

[54] POSTAGE CALCULATOR

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[51] Int. Cl. G01g 23/42, G06f 15/20

[58] Field of Search 235/151.33, 58 PS, 61 PS; 177/3-5, 25, DIG. 3, 1, 210

[56] References Cited

UNITED STATES PATENTS

3,039,686	6/1962	Bell et al.	235/151.33
3,057,547	10/1962	Adler et al.	235/151.33 X
3,290,491	12/1966	Wahlberg.	235/151.33 X
3,315,067	4/1967	Bell et al.	177/25 X
3,458,692	7/1969	Susor	235/61 PS

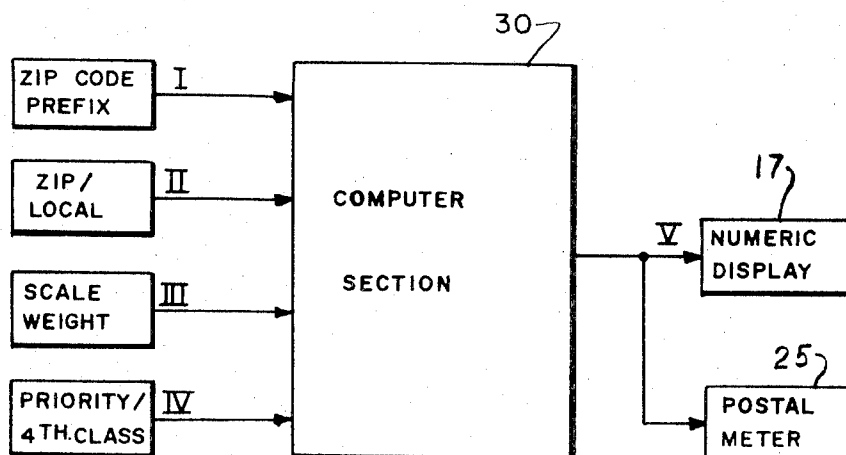
3,459,271 8/1969 Susor et al. 177/3

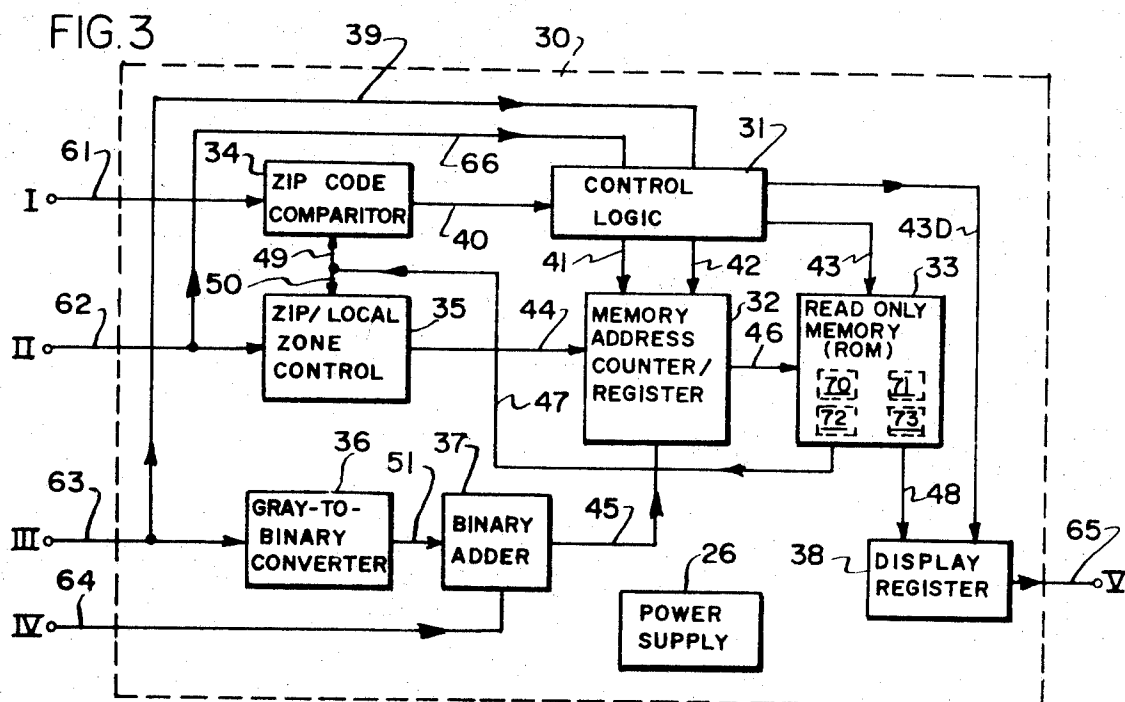
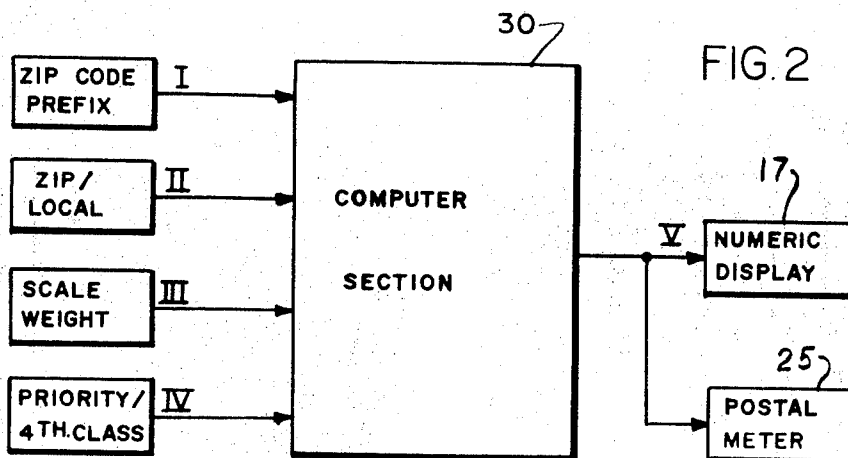
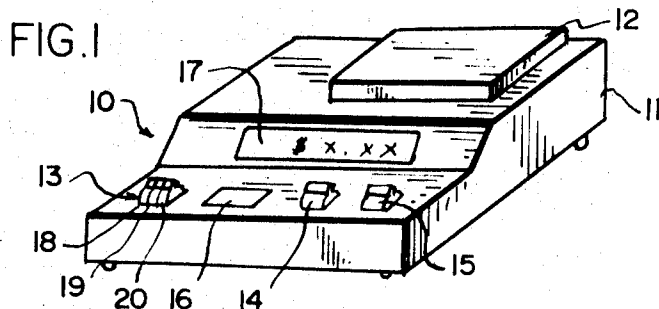
Primary Examiner—Robert S. Ward, Jr.
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[57] ABSTRACT

