

July 21, 1953

.P. L. LAW

2,646,217

ARTICLE DISPENSING SYSTEM

Filed Oct. 26, 1949

5 Sheets-Sheet 1

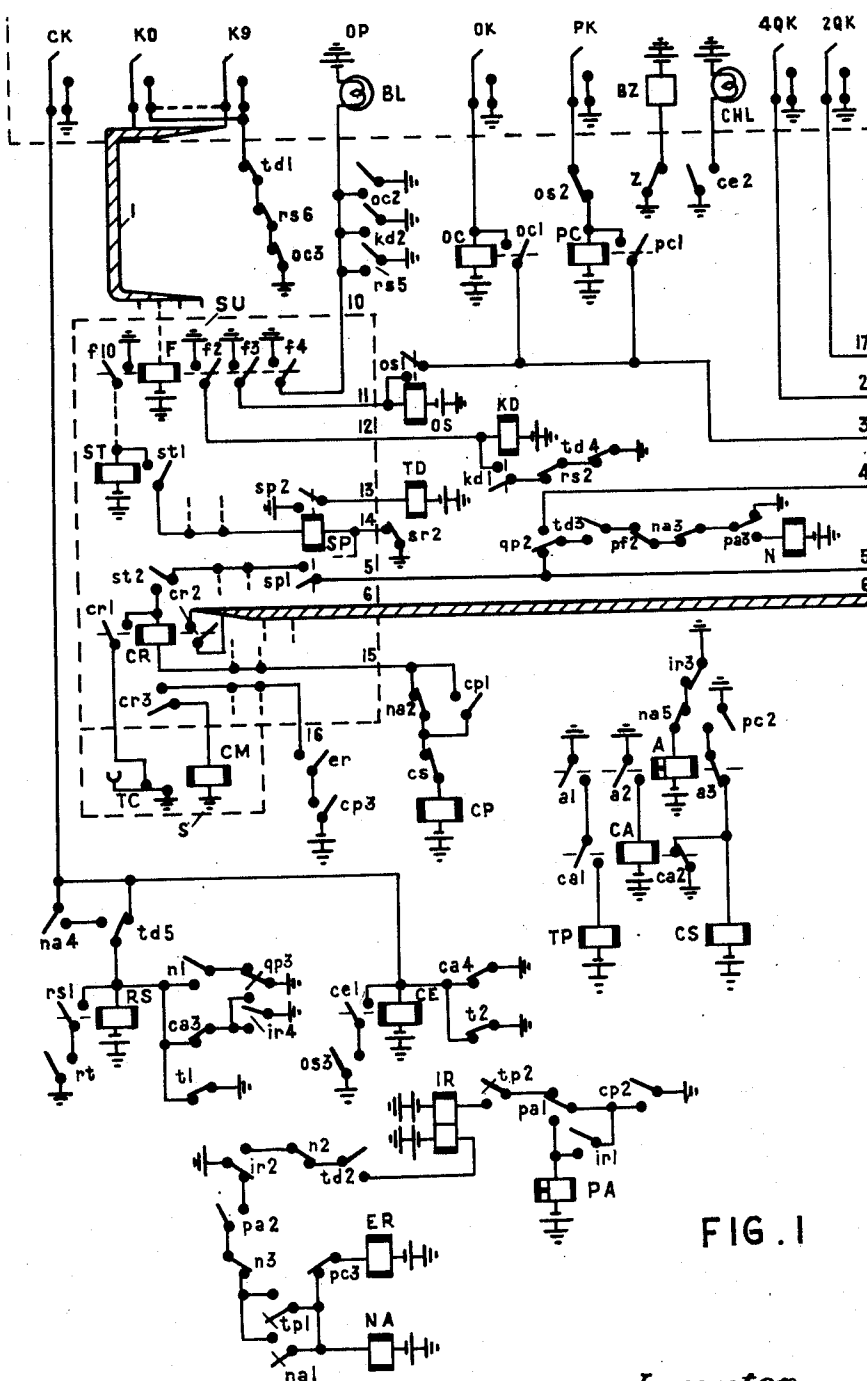


FIG. 1

Inventor
Peter L. Law
By *Ward, Crosby & Neal*
Attorneys

July 21, 1953

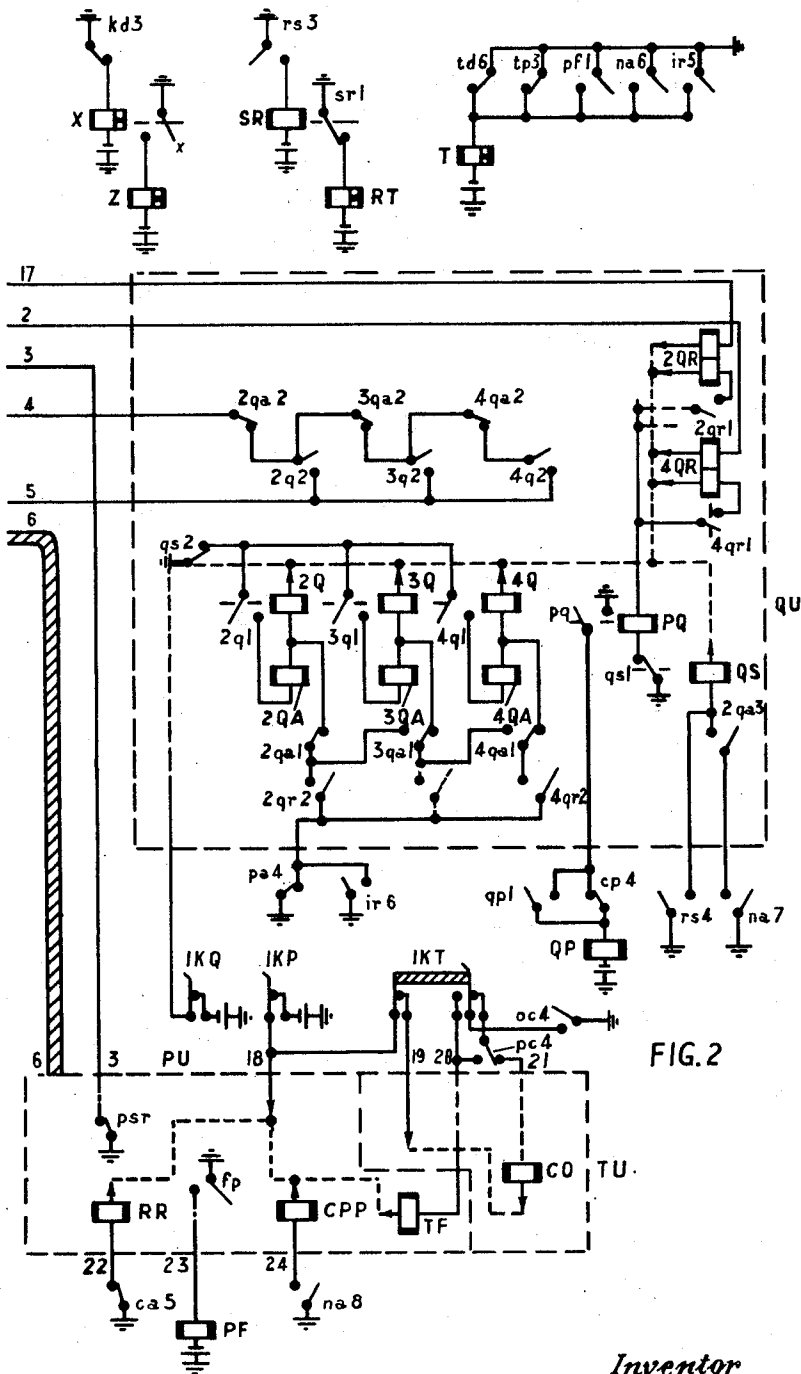
P. L. LAW

