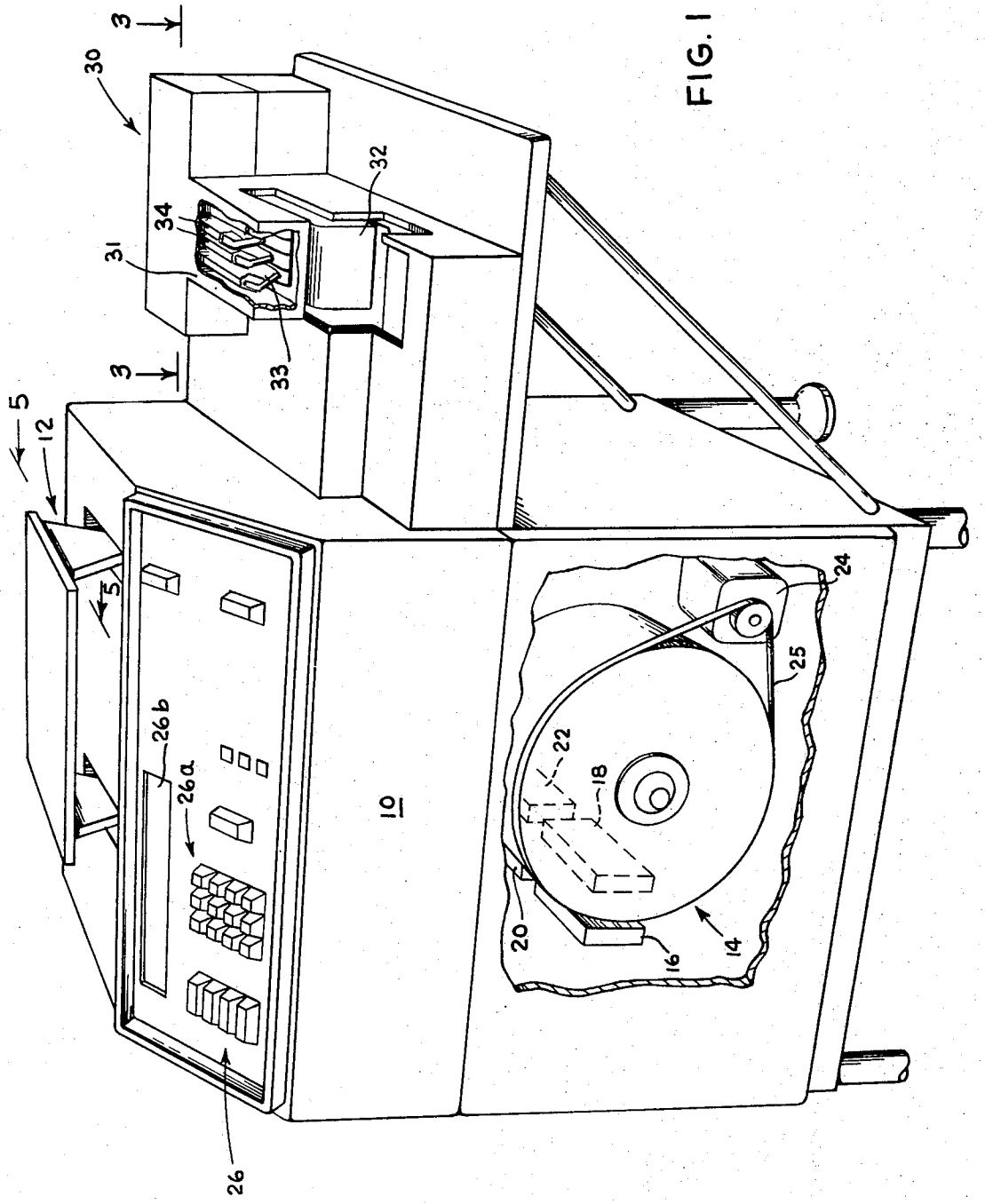


FIG. 1

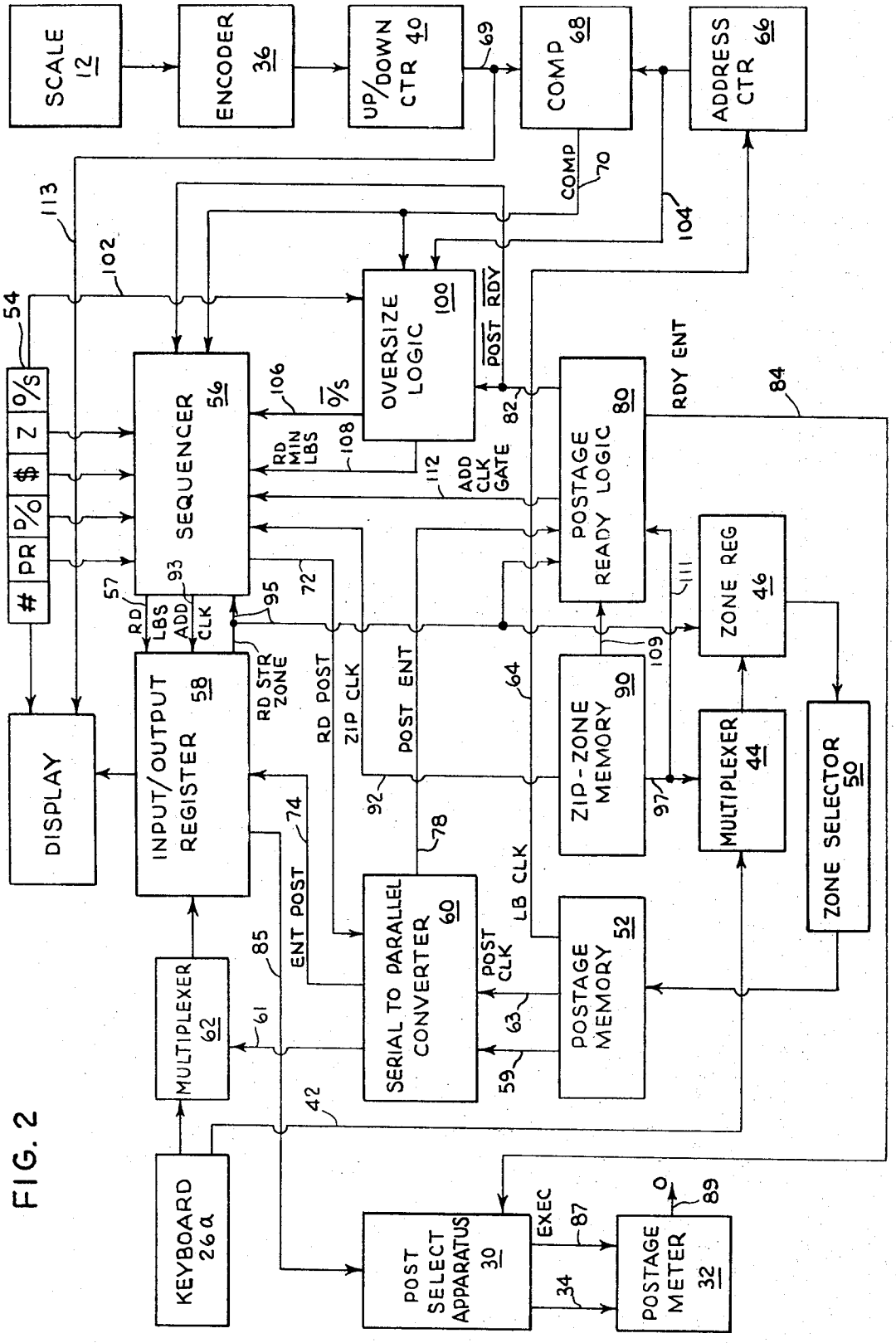
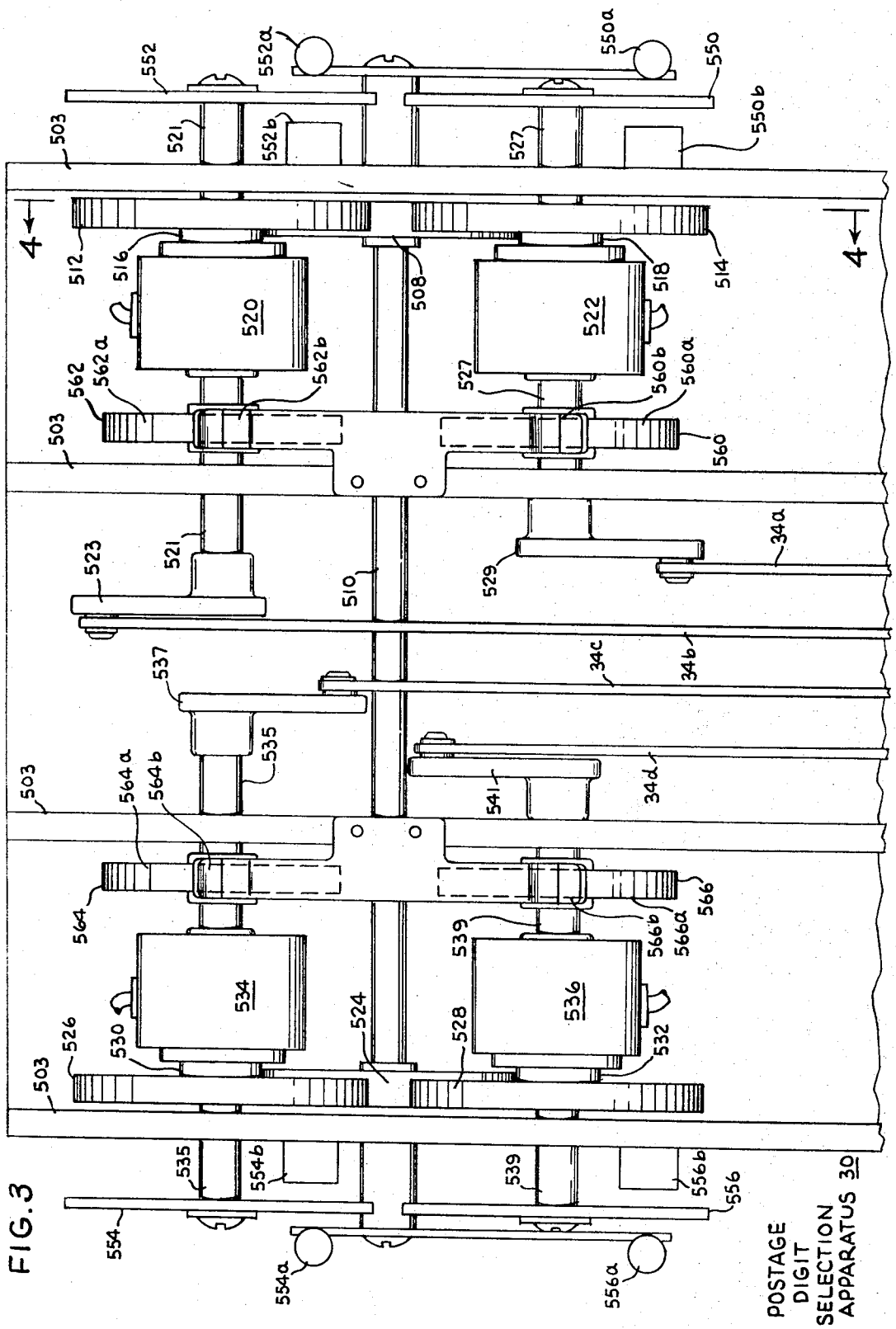

SCALE 12
ENCODER 36
UP/DOWN CTR 40
69
COMP 68
ADDRESS CTR 66
COMP
70
104
113
102
54
OVERSIZE LOGIC 100
POST RDY
82
RDY ENT
84
PR % $ Z %S
SEQUENCER 56
106
%S
RD MIN LBS
108
112
ADD CLK GATE
POSTAGE READY LOGIC 80
ZONE REG 46
111
57
RD
LBS
ADD
CLK
93
95
72
109
DISPLAY
INPUT/OUTPUT REGISTER 58
RD STR ZONE
RD POST
ZIP CLK
POST ENT
64
ZIP-ZONE MEMORY 90
MULTIPLEXER 44
ZONE SELECTOR 50
92
74
78
97
ENT POST
LB CLK
SERIAL TO PARALLEL CONVERTER 60
POST CLK
POSTAGE MEMORY 52
85
MULTIPLEXER 62
61
63
59
42
KEYBOARD 26a
POST SELECT APPARATUS 30
EXEC
87
34
0
89
POSTAGE METER 32

FIG. 2


552
552a
550a
550
550b
503
521
552b
527
4
512
516
508
518
514
520
522
562
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560b
560a
560
523
510
529
34a
537
34c
34b
535
564a
564b
541
34d
564
566
566b
566a
539
534
536
526
530
524
528
532
554b
556b
554
554a
556a
556
POSTAGE DIGIT SELECTION APPARATUS 30