A postal scale and computer for calculating the exact postage for a parcel to be mailed according to its weight, destination zip code, and class of handling. The computer includes a read only memory which stores the postal zone information according to the first three digits of the destination zip code, and the postage rate information according to the combined parcel weight, zone and class of handling. The computer also includes a control logic which searches the memory, first for the proper zone as established by an upper limit prefix for a series of zip code numbers falling within the same zone, and secondly for the proper rate for the weight of the parcel being mailed to the zone determined. The memory is broken down into separate sectors, each mounted on an easily replaceable circuit board to accommodate for changes in postal rates and for different points of mailing origin.

11 Claims, 8 Drawing Figures





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FIG. 4

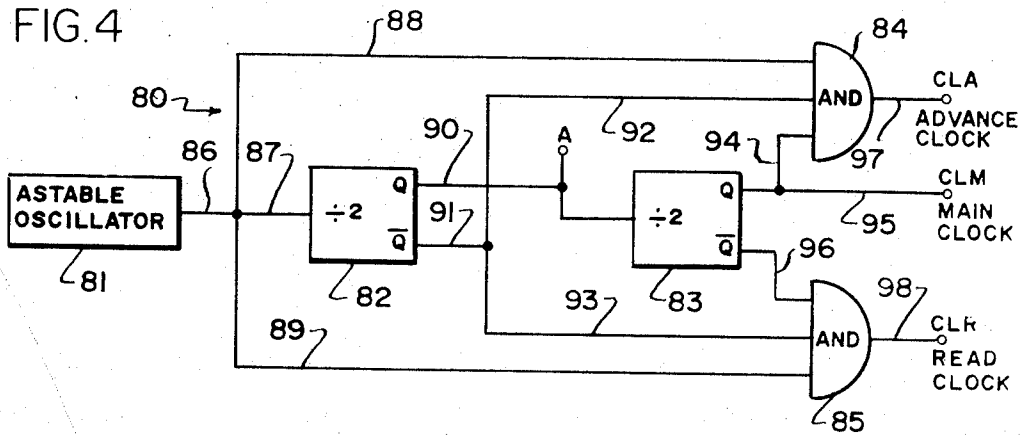


FIG. 5

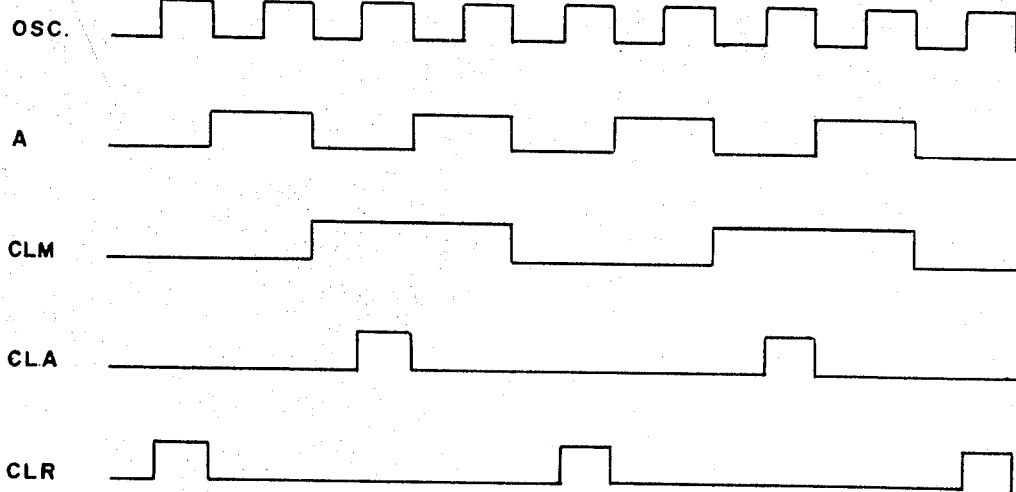
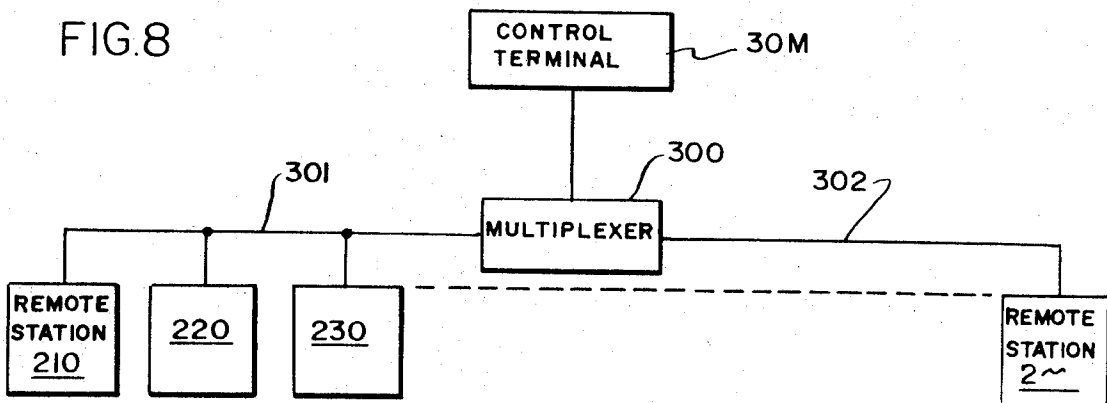
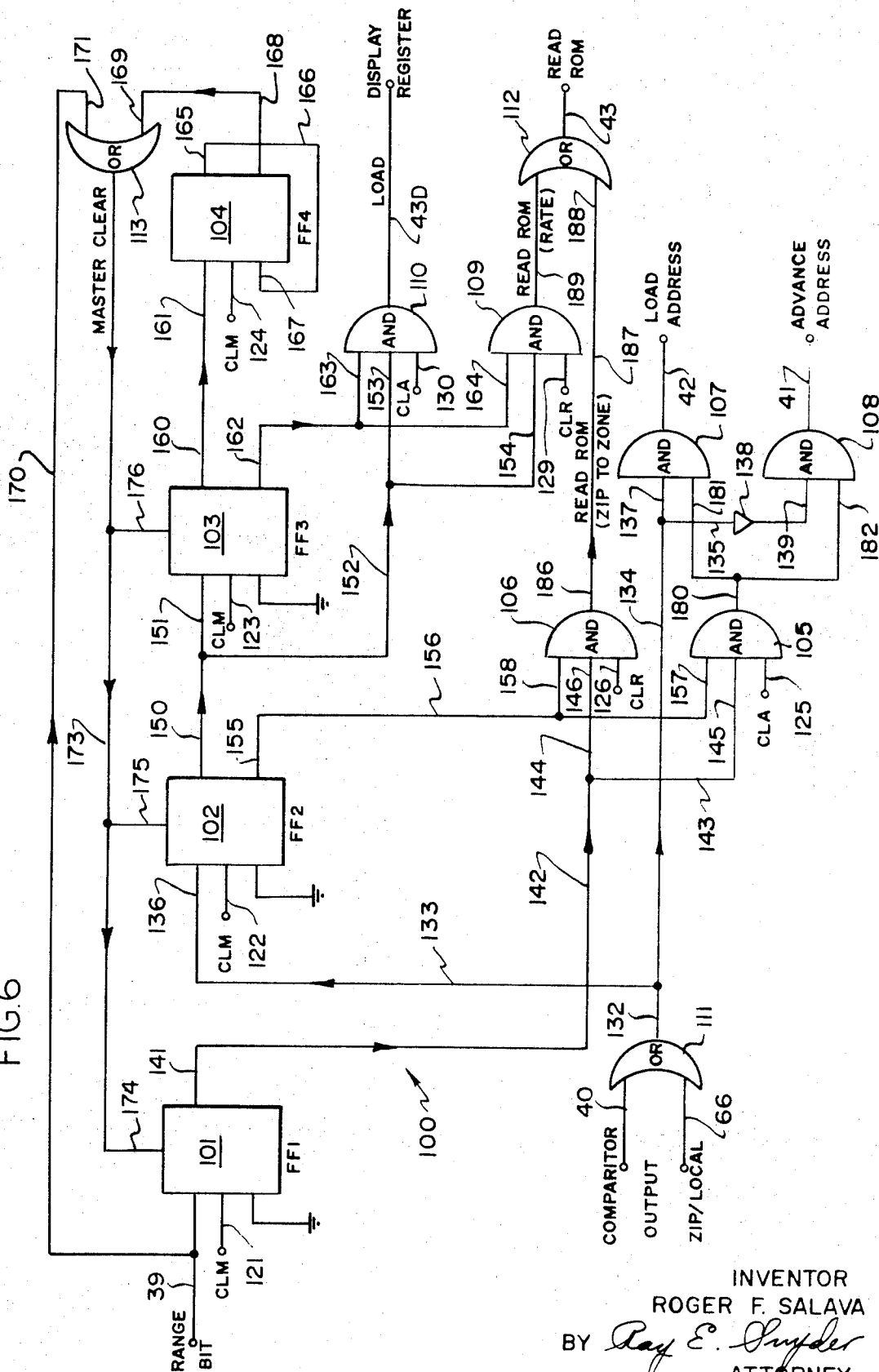


FIG. 8



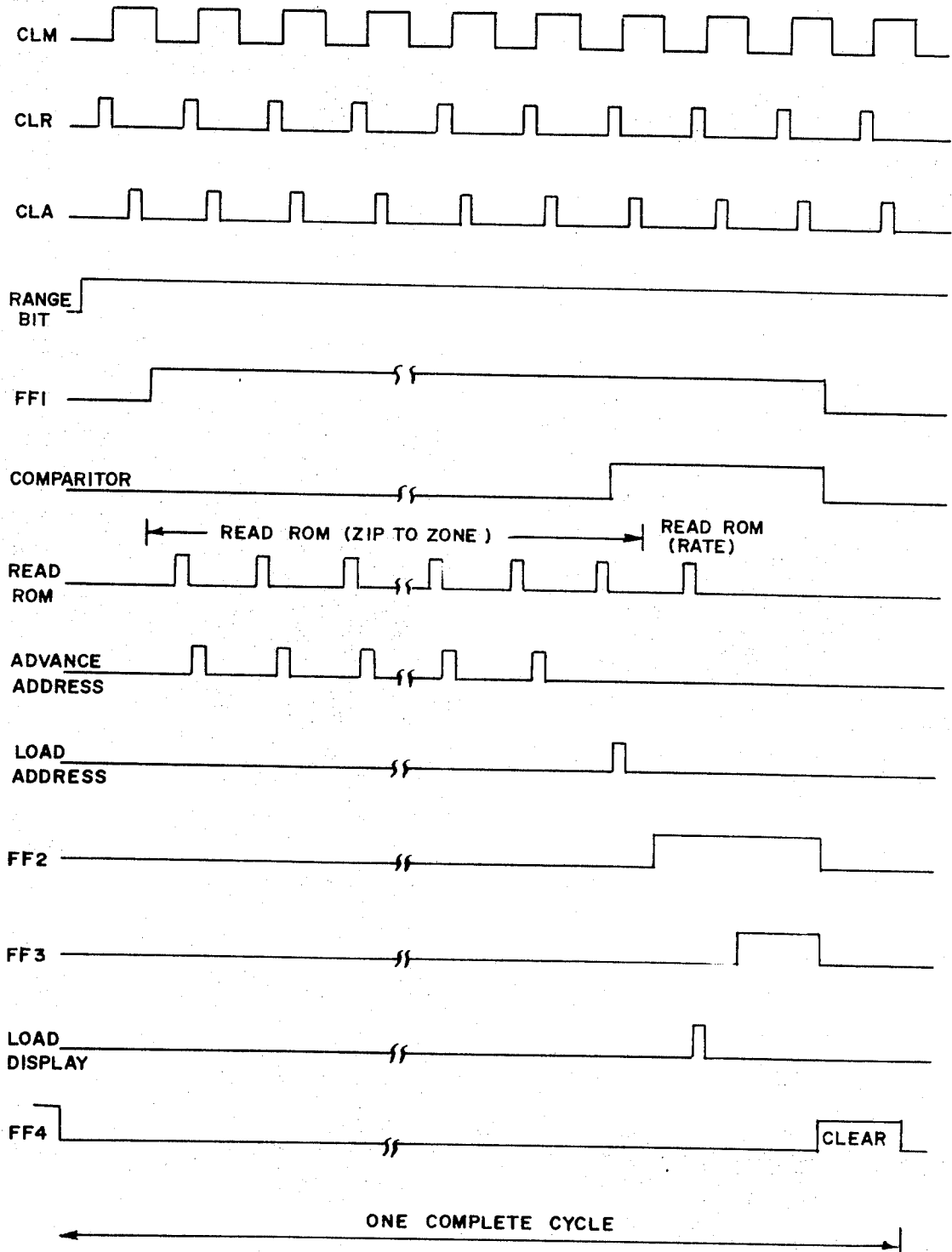
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FIG. 6