2,646,217

ARTICLE DISPENSING SYSTEM

Filed Oct. 26, 1949

5 Sheets-Sheet 2



July 21, 1953

P. L. LAW

2,646,217

ARTICLE DISPENSING SYSTEM

Filed Oct. 26, 1949

5 Sheets-Sheet 3

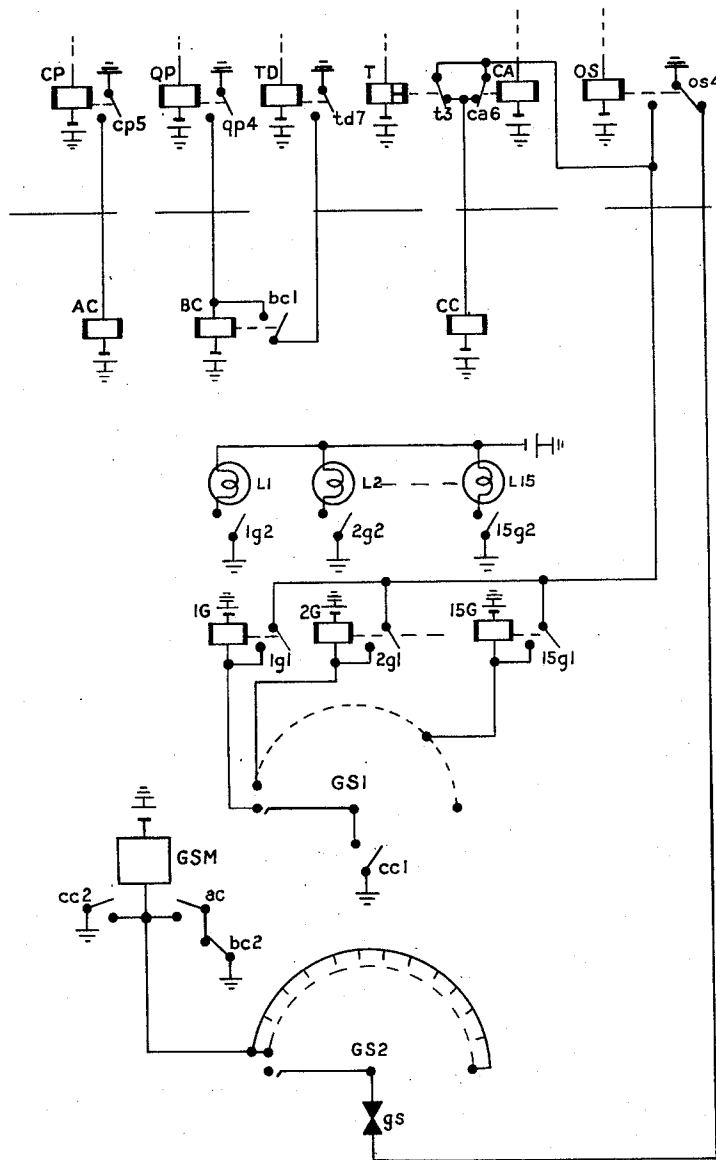


FIG. 3

Inventor
Peter L. Law
By Ward, Crosby & Neal
Attorneys.