FIG. 3

FIG. 4

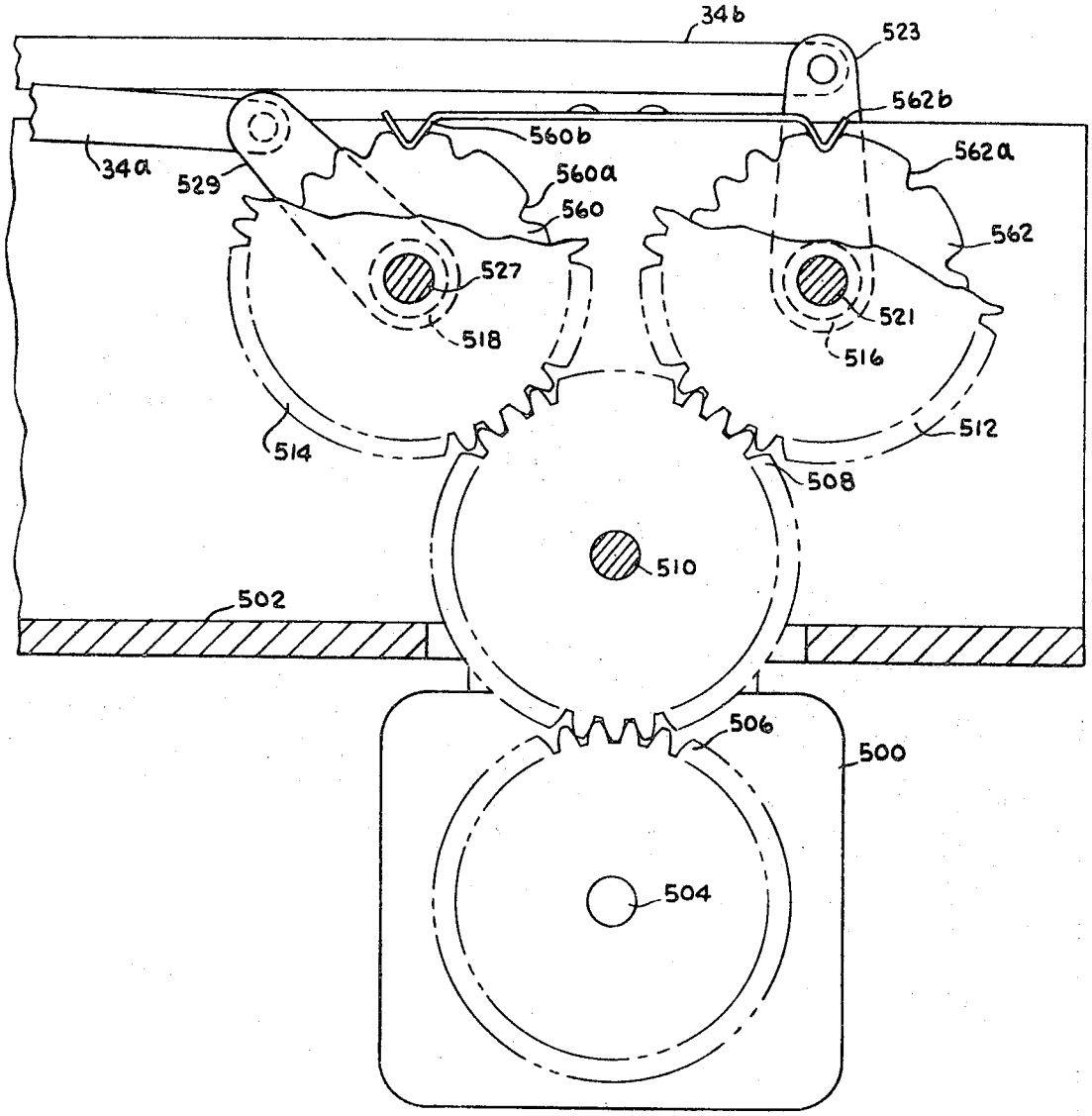


FIG. 5

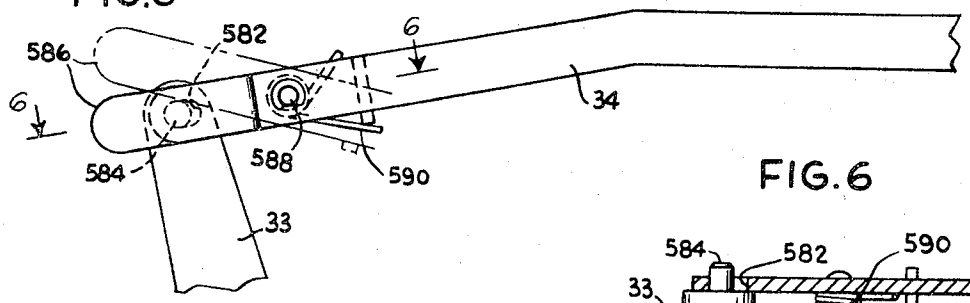


FIG. 6

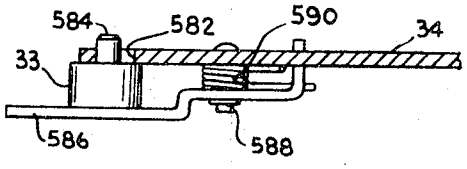
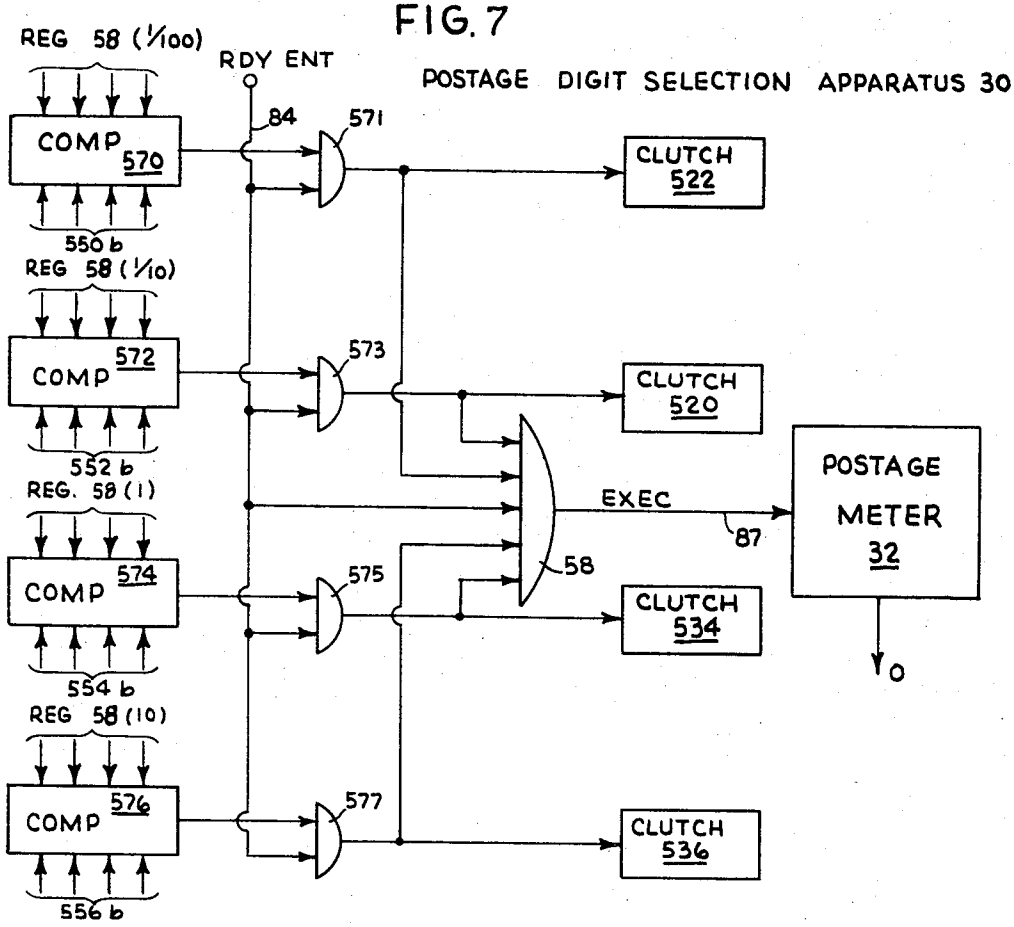


FIG. 7


POSTAGE DIGIT SELECTION APPARATUS 30
REG 58 (1/100)
RDY ENT
84
571
COMP 570
550 b
CLUTCH 522
REG 58 (1/10)
573
COMP 572
552 b
CLUTCH 520
REG. 58 (1)
EXEC
87
POSTAGE METER 32
58
575
COMP 574
554 b
CLUTCH 534
REG 58 (10)
577
COMP 576
556 b
CLUTCH 536
Y0

PARCEL POSTAGE METERING SYSTEM

This is a division, of application Ser. No. 107,223 filed Jan. 18, 1971 now U.S. Pat. No. 3,692,988.

BACKGROUND OF THE INVENTION

There have been a number of proposals for parcel postage systems to be used in the processing of parcels for mailing or shipping. A comprehensive or universal system must be sufficiently flexible to handle a number of variables which are involved in mailing or shipping parcels. The weight of each parcel must be determined with reasonable accuracy and speed. The distances between the original and the various parcel destinations must be determined in order to identify the appropriate postal zone for each parcel. Then, the postage applicable to each parcel must be determined on the basis of its weight and destination or postal zone. Having determined the applicable postage, a postage meter or the like is then set up and controlled to issue a stamp imprinted with that postage; the stamp being adhered to the parcel.

There are other factors or variables which a truly universal system should be equipped to handle. For example, the United States Post Office offers various classes of parcel post service, such as surface parcel post and air parcel post, each with different postage rate schedules based according to weight and postal zone. Also, there is United Parcel Service which offers parcel shipping services. It would thus be desirable to have a system which can be selectively controlled to compute postage or shipping charges for each of these different services.

In addition, there are factors such as insurance, special handling, special delivery, etc. which are often times desired and preferably should be capable of system implementation. Also, the special situation involving the computation of postage or shipping charges for oversize parcels should be considered in the design of a universally flexible parcel postage system.

When dealing with United Parcel Service, there are special shipping situations which require an additional charge, such as when shipping from west to east. Moreover, United Parcel Service (UPS) does not have authorized land routes between a number of geographical locations and must resort to so-called "drop shipping," which presents a special shipping charge situation. In some areas UPS has different rate schedules for intrastate and interstate shipments. All of these various situations should be accounted for.

Heretofore, some of the proposed parcel postage computing systems have been essentially "special purpose" and thus inflexibe machines adapted to handle only a single class of postal service. Attempts to provide "general purpose" machines have resulted in extreme complexity; such systems being unwieldy from both the operator standpoint and the servicing standpoint.