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FIG. 7



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POSTAGE CALCULATOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates generally to weighing scales combined with a computer for calculating the proper postage rate for a parcel to be mailed according to its weight and destination zip code.

2. Description of the Prior Art

Postal scales are well known in the art and include devices of the general type capable of calculating postage rates by volume, weight, density, and zone. Such devices generally are complicated electromechanical mechanisms and usually are analog in nature.

The Post Office system is essentially digital in nature. That is, each mailing address falls within an assigned zip code area characterized by a five digit number. The postage rate for a parcel mailed from one point in the country to another is generally proportional to the weight of the parcel and the distance it must be transported. However, the postage rates established by the Post Office are broken down, first into zones from different points of mailing origin, and secondly into discrete weight-zone combinations which are tabulated in printed charts.

A person using such charts to mail a parcel must determine the zone to which the parcel is to be mailed. This is done by first determining the destination zip code. Zip code directories are readily available for reference. By using an official zone chart for the point of mailing, the proper zone is determined from the first three digits (zip code prefix) of the destination zip code. Usually, one or a series of consecutive zip code prefixes fall within a particular zone.

Having determined the proper destination zone, the next step is to weigh the parcel on an acceptable scale. Noting the weight and zone, the postage rate is read from a rate chart such as POD notice 59 dated July 14, 1969. The postage rate read may be entered on a postal meter, or stamps of the proper denomination affixed to the parcel.

All of the steps described above are susceptible to human error.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a postage calculator capable of performing automatically, quickly, and substantially error free, many of the steps now performed manually in the mailing of parcels.

It is a more particular object to provide a postage calculator that includes a special purpose computer and scale that weighs a parcel to be mailed and automatically converts the weight into a corresponding electrical signal for processing by the computer. The computer also includes a memory bank that stores the mailing destination zone numbers from a particular location according to zip code prefixes, and also stores the postal rates for all weight-zone combinations within certain weight limits. The computer also includes a control logic which directs the searching of the memory, first for the proper zone number according to an upper limit zip code prefix, and secondly for the postal rate for the particular parcel weight, zone, and class of handling. The calculator can also be keyed to actuate automatically a postal meter.

The operation of the calculator requires only the following steps:

1. Place the parcel to be mailed on the scale;
2. Enter the first three digits of the destination zip code;
3. Enter the designation for either zone or local mailing; and
4. Enter the designation for class of handling, either priority mail, 4th class, united parcel, or other.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the external appearance of the postage calculator of the present invention;

FIG. 2 is a block diagram of the electrical input signals to the computer section of the postage calculator;

FIG. 3 is a block diagram of the computer section of the calculator;

FIG. 4 is a circuit diagram of the pulse generator of the computer section;

FIG. 5 is a diagram of the wave shapes produced by the pulse generator of FIG. 4;

FIG. 6 is a circuit diagram of the control logic section of the computer;

FIG. 7 is a diagram of the wave shapes and sequence of operations of the control logic section; and

FIG. 8 is a diagram of a multiple station arrangement using a single computer section for a plurality of scales.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The postage calculator of the present invention may have the external appearance as shown in FIG. 1 and is designated generally by the numeral 10. The calculator 10 comprises a main case or housing 11, a scale 12 mounted on top of the housing 11, switches 13, 14, and 15, an indicator 16, and a numeric display 17.

The switch 13 is the zip code selector switch and may be a group of three separate switches 18, 19, and 20 or they may be a "Touch Tone" array which select the first three digits of the zip code desired for a parcel to be mailed. The indicator 16 registers directly the digits selected by the switches 18, 19, and 20. Alternatively, the indicator 16 may be incorporated directly in switches 18, 19, and 20, or the selection may be displayed directly on the output display 17. The switch 14 is the zip/local selector switch for differentiating between zone and local mailing rates. The switch 15 is the class selector switch for differentiating between priority mail, parcel post, and/or other mail services such as united parcel.

Referring now to FIG. 2, the operation of the postage calculator 10 will now be described in preliminary terms. The first step is to determine from an appropriate listing the zip code of the destination to which the parcel is to be mailed. The first three digits of this zip code are entered by the switches 18, 19, and 20 and the entry is checked on the indicator 16. An electrical signal I corresponding to the position of the switches 18, 19, and 20 and called the "Zip Code Prefix" is supplied as the first input to the computer section 30.

If the mailing destination falls within a local zone so that zone rates do not apply, the zip/local switch 14 is switched to the "local" position. Otherwise, the switch 14 is switched to the "zip" position. A second electrical signal II corresponding to one or the other of the two selected positions and called the "zip/local" signal is also supplied to the computer section 30.

The parcel to be mailed is placed on the scale 12 and the weight measured by the scale is converted into a third electrical signal III called "Scale Weight" which is supplied to the computer section 30.