July 21, 1953

P. L. LAW

2,646,217

ARTICLE DISPENSING SYSTEM

Filed Oct. 26, 1949

5 Sheets-Sheet 4

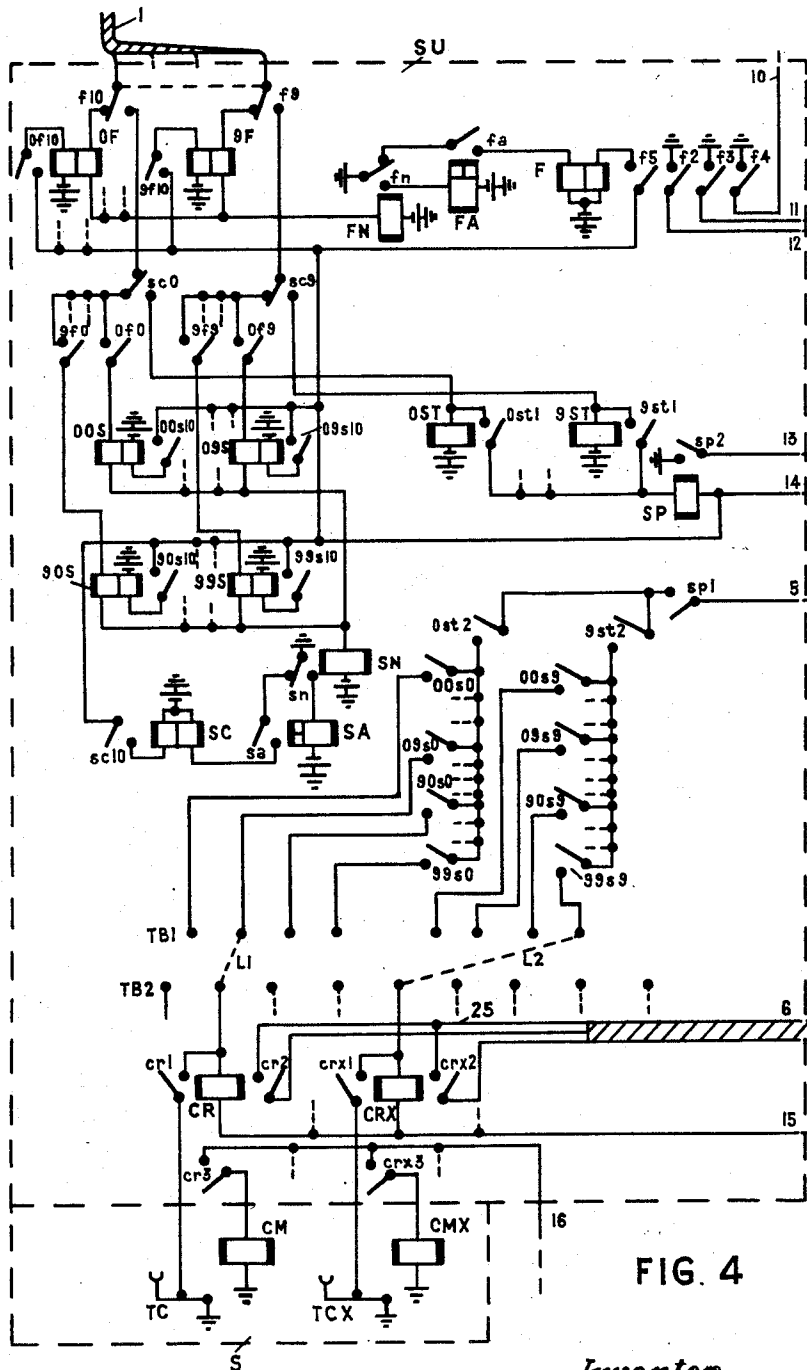


FIG. 4

Inventor
Peter L. Law
By Ward, Crosby & Neal
Attorneys

July 21, 1953

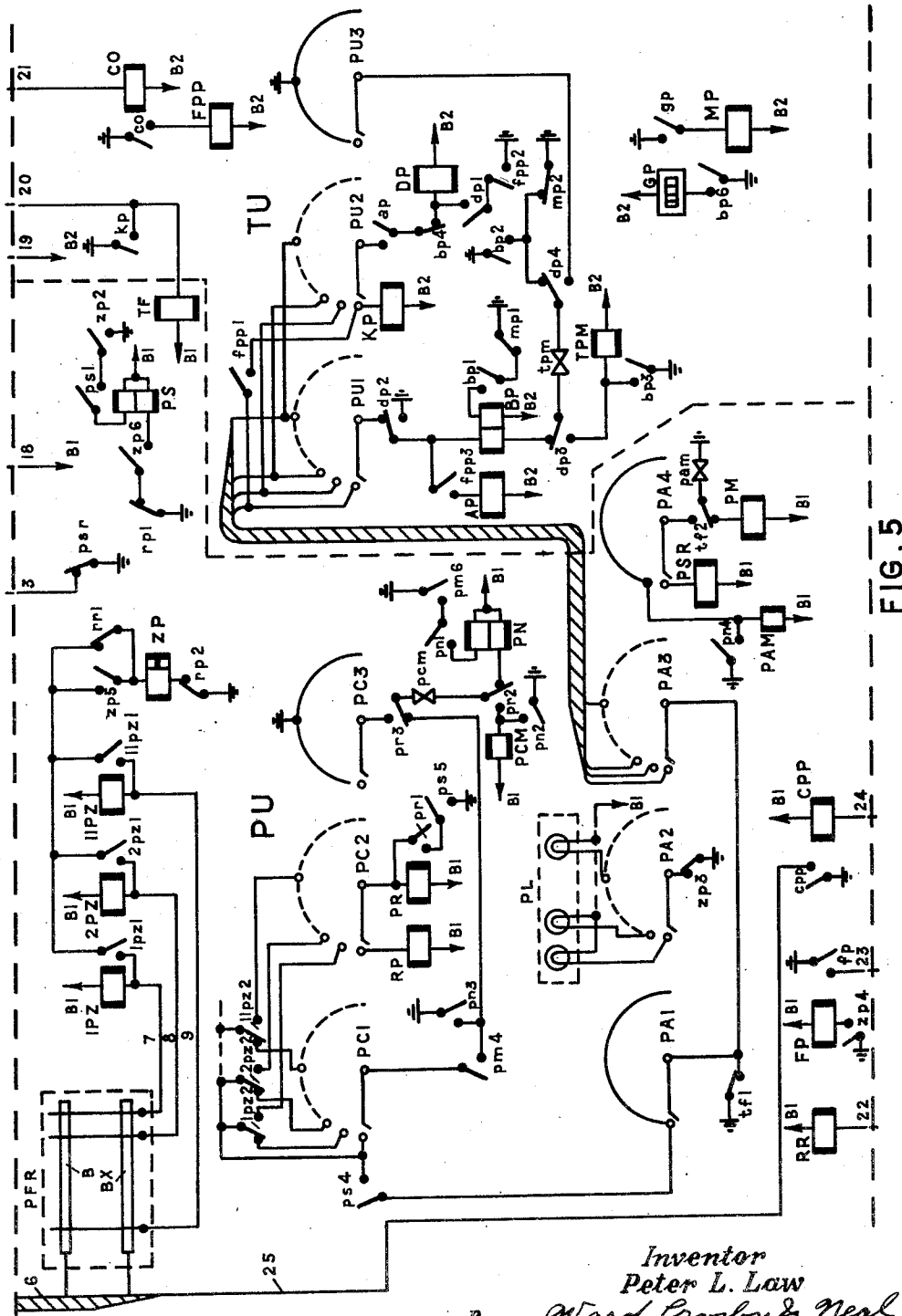
P. L. LAW

2,646,217

ARTICLE DISPENSING SYSTEM

Filed Oct. 26, 1949

5 Sheets-Sheet 5



Inventor
Peter L. Law
By Ward, Crosby & Neal
Attorneys

UNITED STATES PATENT OFFICE

2,646,217

ARTICLE DISPENSING SYSTEM

Peter Lincoln Law, Roseville, near Sydney, New South Wales, Australia, assignor to Communication Engineering Pty. Limited, Cammeray, near Sydney, New South Wales, Australia, a corporation of Australia

Application October 26, 1949, Serial No. 123,641
In Australia November 4, 1948

17 Claims. (Cl. 235—61)

1

The invention relates to article dispensing systems and in particular to such systems in which articles of various character are dispensed from storage by the application of a code allotted to each kind of article.

Hitherto in article dispensing systems of the kind mentioned above, the articles are stored in shelves, bins or the like, which are provided with release mechanisms for each shelf or bin. These systems furthermore comprise a selection device including a selection unit to which the code of a wanted kind of article is applied by electrical contact means. This selection unit operates directly the release mechanisms associated with each of the shelves containing the various kinds of articles.

Further provision is made to prohibit the operator from keying up another code for the next kind of article until the first article is released from storage to avoid false operation of the system.

When an article has left its corresponding shelf it operates a contact arrangement, which indicates that the article has been released, and thus enables the operator to carry on with selection of the next kind of article.

When many articles have to be keyed up in succession, valuable time is lost while the operator has to wait for the signal that the article has been released from storage. According to the invention this difficulty is overcome by including in the selection device of the article dispensing system an auxiliary relay circuit arrangement which is influenced from the selection unit, and operates the selected release mechanism, at the same time freeing the selection device for further operation.

This auxiliary relay circuit arrangement, according to a further feature of the invention also frees the selection device when the code applied to said selection device does not coincide with any one of said release mechanisms.

According to another feature of the invention the auxiliary relay circuit arrangement comprises a timing device which sets the selection device to its initial position when a selected article has not been discharged within a predetermined time period.

In cases where the article dispensing system incorporates a pricing unit with a pricing and adding arrangement it can happen that the pricing and adding arrangement cannot follow quick enough the selection of the various kinds of articles. If the pricing and adding arrangement cannot temporarily take any more price indica-

2

tions, it influences according to another feature of the invention a special relay provided in the auxiliary relay circuit arrangement so that this latter arrangement holds up the further release of articles from their corresponding shelves until the pricing unit is again in a position to take more price indications.

It is a further feature of the invention to provide the article dispensing system with a quantity unit operated by said auxiliary relay circuit arrangement, whenever a plurality of articles of the same kind has to be dispensed.