From a practical standpoint, such systems cannot operate without human intervention. At the very least, an operator must be on hand to determine the postal zone of each parcel destination. This determination must then be introduced into the system as an operator input. Other operator inputs manifesting selections of service, class of service, insurance, etc., are called for if the system is to be applicable to diverse mailings. An oversize parcel situation must also be entered into the system by the operator if the correct postage is to be computed. Thus, operational simplicity is a most important consideration in the design of a truly flexible parcel postage system if the use of highly skilled and thus highly paid operating personnel is to be avoided.

It is accordingly and object of the present invention to provide electromechanical apparatus for positioning the postage digit selector arms of a postage meter in accordance with the postage determined by an automated parcel postage metering system.

A further object is to provide apparatus of the above character which is fast, reliable, and accurate.

Other objects of the invention will in part be obvious and in part appear hereinafter.

In accordance with the invention, there is provided apparatus for interfacing an electronic postage metering system with a conventional mechanical postage meter. Separate position encoders translate the digit positions of the various postage digit selector arms of the postage meter into coded digits which are compared with the corresponding postage digits stored in the system postage output register. The postage digit selector arms are separately driven through their various digit positions, and as each assumes the digit positions corresponding to the associated digits in the postage register, they are decoupled from their respective drives. When all have been positioned to set up a digit by digit comparison with the postage held in the postage register, the postage meter is triggered to issue a postage imprinted stamp.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.

DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. **1** is a perspective view of a parcel postage metering system incorporating the apparatus of with the invention;

FIG. **2** is an overal functional block diagram of the parcel postage metering system of FIG. **1**;

FIG. **3** is a sectional view taken along line **3—3** of FIG. **1**;

FIG. **4** is a sectional view taken along line **4—4** of FIG. **3**;

FIG. **5** is a side elevation view of one end portion of one of the links interconnecting the postage digit selection apparatus of FIG. **3** and the postage meter of FIG. **1**;

FIG. **6** is a sectional view taken along line **6—6** of FIG. **5**;

FIG. **7** is a detailed logic block diagram of the postage data handling portion of the postage digit selection apparatus;

Like reference notations refer to corresponding parts throughout several views of the drawings.