The final step is to select the handling class for the parcel, that is, priority, 4th class, or united parcel and set this selection on the switch 15. This switch provides a fourth electrical signal IV corresponding to the selection made and called the "priority/4" signal to the computer section 30.

The computer section 30 processes the various signals supplied, calculates the proper monetary amount for the postage, and displays this amount to the numeric output display 17. The output from the computer section 30 is an electrical signal V which can actuate the display 17, or alternatively, this signal can be supplied directly to actuate a postal meter 25.

It is assumed that the parcel being mailed has proper linear dimensions permitted by the Post Office to be mailed without penalty. It is also to be understood that a suitable power supply 26 is connected to the various switches and to the scale for providing the electrical signals in appropriate form for processing by the computer section 30.

The postage calculator 10 eliminates the manual steps of:

1. Looking up the zone number on a zone chart corresponding to the destination zip code;
2. Noting the weight measured by a scale; and

3. Looking up the rate for the parcel to be mailed corresponding to the zone number and weight.

The calculator 10 performs the above functions automatically and without error once the zip code is selected and the parcel placed on the scale.

Referring now to FIG. 3, a more detailed description of the computer section 30 and its operation will now be undertaken.

The computer section 30 comprises: a control logic section 31; a memory address counter/register 32; a read only memory (ROM) section or bank 33; a zip code comparator 34; a zip/local zone control 35; a Gray-to-Binary converter 36; a binary adder 37; and a display register 38. The computer section 30 also includes the power supply 26 which is interconnected with all of the above identified sections, but is not shown as so connected on the diagram.

The control logic section 31 is connected internally to receive input signals from the scale 12 directly and from the zip code comparator 34 over conduits 39 and 40, respectively, and to send output signals to the memory address counter/register 32 over conduits 41 and 42, to the read only memory (ROM) 33 over conduit 43, and to the display register 38 over conduit 43D. The memory address counter/register 32 also receives input signals from the zip/local zone control 35 over conduit 44 and from the binary adder 37 over conduit 45. The counter/register 32 sends output signals to the (ROM) 33 over conduit 46. The (ROM) 33 provides output signals back to the zip code comparator 34 and zip/local zone control 35 over conduit 47 and to the display register 38 over conduit 48. The conduit 47 branches into conduit 49 leading to the zip code comparator 34 and into conduit 50 leading to the zip/local zone control 35. The Gray-to-Binary converter 36 provides output signals to the binary adder 37 over conduit 51.

The four input connections 61, 62, 63, and 64 to the computer section 30 are connected, respectively, to the zip code comparator 34, the zip/local zone control 35, the Gray-to-Binary converter 36, and the binary adder 37. The sole output conduit 65 connects the display register 38 to numeric display 17 and/or to postal meter 25.

The operation of computer section 30 can be understood best by first describing what the various sections identified above contain. It should be understood that the exact circuit elements for providing the necessary functions of the calculator 10 are not critical for an understanding of the invention.

A parcel to be mailed must be weighed on the scale 12 and the weight must be converted into an electrical signal in digital form to be processed by the computer section 30. Any suitable means (not shown) such as a photocell can be used as an electrical pickup to detect the weight of the parcel. A number of digital codes could be used but the most efficient digital notation for use in the present invention is binary. However, the direct generation of the binary code by the scale 12 would not be acceptable for the reasons illustrated by the following table A:

TABLE A

Decimal Number	Binary code	Gray code
0	000	000
1	001	001
2	010	011
3	011	010
4	100	110
5	101	111
6	110	101
7	111	100

It may be noted in the table above that, in the binary notation of decimals 3 and 4 all the binary bits change. If the scale 12 alignment generating the code at the threshold between 3 and 4 is not perfect, the output could generate 111 (decimal 7) because the leftmost bit changes before the other bits. The

use of the Gray code in the generation of the electrical signals by the scale 12 overcomes this problem. As may be observed from the table A above, the difference between consecutive numbers in the Gray code differ only in one bit, thus, even with nonperfect alignment, the scale 12 could read 3 or 4 but never an extraneous number.

The direct processing of Gray code within the computer section 30 would be difficult to accomplish. Therefore, the Gray code information from the scale 12 is transmitted over conduit 63 to the Gray-to-Binary converter 36 where it is converted into binary form and fed over conduit 51 to the binary adder 37. The binary adder 37 transmits the weight information in combination with classification information over conduit 45 to the memory address counter/register 32.

The memory bank 33 contains as one sector 70 a listing of the postal zones according to the first three digits of the zip code. Electronically, this could be accomplished by listing the zone for every zip code combination (000 to 999), but this would require a large memory. This same result is achieved in the present invention, with a substantial reduction in the size of the memory, by listing consecutive zip codes within the same zone only by their upper limit code.

The tables B and C set forth below illustrate how this is accomplished. Table B reproduces a portion of a Post Office Department Official Zone Chart for determining zones from all postal units having zip codes 6001-60699. This zone chart lists the first three digits (prefix) of the zip codes of the sectional center facility of address. To determine the zone distance to a particular post office, ascertain the zip code of the post office to which the parcel is addressed. The first three digits of that zip code are included in this chart, and to the right thereof the zone.

Table C indicates how this zone information is stored electronically in the memory 33 for comparison.

Table B
Post Office zone chartTable C
Memory Contents

Zip code Prefixes	Zone	Memory Location	Zone	Upper limit Zip prefix
006-009	8	0	8	009
010-046	5	1	5	046
047	6	2	6	047
048-098	5	3	5	098
100-129	5	4	5	129
130-132	4	5	4	132
,	,	,	,	,
,	,	,	,	,

Electronically, the memory 33 is searched by consecutively addressing and then reading the sector 70 from zero until the zip prefix read from the memory 33 is greater than or equal to the zip prefix entered on the switch 13.

The control logic section 31 contains a pulse generator 80 which generates a plurality of output pulses for actuating sequentially the various sections of the computer section 30, as illustrated by FIGS. 4 and 5. The generator 80 comprises an astable oscillator 81, a first divide by two network 82, a second divide by two network 83, and "AND" gates 84 and 85.