In systems of the type described above arrangements can be made to check the price indications for each kind of article by pressing a checking key prior to the keying of the code of an article to give the price indication of the keyed-up article on the price indicator without releasing the article from storage, and without transferring the price indication of the article via a totalling unit to a message register.

Difficulties however arise when the operator immediately after having keyed up the code of a kind of article presses the price-checking key to suppress marking of the price of the selected kind of article at the message register although the article is actually dispensed.

To overcome this difficulty, means are provided in the auxiliary relay circuit arrangement which disable the price checking key until such time that the total cost of a batch of selected articles is registered in the message register.

According to another feature of the invention isolating keys are connected with the auxiliary relay circuit arrangement, which enable an isolation of the various units used within the system, for example the pricing unit, the totalling unit or the quantity unit. These isolating keys make it possible to isolate a faulty unit without jeopardising the working of the whole system.

It is still another feature of the invention to operate from the auxiliary relay circuit arrangement an order check lamp which lights up whenever any of the articles selected from one order has not been dispensed for any reason, for example, when the bin has been empty or is in the process of re-loading. This arrangement gives a safe indication that something is missing from the order and that the order has to be checked before the articles are handed over to the customer.

As long as small orders are handled this check can easily be done to find out which of the articles is missing. When big orders have to be handled an order checking arrangement according to

another feature of the invention is provided which indicates missing articles by reference to the sequence in which they are selected, so that the missing article or articles can easily be identified.

It is a further feature of the invention to step up a rotary switch in the order checking arrangement for each article selected from storage and to light a lamp each time an article is not released.

It is still a further feature of the invention to step up the rotary switch only one step when a quantity of the same kind of article is selected.

These and other features of the invention will be more clearly understood from the following description in connection with the drawings in which

Figs. 1 and 2 show schematically the electrical circuits for the auxiliary relay circuit arrangement according to one embodiment of the invention.

Fig. 3 shows a circuit diagram for an order checking arrangement adapted to operate in a circuit arrangement shown in Figs. 1 and 2.

Fig. 4 shows a circuit diagram of a selection unit, which can be used in connection with the invention.

Fig. 5 shows the circuit diagram of a pricing unit and totalling unit schematically indicated in Fig. 2.

In the drawings the "detached contact" method is used whereby the contacts of the relays are shown where they appear in the circuit and not necessarily near the relay which operates them. All contacts are shown in their unoperated position. The relays are marked with capital letters and the corresponding contacts are marked with the same small letters and an additional figure to identify the various contacts operated by the same relay.

In Fig. 1 an operator's panel OP is shown including a set of contact members or keys (K0 to K9) which by their operation according to a stock number or code of a wanted kind of article transfer this code via a cable 1 to a selection unit SU which contains the necessary relays for the individual selection of the various kinds of articles. One example of a selection unit which can be used in this system is shown in Fig. 4 and will be described later on. A more detailed description of this selection unit is given in my co-pending application Serial No. 110,149, filed August 13, 1949, for Selection Circuits, now Patent No. 2,611,814. A relay F is energised whenever one of the keys K0 to K9 is pressed and closes its contacts *f1*, *f2*, *f3* and *f4* to establish a number of circuits as will be described later on. When the final digit of the stock number or code has been keyed up on the key set one of a group of relays ST is energised which ultimately prepares over its contact *st2* a circuit for one of the switch relays CR, corresponding to the wanted kind of article. Over contact *st1* a further circuit is closed which operates in series with relay ST the relay SP with contacts *sp1* and *sp2*. Contact *sp1* further extends the circuit for the selected CR relay which is operated when the third digit pilot relay TD, operated over contact *sp2*, closes its contact *td3*. The relay CR marks the price of the corresponding kind of article over contact *cr2* and cable 6 at a pricing unit PU (Fig. 2). Over contact *cr1* a locking circuit for the CR relay is closed via a contacting device or trip contact TC of a corresponding shelf or bin S, carrying the selected article, and over contact *cr3* the release

magnet CM or any other release mechanism associated with this shelf is operated to release an article from this shelf. The article then temporarily interrupts the trip contact TC thus breaking the locking circuit for relay CR.

Besides the keys K0 to K9 for the selection of articles the operator's panel OP is equipped with a cancel key CK to cancel a selection whenever necessary, an "order complete" key OK, which is pressed whenever the selection of a batch of articles belonging to one order is completed, a price checking key PK to enable a checking up on the price indication of the pricing unit PU without releasing any articles, and quantity keys QK two of which are shown in the drawing, to key up more than one article of the same kind. For each quantity of two, three, four articles and so on a separate key is provided.

A "busy" lamp BL lights up whenever part of the system is busy and the operator has to wait before he keys up another stock number or code. A buzzer BZ signals that a number was not keyed up properly, and a check lamp CHL tells the operator that not all the articles keyed up on the keys K0 to K9 have been delivered and that therefore the order has to be checked.

Before the various circuits for the working of the system are described in detail the functions of the various relays will be explained. Whenever a switch relay CR is operated a pilot relay CP (Fig. 1) is energised as well. Although only one CP relay is shown it must be understood that the CR relays can be arranged in groups and a separate pilot relay CP can be associated with each group; in this latter case the contacts of these relays are either connected in parallel (for make contacts) or series (for break contacts) as required. This arrangement has the advantage that a break-down of one of the relays does not affect the working of the system as far as the other relays are concerned.