DETAILED DESCRIPTION

Referring now to the drawings, and first to FIG. **1**, a parcel postage system, such as disclosed in detail in the above-noted U.S. Pat. No. 3,692,988, includes a console, generally indicated at **10**, which contains, among other things, electronic circuitry for processing weight

and postage data. Parcel weight data is obtained from a scale, generally indicated at **12**, incorporated in console **10**, while postage data is primarily obtained from a memory drum, generally indicated at **14** and also accommodated within the console. As will be seen, memory drum **14** has two separate memory banks; one storing a postage rate schedule and the other storing a zip code to postal zone conversion table. The data stored on memory drum **14** is optically encoded as opaque and transparent binary bits which are sensed by optical readout stations. As seen in FIG. **1**, a light emitter **16** shines light through the postage rate memory bank peripheral portion of the memory drum **14** to a receiver **18**, consisting of an array of suitable photosensors such as phototransistors. Similarly, the zip to zone memory bank peripheral portion of the memory drum is read out using a light emitter **20** and a receiver **22**. Memory drum **14** is rotated by a motor **24** and an interconnecting belt drive **25**.

It will readily occur to those in the art that other forms of data memories may be employed in the system of the present invention. For example, the postage and zone data may be optically encoded on one or more transparent discs. Moreover, suitable data memories may be provided in the form of magnetically encoded discs and drums, or even magnetic core matrices, although it is preferred to use a cyclical memory wherein the data is revolved passed readout stations, thus simplifying accessing from a component standpoint.

The console **10** also includes a control panel, generally indicated at **26** in FIG. **1**, which contains a plurality of mode keys selectively depressed by an operator to initiate various system operating modes to be described. The control panel also includes numerical entry keys accommodating the manual input of data pursuant to the invention. Space is also provided in the control panel **26** to accommodate a display panel **26*b*** where data is displayed; such data being system derived postage and weight data, as well as data entered from the control panel **26**.

The console **10** is electrically linked to electromechanical postage selection apparatus, generally indicated at **30**. The selection apparatus, as will be seen, is mechanically linked to a postage meter **32** of known construction, such as a Pitney-Bowes 5,300 Series Postage Meter. Parcel postage data derived at the console on the basis of the parcel weight is fed to the selection apparatus **30**, which operates to mechanically position the various postage digit selector arms, jointly indicated at **33** in FIG. **1**, by way of interconnecting links, jointly indicated at **34**, so as to set up the postage meter **32** for the proper postage. The postage meter is then signaled to issue a stamp printed with the value of the postage received from console **10**.

At this point, it should be pointed out that the system of the present invention is applicable to United States Post Office parcel post service and United Parcel Service (UPS). As is well known, a parcel can be sent either by parcel post (PP) or UPS. Thus, when reference is made to determining the applicable postage, this is intended to mean either the postage charged by the Post Office or the shipping charges applicable to the parcel if sent by UPS. Each service has its own rate schedule determined on the basis of the parcel weight, and, generally speaking, the distance the parcel is to be sent, and, in fact, the present invention contemplates storing both rates schedules on memory drum **14**.

In practice, parcels would be separated into groups depending upon whether they are to be sent by PP or UPS. One group of parcels, for example, those to be sent by Parcel Post would be successively weighed on a scale **12** to obtain the parcel postage stamps from postage meter **32**; the postage values being automatically deducted from a prepaid postage amount entered by postal officials. The parcel postage meter **32** would then be removed; the cover **31** being opened and the links **34** readily disconnected from the postage digit selector arms **33**. A UPS meter is substituted, and the console **10** is conditioned to determine the shipping charges for the parcels to be sent by UPS.

Alternatively, separate selection apparatus **30** and mechanically interlinked meters **32** can be provided for each service. They would be separately electrically linked to the console and would be individually selected from the control panel **26** by the operator according to which service is to be employed, either PP or UPS, for each parcel being weighed on scale **12**.

OVERALL SYSTEM BLOCK DIAGRAM

The basic operation of the system of FIG. **1** will be more readily understood from the system block diagram seen in FIG. **2**. With the exception the postage meter **32** and the electromechanical selection apparatus **30**, all of the components seen in FIG. **8** are functionally and physically located within console **10**. When a parcel is placed on scale **12**, its mechanical response is coupled to a scale encoder **36** adapted to convert the parcel weight into a proportional number of pulses which are accumulated in a counter **40**. As will be seen, counter **40** is an up/down pulse counter, enabling it to accurately follow the scale response as it oscillates about and ultimately settles down to a final weight reading.

The operator, upon reading the parcel address destination, determines the appropriate postal zone on the basis of the distance between his geographical location and the parcel destination. The operator enters the postal zone by depression of the appropriate key of a numerical entry keyboard **26*a*** included in control panel **26** (FIG. **1**). This zone entry is supplied by connection **42** and a multiplexer or switch **44** to a zone register **46**. Prior to the entry of a zone from numerical entry keyboard **26*a***, the operator presses a mode key Z included in a mode key group **54**, which has as one of its functions the conditioning of multiplexer **44** to route the keyboard zone entry through to zone register **46**. The zone digit entry held in zone register **46** conditions a zone selector **50** to effect appropriate zone entry into the postage memory **52** which, as previously noted, comprises one of the memory banks carried by memory drum **14** (FIG. **1**). In physical terms, zone entry into the postage memory **52** is effective by selecting one of a plurality of phototransistors, or the equivalent, included in the receiver array **18** generally illustrated in FIG. **1**. As will be subsequently described, the postage memory **52** includes a series of side by side zone channels in which postage data is serially recorded by parcel weight. Thus, the zone selector **50** effects selection of the appropriate phototransistor of the receiver array **18** which is aligned with the channel of the postage memory **52** assigned to the particular zone entered into the zone register **46** from the keyboard **26*a***.

The next operator function, and in most situations the only remaining operator function required for each parcel, is to depress a postage request key PR included in mode key group **54** in control panel **26.** This generates an input over lead **55** to a sequencer **56** which operates to organize the system operating functions pursuant to determining the applicable parcel postage.