The astable oscillator 81 generates a square wave output designated "Osc." and shown on some arbitrary time base in FIG. 5. This output signal is delivered over an output conduit 86 which branches into a conduit 87 leading into the network 82 and into conduits 88 and 89 leading to the AND-gates 84 and 85, respectively. The network 82 divides the input signal by two and delivers a square wave output of one-half the frequency of the input signal over a conduit 90 to the network 83. The complement of this output signal appears at conduit 91 and is delivered over branch conduits 92 and 93 to the AND-gates 84 and 85, respectively. The appearance of the

output signal on conduit 90 may be observed at point A and is seen in FIG. 5 to be one-half the frequency of "Osc." in the wave designated "A." The network 33 divides the input signal by two and delivers a main clock output signal, designated "CLM," over a conduit 95. A branch conduit 94 connected to conduit 95 delivers this same signal to the AND-gate 84. The complement of the CLM signal is delivered over a conduit 96 to the AND-gate 85.

Both of the AND-gates 84 and 85 are three-input gates and require the coincidence of three input signals to pass an output signal. The output of the gate 84 constitutes the advance address signal delivered over a conduit 97 and designated "CLA." This CLA signal is shown in FIG. 5 to be a square pulse of the same width as the "Osc." wave but appearing at one-fourth the frequency. The output of the gate 85 constitutes the read signal delivered over a conduit 98 and designated "CLR." This CLR signal is also shown in FIG. 5 as a square pulse similar to the CLA pulse, but displaced in time due to the input pulse incidence. For subsequent discussion of the operations, the sequence of pulse delivery shall be understood to be:

"clock," "read," and "advance."

A circuit diagram of a portion of the control logic 31 is reproduced in FIG. 6 and its operation may be understood with reference to the wave shape and pulse sequence diagrams shown on FIG. 7. The logic section shown may be designated by the numeral 100 and comprises four bistable networks or flip-flops 101, 102, 103, and 104; AND-gates 105, 106, 107, 108, 109, and 110; and OR-gates 111, 112, and 113.

Each of the flip-flops 101, 102, 103, and 104 has an input terminal 121, 122, 123, and 124, respectively, connected to receive the main clock signals CLM. Each of the AND-gates 105 and 110 has an input terminal 125 and 130, respectively, connected to receive the advance address signal CLA. Each of the AND-gates 106 and 109 has an input terminal 126 and 129, respectively, connected to receive the read signal, CLR. The CLM, CLA, and CLR signals are reproduced in FIG. 7 on a compressed time scale from that of FIG. 5 to facilitate an explanation of the operation of the logic section 100.

The OR-gate 111 has input connections 40 and 66 connected to receive signals from the zip code comparator 34 and zip/local selector switch 14, respectively. The output terminal 132 of the OR-gate 111 is connected by means of branching conduits 133, 134, and 135 to a second input terminal 136 of the flip-flop 102, to one input terminal 137 of AND-gate 107, and through an inverter 138 to one input terminal 139 of AND-gate 108.

The output terminal 141 of flip-flop 101 is connected to conduit 142 which branches into conduits 143 and 144 connected to second input terminals 145 and 146, respectively, of the AND-gates 105 and 106.

One output terminal 150 of the flip-flop 102 is connected by a conduit 151 to an input terminal of the flip-flop 103, and by branching conduits 152, 153, and 154 to second input terminals of the AND-gates 110 and 109. A second output terminal 155 of the flip-flop 102 is connected by means of a conduit 156 to third input terminals 157 and 158 of the AND-gates 105 and 106, respectively.

One output terminal 160 of the flip-flop 103 is connected directly to an input terminal 161 of the flip-flop 104. A second output terminal 162 of the flip-flop 103 is connected to third input terminals 163 and 164 of the AND-gates 110 and 109, respectively.

One output terminal 165 of the flip-flop 104 is connected back by means of a conduit 166 to an input terminal 167. A second output terminal 168 is connected to one input terminal 169 of the OR-gate 113. A branch conduit 170 connects the conduit 39 to a second input terminal 171 of the OR-gate 113. The output terminal 172 of the OR-gate 113 is connected by conduit 173 to input terminals 174, 175, and 176 of the flip-flops 101, 102, and 103, respectively.

The output terminal 180 of the AND-gate 105 is connected to second input terminals 181 and 182 of AND-gates 107 and

108, respectively. The output terminal 186 of AND-gate 106 is connected by conduit 187 to one input terminal 188 of the OR-gate 112. The output terminal of AND-gate 107 is connected to conduit 42 to supply a load address signal to the memory address counter/register 32. The output terminal of the AND-gate 108 is connected to conduit 41 to supply an advance address signal to the memory address counter/register 32. The output terminal of the AND-gate 110 is connected to conduit 43D to supply a load signal to the display register 38. The output terminal of the AND-gate 109 is connected to a second input terminal 189 of the OR-gate 112. The output of the OR-gate 112 is connected to conduit 43 to supply a read signal to the (ROM) 33.

When a parcel is placed on the scale 12, a "Range Bit" signal is supplied over conduit 39 to the first input terminal of the flip-flop 101, as illustrated in FIGS. 6 and 7. Such a signal is supplied only when there is a parcel on the scale 12 and its weight falls within the calculation limits of the calculator 10. The next clock pulse CLM supplied to the input 121 of the flip-flop 101 toggles it into operation and an output signal is transmitted to the inputs 145 and 146 of the AND-gates 105 and 106. The output signal of the flip-flop 101 is shown on FIG. 7 and designated, "FF1."

Read pulses CLR are supplied to the input terminal 126 of the AND-gate 106, and with the presence of a signal on the input terminal 146 from flip-flop 101, an output signal is transmitted over conduit 187 to the OR-gate 112. The OR-gate 112 supplies an output signal to the ROM 33 directing it to read the zip-to-zone conversion of sector 70.

"Advance address" pulses CLA are supplied to the input terminal 125 of the AND-gate 105, and with the presence of a signal on input terminal 145 from flip-flop 101, an output signal is transmitted over conduit 180 to the input 182 of the AND-gate 108. The AND-gate 108 retransmits the signal over conduit 41 to the advance address counter/register 32 directing it to advance the address. The AND-gate 105 also transmits an output signal over 180 to one input terminal 181 of the AND-gate 107. The gate 107 does not respond until a signal from the OR-gate 111 is supplied to the other input terminal 137. The inverter 138 ensures that the AND-gate 108 responds when the gate 107 does not, and vice versa.