Over a contact of the CP relay and a normally closed contact of a TP relay an indicating relay IR is operated which locks itself until the selection unit SU has released. At the same time the relay IR starts a timing device consisting of the slow release relay A or a chain of such relays and the cancel relay CA which cancels the price indication and breaks the locking circuit for the relays CR via a reset relay CS. The supervision of the timing device is carried out by a time pilot relay TP, which is always operated when all the relays of the timing device (A and CA) are energised and further controls the operation of the IR relay.

As soon as the CP relay and the IR relay are energised a pilot auxiliary relay PA operates which remains locked to the CP relay while the articles are being released from their corresponding shelves. The PA relay connects the control relay N with the trip contact TC and the relay CR to check whether the circuits via the trip contact TC and the relay CR are closed or open and to operate when the circuits are closed.

When the IR relay has been released again after operation and subsequent release of relay N as described later on an auxiliary locking relay NA and an energising relay ER are operated. The relay NA remains operated until an article is released and over one of its contacts (*na8*, Fig. 2) operates the relay CPP to mark the price in the pricing unit PU. At the same time relay ER connects over contact *er* (Fig. 1) battery with the selected release magnet CM for the release of the warranted kind of article.

5

Further relays (SR, RS and T) are provided for the resetting of the various circuits, and the relay CE, and the relay Chain X, Z give the necessary supervisory signals to the operator.

The starting of any order is indicated in the relay circuit arrangement by an "order start" relay OS, while the completion of an order is transferred into the relay circuit arrangement by the "order complete" relay OC.

In case a checking of the price indications without a release of articles has to be performed, the price checking key PK operates the "price checking" relay PC which at its contact *pc3* disables the circuit for relay ER and thus prevents energizing of magnet CM of any article subsequently keyed up at the key set.

To release a certain quantity of the same kind of article a quantity unit QU (Fig. 2) is connected with the circuit. The function of this unit will be described later on in detail.

The prices of the articles belonging to one order are added up in a totalling unit TU which is connected with the pricing unit PU, and operates as soon as the "order complete" signal is given. The pricing unit PU and the totalling unit TU are shown schematically in Fig. 5. Arrangements which can be used for the abovementioned purpose are in detail described in my co-pending application Serial No. 110,979, filed August 18, 1949, for Recording Arrangements for Article Dispensing Systems, now Patent No. 2,608,348.

If one of these units gets faulty it can be isolated by a group of isolating keys which are indicated in Fig. 2 by the key IKQ for isolating the quantity unit QU, key IKP for isolating the pricing unit PU and key IKT for isolating the totalling unit TU. As the totalling unit TU depends for its operation on the operation of the pricing unit PU operation of the key IKP disables also the totalling unit TU. Whenever one of these keys is thrown the other parts of the system operate in the usual manner.

A detailed description of the various circuits and their functions will be given hereafter: All relay contacts are shown in their unoperated position. However the following relays and their contacts are normally operated. Relay A (Fig. 1) is energised from battery via slow release relay A, contacts *na5* and *ir3* to earth. Over contact *a2* relay CA is energised and over contacts *a1* and *ca1* relay TP is operated so that normally the contacts *ca1* to *ca5* and *tp1* to *tp3* are in their operated position. The slow release relay X (Fig. 2) is normally operated over contact *kd3* and energises over its contact *x* the slow release relay Z which thus interrupts at its contact *z* (Fig. 1) the circuit for the buzzer BZ. The slow release relay RT (Fig. 2) is energised over contact *sr1* and closes its contact *rt* (Fig. 1). The slow release relay T (Fig. 2) is operated over contact *td6* and keeps its contacts *t1* and *t2* (Fig. 1) open.

When an article, for example an article with the designation 990, is to be selected the operator keys up the first digit of this designation on his keyset by pressing the key K9 (Fig. 1). Thus earth is connected to the selection unit SU over contact *oc3*, contact *rs6*, contact *td1*, operated key K9, cable 1 to contact *f19* in Fig. 4. Each key K0 to K9 is connected with one of the contacts *f10* to *f19* for the operation of corresponding relays 0F to 9F. Thus over the abovementioned circuit relay 9F is operated by the earth on contact *f19* over relay FN to battery. Relay

6

9F closes a locking circuit from battery over the second winding of relay 9F, contact *9f10* to the common earth of the selection unit provided over the lead 14 and contact *rs2* (Fig. 1). The relay 9F, furthermore, closes its contacts *9f0* to *9f9*. Corresponding contacts are provided for the other relays as indicated for relay 0F by the contacts *0f9* to *0f10*.