Since the appropriate zone has already been entered into zone register **46,** thereby accessing postage memory **52** for all postage data, regardless of parcel weight, for that particular zone, the sequencer **56** generates a signal RD LBS over lead **57** to an input/output register **58.** This signal conditions register **58** for acceptance of the appropriate postage data read from the postage memory **52** over connection **59** to a serial to parallel converter **60** and thence over connection **61** and multiplexer **62** to the input/output register. As will be described, the postage data is stored and read out from postage memory in serial binary coded decimal, while the input/output register **58** is designed to accept the postage data in serial digit, parallel bit fashion. Thus, the serial to parallel converter **60** is necessary to accept the digit bits serially from postage memory **52** and successively pass the bits of each postage digit in parallel to the input/output register **58.** The memory **52** also includes a postage clock bit channel which is read out to provide postage clock pulses POST CLK over lead **63** to converter **60** for synchronizing the serial to parallel conversion.

Having accessed the postage memory **52** for the appropriate zone, it now remains to further access the postage memory for the appropriate parcel weight, held in up/down counter **40,** in order to obtain the applicable postage for entry into input/output register **58.** To this end, the postage memroy is provided with a pound clock pulse channel in which are recorded a series of pound clock bits located in predetermined relation to the stored postage data. These pound clock pulses LB CLK, read out during each revolution of the drum memory **14** (FIG. **1**), are applied over lead **64** to an address counter **66.** The pound clock pulse count accumulating in address counter **66** is continuously compared in a comparator **68** with the parcel weight stored in the up/down counter **40** supplied over connection **69.** When a comparison is reached between the pulse counts in address counter **66** and up/down counter **40,** comparator **68** generates a compare signal COMP over lead **70** to the sequencer **56.** Due to the arrangement of the postage data in postage memory **52,** the generation of compare signal COMP signals that the postage data applicable to the parcel weight registered in the up/down counter **40** is about to be read out to the serial to parallel converter **60.** The sequencer circuit **56,** in response to the compare signal COMP generates a read postage command signal RD POST over lead **72** to the serial to parallel converter **60.** This signal conditions the converter **60** to perform the serial to parallel bit conversion on a digit by digit basis for the next four postage digits read from the postage memory **52.** The four bits of each postage digit are assembled and then transferred in parallel, digit by digit, to the input/output register **58.** Each postage digit is shifted into the input/output register in response to an enter postage signal ENT POST generated over lead **74.**

When the last of the four postage digits, in the illustrated embodiment of the invention, has been assembled in parallel bit fashion and shifted into the input/output register **58,** the serial to parallel converter **60** generates a postage entered signal PST ENT over line **78** to a postage ready logic circuit **80.** Prior to receipt of this signal the postage ready logic circuit **80** provides a postage not ready signal $\overline{\text{POST RDY}}$ over lead **82** to the sequencer **56** effective to enable the various sequence control functions of the sequencer. When the postage not ready signal $\overline{\text{POST RDY}}$ goes false in response to receipt of the postage entered signal POST ENT, signifying that the postage has been fully entered into the input/output register **58,** the sequencer **56** is effectively disabled.

Assuming that no additional postage over and above the postage value held in the input/output register is applicable to the particular parcel on scale **12,** the postage ready circuit **80** generates a ready enter signal RDY ENT which is supplied over lead **84** to the electromechanical postage selection apparatus **30.** This apparatus then looks at the postage digits registered in the input/output register **58** communicated over connection **85** and operates to mechanically position the postage digit selector arms **33** of postage meter **32** accordingly via the interconnecting links, diagrammatically indicated at **34** in FIG. **2.** After all the postage levers have been approximately positioned by the selection apparatus **30,** an execute signal EXEC issues over lead **87,** signaling the postage meter to execute a print cycle and issue an appropriately imprinted postage stamp which may then be applied to the parcel. After the postage meter **32** has issued the stamp, it issues a cycle complete signal O which is fed back over lead **89** to the console for the purpose of resetting the console components preparatory for the next parcel.

In some of the cases, it is contemplated that the operator will not be supplied with the postal zone of the parcel destination, but will be able to readily obtain the zip code of the parcel destination typically recorded on the parcel address. In these cases, the operator enters the first three digits of the zip code into the input/output register **58** via numerical keyboard **26***a* and multiplexer **62.** It is only when key Z is depressed preparatory to a direct zone entry, that the keyboard is connected by multiplezer **44** to the zone register **46.**

With the entry of a zip code into the input/output register and the depression of the postage request key PR, the sequencer **56** initiates a zone search through a zip to zone memory **90,** included as the other memory bank carried by memory drum **14** (FIG. **1**). As will be seen, the zip-zone memory **90** includes a zip clock bit channel, with each zip clock bit storage position aligned with a binary coded decimal zone storage position. As will become apparent, the zip-zone memory is specially encoded on the basis of the geographical location of each particular system installation, since the applicable postal zone in each case is determined by the distance to the parcel destination. These zip clock bits are read as zip clock pulses ZIP CLK from the zip-zone memory **90** during each memory drum revolution and are fed over lead **92** to sequencer **56** during a zone search. These zip clock pulses are gated through as add clock pulses ADD CLK over lead **93** to the input/output register **58.**

As will be seen, the input/output register is adapted not only as a binary coded decimal (BCD) digit shift register, but also as a BCD counter. Thus, each zip clock pulse ZIP CLK gated through as an add clock pulse ADD CLK to the input/output register incre-

ments the zip code number registered therein by one. The input/output register is incremented until it overflows, i.e., goes from 999 to 000. When overflow occurs, the input/output register 58 generates a read store zone signal RD STR ZONE on output lead 95 to zone register 46. The zone register responds by accepting and holding the zone number coincidentally read from the zip-zone memory 90 and supplied over connection 97 and multiplexer 44.

From this general description, it is seen that by serially arranging the zone data in the zip-zone memory 90 in accordance with the distance between the various zip code designated geographical locations and the system installation location, where the zone data is located in the memory by counting up to the compliment of the zip code held in the input/output register, the appropriate zone can be entered into the zone register 46 from the zip-zone memory 90, thereby effecting a zip to zone conversion.

The read store zone signal RD STR ZONE on output lead 95 is also supplied to the sequencer 56 to indicate that the appropriate zone has been located and entered into the zone register 46 and that a search of the postage memory 52 for the applicable postage may now be performed in the manner previously generally described.

Occasionally, the system of the present invention may be called upon to determine the postage applicable to an oversized package. Under both the PP and UPS rate schedules, the postage applicable to an oversized package is determined as follows. If the oversized package is less than an established minimum weight, 25 pounds for UPS and 10 pounds for PP, the applicable postage is determined on the basis of the established minimum weight. However, if the oversized parcel weights more than the established minimum weight, the applicable postage is determined by its actual weight.