A signal corresponding to the zone for a particular zip code is transmitted from the ROM 33 over conduits 47 and 49 to the zip code comparator 34. When the signal from the ROM 33 is greater than or equal to the zip code prefix signal supplied over conduit 61, the zip code comparator 34 sends an output signal over conduit 40 to the OR-gate 111. The "Comparator" output signal is shown in FIG. 7.

The output signal from the OR-gate 111 is transmitted over conduits 133, 134, and 135 and performs three functions. For one, the signal is transmitted through the inverter 138 to the AND-gate 108 to halt its advance address. Secondly, the signal appearing at the input 137 together with the next CLA pulse transmitted through the AND-gate 105 and appearing at the input 181 causes the AND-gate 107 to conduct providing an output pulse called the "load address" over conduit 42. The load address pulse is shown in FIG. 7 and occurs at the point in time that would have been the next advance address pulse. Finally, the signal supplied over conduit 133 to the input 136 of flip-flop 102 together with the next CLM pulse supplied to the input 122 toggles this circuit into conduction. The output of the flip-flop 102 is shown in FIG. 7 and designated "FF2."

The output signal of the flip-flop 102 is transmitted over the conduit 156 to the inputs 157 and 158 of the AND-gates 105 and 106 and thereafter blocks their operation so long as FF2 remains in a state of conduction. The output signal is also transmitted over conduit 152 to the inputs 153 and 154 of the AND-gates 110 and 109. The coincidence of the next CLR pulse on the input 129 triggers the AND-gate 109 into conduction. The output signal from the AND-gate 109 is the read ROM (Rate) pulse shown on FIG. 7. This pulse directs the ROM 33 to read the correct monetary amount for the particu-

lar parcel weight-zone combination as will be described more completely hereinafter. The coincidence of the next CLA pulse on the input 130 and the signal from FF2 causes the AND-gate 110 to conduct and an output signal designated "load display" is supplied over conduit 43D to the display register 38. Finally, the output signal of the flip-flop 102 appearing at the terminal 150 is transmitted directly to the input 151 of the flip-flop 103.

The input signal appearing on 151 together with the next CLM pulse on input 123 toggles the flip-flop 103 into conduction. The output signal is shown on FIG. 7 and is designated "FF3." This output signal is supplied through terminal 162 to input terminals 163 and 164 of the AND-gates 110 and 109 thereafter blocking their operation so long as FF3 conducts. An output signal is also supplied through terminal 160 directly to input 161 of the flip-flop 104. This signal together with the next CLM pulse supplied to input 124 toggles this circuit into operation.

The output signal of the flip-flop 104 is shown on FIG. 7 and is designated "FF4." This signal is supplied through the output terminal 168 to the input 169 of the OR-gate 113. The OR-gate 113 conducts and supplies a master clear signal over conduit 173 to the input terminals 174, 175, and 176 of the flip-flops 101, 102, and 103 to restore them to their original condition. An output signal is also transmitted from the output terminal 165 of flip-flop 104 over conduit 166 back to the input 167. This signal restores the flip-flop 104 to its original condition. This also completes the cycle of operation for the logic section 100 and conditions it for calculating the postage for the next parcel.

In the present design for the logic section 100, the absence of a range bit at input conduit 39 also constitutes a clear signal which is transmitted over conduit 170 to the second input 171 of the OR-gate 113. The output of the OR-gate 113 in response to this signal is the same as for the output of the flip-flop 104.

The operation of the computer section 30 and particularly that of the control logic 31 has been described herein in some detail because it controls the operation of the other sections of the computer section 30. These other sections are not described herein with the same detail but are believed to be understandable to one skilled in the art as to their possible structure and function.

The operation of the computer section 30 thus far has been described as to how the proper zone is determined according to the designated zip code for a parcel to be mailed, and the weight in binary code as measured by the scale 12. The next step for the computer section 30 is to determine the proper postage in response to the read ROM command using this information and from the additional designation as to class of handling and zone or local destination. The read only memory 33 has a second sector 71 in which a location is reserved for each weight/zone combination for parcel post (4th class), and a third sector 72 for the weight/zone combinations for priority mail. Additional sectors 73, 74, etc., for united parcel and/or other mail services may also be included in the ROM 33. Tables D and E below list portions of the 4th class (parcel post) zone rates and the priority mail (heavy pieces) rates, respectively.

TABLE E.—PRIORITY MAIL (HEAVY PIECES) RATES

		Rate					
5	Weight over 7 ounces and not exceeding pounds	Local	4	5	6	7	8
		zones 1, 2 and 3	zone	zone	zone	zone	zone
	1.....	\$0.80	\$0.80	\$0.80	\$0.80	\$0.80	\$0.80
	1½.....	.98	1.02	1.07	1.14	1.18	1.24
	2.....	1.16	1.23	1.34	1.47	1.55	1.68
	2½.....	1.40	1.48	1.62	1.79	1.91	2.08
10	60.....	33.32	34.73	38.86	44.35	49.79	55.28
	70.....	33.80	35.23	39.42	44.99	50.51	56.08

It should be noted that the rates set forth above are discrete for each weight/zone combination and the total such combinations within the weight limits tabulated is an easily manageable number. It is preferred that the total sector 71 or 72 be mounted on an easily replaceable circuit board so that the calculator 10 can be brought up to date in the event the Post Office changes the rates for either class of mail.

It is also desirable to have the sector 70 mounted on a replaceable circuit board so that the calculator 10 can be calibrated for different points of mailing origin throughout the country. Other than these sectors 70, 71, and 72 etc., of the memory bank 33, the remaining sections of the calculator 10 should be common and usable for any point of mailing origin.