The relay FN changes over its contact *fn* and thus operates the slow release relay FA which prepares over the contact *fa* a circuit for the relay F. As soon as the key K9 is released again, relay FN is de-energised and releases its contact *fn*, thus completing a circuit for the relay F which now operates over the still closed contact *fa*. This contact opens with a time delay but, in the meantime, relay F has closed a locking circuit from battery over its second winding, contact *f5* to the common earth of the selection unit SU. Relay F, furthermore, closes its contacts *f2*, *f3* and *f4* and, as shown in Fig. 1, lights up the "busy" lamp BL over contact *f4* and lead 10, and energises over contact *f3* and lead 11 the "order start" relay OS, which locks itself from battery over relay OS, contact *os1*, lead 3 (Fig. 2), contact *psr* in the pricing unit PU to earth. Over contact *f2* and lead 12 a circuit is closed for the KD relay, which locks over its own contact *kd1*, contacts *rs2* and *td4* to earth. Over contact *kd2* the "busy" lamp BL is kept alight. The relay F (Fig. 4), furthermore, changes over the contacts *f10* to *f19*, thus connecting the leads from the keys in cable 1 with the contacts *sc0* to *sc9* for the selection of the second digit of the article designation. These latter contacts are connected over the contacts *0f0* . . . *0f9*, *9f0* . . . *9f9* of the abovementioned relays 0F to 9F with the second digit relay groups consisting of ten groups of ten relays each as indicated by the relays 00S to 09S and 90S to 99S, which in turn when operated close their contacts *00s0* to *00s10*, *09s0* to *09s10*, *90s0* to *90s10* and *99s0* to *99s10*.

When the operator now presses key K0 to select the second digit of the article designation, earth on the keys is connected over operated contact *f10*, contact *sc0*, operated contact *9f0*, relay 90S, relay SN to battery, so that these two relays operate. Relay 90S closes a locking circuit from battery over its second winding, contact *90s10* to the common earth on lead 14 and, at the same time, closes its further contacts *90s0* to *90s9*. Relay SN operates contact *sn*, thus energising the slow release relay SA which, over contact *sa*, prepares a circuit for the relay SC. As soon as the operator releases key K0 again, relay SN is de-energised, and thus relay SC can operate over the released contact *sn*, the still operated contact *sa* (as relay SA is slow to release), relay SC, to battery. This latter relay closes a locking circuit for itself over its second winding and contact *sc10*, so that it remains operated when the relay SA releases and breaks the original operating circuit.

Relay SC changes over its contacts *sc0* to *sc9* and thus connects now the leads from the keyset with the third digit relay group consisting of the relays 0ST to 9ST with their contacts *0st1* and *0st2* to *9st1* and *9st2*. The operation of key K0 to select the third digit of the article designation 990 connects earth over operated contact *f10*, operated contact *sc0*, relay 0ST to battery, thus operating this relay which locks itself over its own contact *0st1*, relay SP, common earth lead 14, contact *sr2* (Fig. 1), to earth. As soon as key K0 is released again and thus earth

7

is removed from relay 6ST, relay SP can operate in the abovementioned locking circuit, closing its contacts *sp1* and *sp2*.

For each article to be selected a particular switch relay, indicated in Fig. 4 by the relays CR and CRX, is provided, which is connected with one of the terminals TB2 of a jumpering frame. Another group of terminals TB1 of this jumpering frame is connected with corresponding contacts 00s0 . . . 00s9 By connections between the terminals TB1 and TB2, as for example indicated by the connections L1 and L2, any of the relays CR to CRX can be connected with any of the contacts so that it is possible to allot any of the available designations to the relays initiating the dispensing of the various articles.

The operated relay SP closes, as mentioned above, its contacts *sp1* and *sp2*. Contact *sp2* operates relay TD (Fig. 1) over the lead 13, while contact *sp1* completes the circuit for the selected CR relay as earth is put on lead 5 by the closing of contact *td3* (Fig. 1). At contact *td1* (Fig. 1) earth is removed from the keyset and at contact *td3* the locking circuit for relay KD is interrupted. Thus the circuit for the slow release relay X (Fig. 2), which was interrupted at contact *kd3*, is closed again, so that this relay does not release the slow release relay Z. If necessary, more than one relay can be used in such a time delay circuit to get a longer release time.

The CR relay thus operates, as shown in Fig. 1, from earth over contacts *pa3*, *na3* and *pf2*, closed contact *td3*, contact *qp2*, closed contacts *sp1*, 0st2 and 00s0 (Fig. 4), relay CR, lead 15, contacts *na2* and *cs* (Fig. 1), relay CP, to battery. Relay CR transmits over contact *cr2* a price marking via cable 6 to the pricing unit PU (Fig. 2) as will be described later on in more detail. At contact *cr3* (Figs. 1 and 4) a circuit is prepared for the corresponding release magnet CM in the shelf unit S carrying the articles and at contact *cr1* a new circuit for the relays CR and CP is established over the trip contact TC associated with the magnet CM in the shelf unit S. In case another designation was keyed up on the keyset, another CR relay, for example the relay CRX and the corresponding magnet CMX and trip contact TCX, would be selected for operation.

Relay CP opens its contact *cp4* (Fig. 2) to disconnect the quantity relay QP from the quantity unit QU and furthermore closes its contacts *cp1* to *cp3* (Fig. 1). At contact *cp1* a parallel circuit to contact *na2* is established. Contact *cp3* prepares a circuit for the clutch magnet CM. Over contact *cp2* the relay IR is energised via contact *pa1*, operated contact *tp2*, relay IR to battery. Relay IR completes a locking circuit from earth over its operated contact *ir2*, contact *n2*, operated contact *td2* and its second winding to battery. Contact *ir5* (Fig. 2) closes another circuit for relay T and contact *ir6* connects earth with the quantity unit PU. At contact *ir3* (Fig. 1) the circuit for relay A is interrupted but as this relay is very slow releasing it does not release immediately.