Still referring to FIG. 2, when the operator determines that a parcel placed on scale 12 is oversized, an oversize key O/S is depressed, conditioning an oversize logic circuit 100 over lead 102. During the searching of the postage memory 52 for the applicable postage, the accumulating count of the pound clock pulses LB CLK read from the postage memory 52 into the address counter 66 is applied over connection 104 to the oversize logic circuit 100, as well as the comparator 68. The oversize logic circuit also receives the compare output COMP from comparator 68. As will be seen, the count content of the address counter 66 is continuously decoded to detect when it is incremented to the established minimum pound value. Until this minimum pound value is reached in the search of the postage memory 52, the oversize logic circuit 100 supplies a signal $\overline{O/S}$ over lead 106 to the sequencer 56, in effect telling the sequencer to disregard the compare signal COMP issuing from the comparator 68 over lead 70, which would occur if the oversized package weighs less than the established minimum. In this case, when the address counter increments to the established minimum weight value, the oversize logic circuit 100 supplies a read minimum pounds signal RD MIN LBS over lead 108 to the sequencer 56, which responds by issuing the read postage signal RD POST over lead 72 to the serial to parallel converter 60. The postage applicable to the established minimum weight is thus entered into the input/output register.

On the other hand, if the established minimum weight value is achieved in the address counter 66 before a compare signal COMP issues from comparator 68, the oversize logic circuit 100 is converted to its inoperative state as though it had not been conditioned in the first instance by oversize key O/S. The disabling effect of the signal $\overline{O/S}$ is removed, and the sequencer awaits the receipt of the compare signal COMP from comparator 68 pursuant to retrieval from the postage memory 52 of the postage value based on the actual weight of the oversized parcel.

In certain situations dealing with the UPS system, a nominal additional postage charge is required in shipping parcels between certain locations. These special situations can be conveniently handled in accordance with the present invention by providing recorded flag bits in the zip-zone memory 90 which are read out as flag pulses into the postage ready logic 80 over lead 109 under the control of the read store zone signal RD STR ZONE at the same time that the zone is read into the zone register 46. After the postage applicable to the parcel weight has been located in the postage memory 52 and entered into the input/output register 58, the postage ready logic 80 determines whether it received one or more flag pulses over lead 109 from the zip-zone memory 90 at the time the proper zone was located and entered into the zone register 46. If flag pulses had been received, the postage ready logic circuit 80 is conditioned to accept over connection 111 from the zip-zone memory 90 uniquely coded bits in effect designating the amount of additional postage to be added to the postage already registed in the input/output register 58. The postage ready logic circuit 80 generates an add clock gate pulse ADD CLK GATE over lead 112 to the sequencer 56 effective to gate through to the input/output register a predetermined number of zip clock pulses ZIP CLK as add clock pulses ADD CLK to the input/output register 58. The input/output register is thus incremented accordingly so as to register the original postage plus the additional postage.

The various entries into the input/output register 58, such as zip code numbers and postage are displayed at the display panel 26*b*. In addition, a key No. in group 54 may be depressed to condition the display panel to display the parcel weight in the up/down counter 40 communicated over connection 113.

For a detailed description of the operation of the system of FIG. 2, reference may be had to U.S. Pat. No. 3,692,988, whose disclosure is specifically incorporated herein by reference.

POSTAGE SELECTION APPARATUS

The electromechanical postage digit selection apparatus 30, seen generally in FIGS. 1 and 2, is shown in detail in 3 through 7. It will be recalled from the general description of FIGS. 1 and 2 that the postage digit selection apparatus is mechanically interconnected to the settable postage digit arms 33 of postage meter 32 by links 34 and operates to position the postage digit arms to the corresponding postage digit values registered in the input/output register 58.

Referring first to FIG. 4, the postage digit selection apparatus 30 includes a motor 500 supported by a frame casting 502. The output shaft 504 of motor 500 carries a gear 506 which meshes with a gear 508 keyed on an elongated jack shaft 510, best seen in FIG. 3. Jack shaft gear 508 engages gears 512 and 514 respec-

tively mounted on the input shafts **516** and **518** of clutches **520** and **522.** The other end of jack shaft **510** carries a gear **524** which engages a pair of gears **526** and **528** respectively mounted on the input shafts **530** and **532** of clutches **534** and **536.**

Output shaft **527** of clutch **522** extends coaxially through input shaft **518,** which is in the form of a sleeve, and beyond both sides of the clutch body and carries at one end a crank **529.** This crank is pivotally connected to one end of link **34***a*, which is pivotally connected at its other end to the hundredths digit selector arm **33** of the postage meter **32.** Similarly, the output shaft **521** of clutch **520** carries at one end a crank **523** which is pivotally connected to one end of link **34***b*. The other end of link **34***b* is pivotally connected to the tenths digit selector arm **33** of the postage meter **32.** One end of output shaft **535** of clutch **534** carries a crank **537,** which is pivotally connected to one end of the units digit selection link **34***c*, while one end of output shaft **539** of clutch **536** carries a crank **541** pivotally connected to the one end of the tens digit selection link **34***d*.

It will be appreciated that the various clutch output shafts and jack shaft **510** are journalled by laterally spaced vertical extensions **503** of the frame casting **502.**

Still referring to FIG. **3,** the other end of output shaft **527** of clutch **522** is adapted to mount an encoder disc **550** rotating with the output shaft in a plane between a light source **550***a* and a receiver **550***b*. Disc **550** is encoded in binary coded decimals with the numbers 0 through 9 around its periphery and is angularly oriented on output shaft **527** so as to provide a digital readout of the digit positions of the hundredths postage digit selector arm **33,** as positioned by crank **529** and link **34***a*. Similarly, output shaft **521** mounts an encoder disc **552** which is read out by a light source **552***a* and receiver **552***b* to provide a digital readout of the digit positions of the tenths postage digit selector arm, as positioned by crank **523** and interconnecting link **34***b*. In the same manner, encode discs **554** and **556** provide digital readouts of the digit positions of the units and tens postage digit selector arms of the postage meter **32.**

Each of the clutch output shafts carries a detent disc which serves to ultimately angularly orient the clutch output shafts to the various postage digit positions. In practice, these detent discs serve as course positioning means for the postage digit selector arms **33** of the postage meter; the internal detent mechanism of the postage meter serving as the final, precise digit positioning means for the various postage digit selector arms. Thus, as seen in FIGS. **3** and **4,** output shaft **527** carries a detent disc **560** which is formed with an annular array of detents **560***a*, as best seen in FIG. **4.** The detents **560***a* are engaged by a pawl **560***b* to ultimately angularly orient the crank **529** and link **334***a* for the various hundredths postage digit positions. Similarly, output shaft **521** carries a detent disc **562** formed having an array of detents **562***a* which are engaged by pawl **562***b* to ultimately orient crank **523** and link **34***b* for the various tenths postage digit positions. In the same manner, putput shafts **535** and **541** carry detent discs **564** and **566,** respectively, which are engaged by pawls **564***b* and **566***b* to ultimately orient their associated cranks and links for the various units and tens postage digit positions.