Manual actuation of the class selector switch 15 provides a signal to the binary adder 37 over conduit 64 corresponding to the selection of 4th class or priority mail, or other mail services. The zone signal corresponding to the selected zip code prefix has been read from the ROM 33 as previously described and supplied over conduits 47 and 50 to the zip/local zone control 35 which in turn transmits this signal over conduit 44 to the memory address counter/register 32. The function of the binary adder 37 is to "add" the starting location (in binary numbers) for the desired sector 70, 71, 72, etc., of the ROM 33 to the weight binary numbers as received from the Gray-to-Binary converter 36 and supply this signal over conduit 45 to the counter/register 32. The sum of the class, zone, and weight binary numbers are thus loaded into the counter/register 32 and a signal corresponding to this total is transmitted over conduit 46 to the ROM 33. The control logic 31 next commands the proper postage rate to be read from the ROM by a signal transmitted over conduit 43. The postage rate as read from the sector 71, 72, or 73, etc., is transmitted over conduit 48 to the display register 38 which causes the proper monetary amount to be displayed on the numeric display 17. Alternatively, or simultaneously, the display register 38 may actuate the postal meter 25 causing it to dispense a sticker carrying the rate so determined.

The binary adder 37 makes efficient use of a single memory broken into the sectors described. Depending upon the maximum weight capability desired for the scale 12, it may be desirable to break the ROM 33 into individual memories, but the basic technique described would remain the same.

Manual actuation of the switch 14 provides a signal II over conduit 62 to the zip/local zone control 35 which in turn provides a signal over conduit 44 to the memory address counter/register 32. The signal II is also applied over conduit 66 to the second input of the OR-gate 111. When the switch

TABLE D.—FOURTH-CLASS (PARCEL POST) ZONE RATES

Weight 1 pound and not exceeding pounds	Zones							
	Local	1 and 2	3	4	5	6	7	8
		Up to 150 miles	150-300 miles	300-600 miles	600-1,000 miles	1,000-1,400 miles	1,400-1,800 miles	Over 1,800 miles
2.....	\$0.50	\$0.60	\$0.60	\$0.65	\$0.70	\$0.80	\$0.85	\$0.90
3.....	.50	.65	.70	.75	.85	.95	1.05	1.15
4.....	.55	.70	.75	.85	.95	1.10	1.20	1.35
70.....	1.85	3.40	4.15	5.30	6.85	8.65	10.60	12.55

14 is actuated for the zip position, the computer section 30 carries out the rate calculations as described above. When the switch 14 is actuated for the Local position, the control 35 automatically locks the three lower order address bits (zone bits) to 000 for the local rate. The memory 33 is then read in either sector 71, 72, or other for the corresponding local rates which are displayed on the numeric display 38.

The embodiment of the calculator 10 shown and described above was for a single, self-contained unit. The principles involved may also be applied on a "time-shared" basis to a multiple station system 200 as shown in FIG. 8. The computer section 30M is capable of calculating the postage for a particular parcel in the manner described in a small fraction of a second. It is therefore capable of serving a plurality of remote stations or terminals 210, 220, 230,.... All the external elements of the calculator 10 may be employed at each terminal 210, 220, etc., except the computer section 30M. It is only necessary to include some type of multiplexing device 300 to insure that the proper rate for a particular parcel be directed to the correct terminal.

The embodiment of the postage calculator shown and described is by way of example only, and it is to be understood that many modifications may be made thereto without departing from the spirit of the invention. The invention is not to be considered as limited to this embodiment except insofar as the claims may be so limited.

I claim:

1. A postage calculator for determining automatically the correct postal rate for a parcel to be mailed having a scale for weighing the parcel and comprising;

a self-contained special purpose computer for determining the postal rate;

electrical means for converting the scale weight into digital code for processing by the computer;

electrical input means for entering a signal corresponding to the first three digits of the parcel mailing destination zip code for processing by the computer; and

readout means for displaying the postal rate determined by the computer.

2. The calculator of claim 1 wherein:

said computer contains a first memory sector which stores at a plurality of locations the mailing zone numbers according to an upper limit code for the first three digits or zip code prefix of one or a group of serial zip code numbers falling within the same zone.

3. The calculator of claim 2 including:

a control logic connected to said memory sector which successively commands the reading of each location within the first memory sector and commands the advancing of the address to read the next location.

4. The calculator of claim 3 including:

electrical comparitor means interconnected with said electrical input means, with said control logic, and with said memory sector and operable when the signal read from

the memory sector equals or exceeds the signal corresponding to the zip code prefix to provide an output signal to the control logic to halt the address of the memory sector.

5. The calculator of claim 4 including:

a second memory sector interconnected with said control logic which stores at a plurality of locations the postal rates for all weight-zone combinations as established by the Post Office within certain prescribed limits for parcels to be mailed by priority mail.

6. The calculator of claim 5 including:

a third memory sector interconnected with said control logic which stores at a plurality of locations the postal rates for all weight-zone combinations as established by the Post Office within certain prescribed limits for parcels to be mailed by parcel post (4th class).

7. The calculator of claim 6 wherein each of said memory sectors are separately mounted on an easily replaceable circuit board or chip for accommodating changes in postal rates and for calibrating said calculator for various points of mailing origin.

8. The calculator of claim 6 including:

binary adder means interconnected with said scale and with said control logic and operable on a command from said control logic to direct the reading of the postal rate from the proper memory sector.

9. The calculator of claim 6 including:

electrical zone selector switch means interconnected with said memory sectors and with said control logic and effective when actuated to designate either zone or local mailing for a parcel to be mailed and thereby cause the reading of either the zone or local postal rates from said second or third memory sectors.

10. The calculator of claim 8 including:

electrical class selector switch means interconnected with said binary adder and effective when actuated to designate either parcel post or priority mail class of handling.

11. A multiple terminal postage calculator comprising:

a plurality of mailing stations, each having a scale for weighing the parcels to be mailed;

electrical means connected to said scales for converting the weight of a parcel into digital code;

a plurality of switch means at each mailing station for entering the first three digits of the destination zip code, the designation of zone or local mailing, and the class of handling;

a single central special purpose computer connected to all of said terminals and operable to determine the proper postal rate for a particular parcel according to its weight and designation as to destination and class of handling; and

a multiplexing network interconnecting said computer with said terminals and operable to direct the proper postal rate to the proper mailing terminal.