The operation of the postage selection apparatus **30** can best be appreciated from a description of FIG. **7.** As long as the system is turned on, motor **500** of the postage selection apparatus **30** (FIG. **4**) is energized to supply continuous drive to the input shafts of the various clutches of FIG. **3.** The various clutches are initially conditioned such that their input shafts are drivingly coupled to their output shafts, and the various cranks are continuously rotated. The links **34** interconnecting the cranks and the postage digit selector arms **33** cause the selection arms to continuously move back and forth through their various postage digit positions. As seen in FIG. **7,** the digital readout of the positions of the hundredths postage digit selector am is supplied to a comparator **570** for comparison with the hundredths digit held in input/output register **58.** Similarly, the digital readout of the positions of the tenths digit selector arm is applied to comparator **572** for comparison with the tenths digit in input/output register **58.** The digital readout of the positions of the units postage digit selector arm is fed to comparator **574** for comparison with the units digit in the input/output register while the digital readout of the tens postage digit selector arm digit positions is compared with the content of the tens digit register **150** of the input/output register in a comparator **576.**

The outputs of these comparators are supplied as one input to separate AND gates **571, 573, 575** and **577.** The other input to each of these AND gates is the ready enter signal RDY ENT, which issues from the postage ready logic **80** when it is determined that the postage value stored in the input/output register is the final value to be issued by the postage meter **32.**

As the postage digit selection arms **33** are moved to the postage digit positions called for by the corresponding postage digits held in the input/output register, AND gates **571, 573, 575** and **577** supply outputs to the various clutches effective to disengage their input shafts from their output shafts. Thus, as the hundredths postage digit selector arm moves to the digit position corresponding to the hundredths postage digit stored in the hundredths digit register **156** of the input/output register **58,** comparator **570** generates an output which passes through AND gate **571** to disengage clutch **522.** Output shaft **527** is decoupled from input shaft **518** of clutch **522,** and crank **529** and link **34***a* are ultimately positioned by pawl **560***b* acting on detent disc **560.** However, the ultimate and precise positioning of the hundredths postage digit selector arm is achieved by the internal detent mechanism of the postage meter **32.** The tenths, units and tens postage digit selector arms **33** of the postage meter **32** are ultimately positioned in accordance with the digit contents of the tenths, units and tens postage digits stored in the input/output register **58** in the same manner. It will be noted that the positions of the postage digit selector arms are carried out concurrently and independently of each other, thus permitting rapid postage setting of the postage meter **32.**

When all of the postage digit selector arms **33** have been positioned, AND gate **580** is enabled to pass an execut signal EXEC over lead **87** (see also FIG. **2**), commanding the postage meter to execute a print cycle and issue a stamp with the postage value held in the input/output register imprinted therein. At the conclusion of the postage meter operating cycle, the cycle complete signal O issues to be fed back to the console

to clear the various flip-flops, registers and counters preparatory for the next system operation.

As seen in FIGS. **5** and **6**, the forward end of each link **34** is formed having an elongated slot **582** which accommodates a laterally extending pin **584** carried at the upper end of each postage digit selector arm **33**. A latch **586** pivotally mounted on a pin **588**, carried adjacent the forward end of each link **34**, engages the side of the postage digit selector arm **33** opposite pin **584** so as to maintain the pin captive in slot **582**. By virtue of this arrangement, there is provided a lost motion connection between the links **34** and their associated postage digit selector arms **33**, thereby enabling the internal detent mechanism of the postage meter to take over from the final positioning of the postage digit selector arms from the various detent discs **560, 562, 564** and **566** of the postage digit selection apparatus **30**.

Arm **586** at the forward end of each link **34** is biased downwardly into engaging relation with the postage digit selector arm **33** by a spring **590**. The arm **586** is readily pivoted upwardly, as indicated in phantom in FIG. **5** to facilitate disconnection of the links from their associated postage digit selector arms **33**, thus freeing the upper portion of the postage meter **32** for removal from its base when it becomes necessary to obtain additional prepaid postage at a local post office.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. Apparatus for positioning the various postage digit selector arms of a postage meter to postage digit positions according to the corresponding postage digits of a postage value held in an output register of a postage metering system, said apparatus comprising, in combination:

A. units digit, tenths digit and hundredths digit clutches, each having input and output shafts;

B. a motor continuously drivingly rotating said clutch input shafts during a positioning cycle;

C. links interconnecting the respective output shafts of said clutches to the units, tenths, and hundredths postage digit selector arms of the postage meter, whereby to reciprocate the various postage digit selector arms through their various digit positions so long as their respective clutches are engaged;

D. separate position encoders coupled to each said clutch output shaft for providing digital readouts of the absolute digit positions of the associated postage meter digit selector arms as they are moved through their various digit positions;

E. separate comparator means for continuously comparing the digital readouts of the postage digit positions of the various postage digit selector arms with the corresponding postage digit held in the output register, and, as comparisons are achieved, electrically signalling the appropriate clutches to disengage their input shafts from their output shafts, whereby to stop the various postage digit selector arms at the postage digit position called for by the corresponding postage digits held in the output register; and

F. gating means electrically connected to each said comparator means for signalling the postage meter to execute a print cycle upon disengagement of all of said clutches.

2. The apparatus defined in claim **1**, which further includes separate detent means carried on each said clutch output shaft, each said detent means operating to properly angularly orient its associated clutch output shaft for the appropriate selector arm digit position upon clutch disengagement.

3. The apparatus defined in claim **2**, which further includes a crank interconnecting each said link to its respective clutch output shaft.

4. The apparatus defined in claim **3**, which further includes means providing a lost motion connection between each said link and its respective postage digit selector arm.

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