A circuit is closed for the slow release relay PA from earth via operated contacts *cp2* and *ir1*, relay PA to battery. At the same time contact *ir4* prepares a circuit for the release relay RS, which, however, cannot operate as contact *ca3* is still open. As the PA relay has operated the circuit for the first winding of relay IR is interrupted at contact *pa1* and a new circuit for relay PA is established over this contact. Contact *pa4*

8

(Fig. 2) takes earth off the quantity unit QU, but this earth is still supplied via contact *ir6*. At contact *pa2* (Fig. 1) a circuit is prepared for the relays ER and NA.

The changeover contact *pa3* takes earth off the train of contacts *na3*, *pf2*, *td3* and *qp2* and connects these contacts with the N relay. Thus the CR relay and the CP relay depend now on the locking circuit via the trip contact TC. If the trip contact TC and contact *cr1* are properly closed, the relay N is energised from earth via trip contact TC, operated contacts *cr1*, *st2* and *sp1*, contacts *qp2*, operated contact *td3*, contacts *pf2* and *na3*, operated contact *pa3*, relay N to battery. Thus the operation of relay N is an indication that the trip contact TC is working properly. Relay N closes its contact *n1* and opens its contacts *n2* and *n3*. At contact *n1* a circuit is closed from battery via the RS relay, operated contact *n1*, contact *qp3* to earth. At contact *n3* the circuit for the relays ER and NA is further interrupted and at contact *n2* the locking circuit for relay IR is broken so that this relay now releases and at contact *ir2* puts earth on contact *pa2* for the operation of relay ER and NA when relay N releases its contact *n3*. At contact *ir3* earth is applied again to relay A before this relay could fall back.

Relay RS, energised over contact *n1*, closes a locking circuit for itself from earth over the operated contacts *rt* and *rs1*. The "busy" lamp BL is kept alight over contact *rs5* while at the same time the former locking circuit for relay KD is further interrupted at contact *rs2*, and the earth connection of the key set is further broken at contact *rs0*. At contact *rs4* (Fig. 2) earth is applied to the relay QS in the quantity unit QU but the operation of relay QS is without effect as the quantity unit QU has not been operated. Closing of contact *rs3* (Fig. 2) operates relay SR which interrupts at contact *sr1* the circuit for the normally operated relay RT, and at contact *sr2* (Fig. 1) breaks the locking circuit for the relays ST and SP and the operated digit relays in the selection unit SU (Fig. 4) which now release thus interrupting the circuits for the relay TD and N and restoring the selection unit SU with the exception of the selected switch relay CR to normal.

Relay RT (Fig. 2) is a slow release relay so that it interrupts its contact *rt* (Fig. 1) in the locking circuit of relay RS with a certain time delay to make sure that the relays of the selection unit SU are properly released.

When relay N is de-energised, circuits are completed for the operation of the relays ER and NA from earth via contact *ir2*, operated contact *pa2*, contact *n3*, operated contact *tp1* and then to relay NA in parallel with contact *pc3* and relay ER to battery. The operated contact *er* of relay ER completes the circuit for the selected magnet CM from battery via operated contacts *cp3*, *er* and *cr3*, magnet CM to earth, so that this magnet now operates the release mechanism of the corresponding shelf.

With the release of the relays RS and TD earth is again connected with the keys K0 to K9 and the "busy" lamp BL is extinguished, thus indicating that the operator can proceed with the keying up of the next stock number. In the meantime the relay NA is energised as mentioned above and operates its contacts *na1* to *na6*. Contact *na1* closes a parallel circuit to contact *tp1*, contact *na2* opens and thus makes the locking circuit for relays CR and CP dependent on con-

tact *cp1*, contact *na3* interrupts the original energising circuit for the CR relays and contact *na4* prepares a connection from the "cancel" key CK to the RS relay for special purposes as described later on. At contact *na5* the circuit for the A relay is again interrupted, while contact *na6* (Fig. 2) keeps the T relay energised. Contact *na7* connects earth with the quantity unit QU and contact *na8* operates the CPP relay in the pricing unit PU to mark the price of the selected article.

When an article is released from its shelf by magnet CM, this article temporarily interrupts the trip contact TC. Thus the locking circuit for the CR relay and the CP relay is broken. As the relay CP is a very fast releasing relay it opens its contact *cp1* even if the trip contact TC gets only a tap from a light article and thus interrupts safely the locking circuit so that the CR relay can fall back later. At contact *cp2* the circuit for slow release relay PA is interrupted which after a certain time delay interrupts at contact *pa2* the circuit for relay NA. This time delay ensures that relay NA does not release before the CR relay is safely released.

All the relays and circuits are now again in their initial positions and thus ready for the selection and release of the next article.

The operation of the pricing unit PU will now be described in detail in connection with Fig. 5. As mentioned before, the various relays CR, CRX (Fig. 4) close when operated their contacts *cr2*, *crx2* and thus transfer price indications representing the price of the selected article to the pricing unit PU via cable 6. One contact spring of each contact is connected with the lead 25, while the other contact spring of each contact is connected individually through cable 6 with one of the pricing bars B, BX of the pricing frame PFR (Fig. 5). Price wires 7, 8 and 9 corresponding to the units in the price of an article are arranged across pricing bars B, BX and by connecting any of the price wires with any of the pricing bars a particular price can be allotted to any of the dispensed articles. The price wires 7, 8 and 9 lead to corresponding pricing relays 1PZ, 2PZ . . . 11PZ which operate their contacts 1*pz1*, 1*pz2*, 2*pz1*, 2*pz2* . . . 11*pz1*, 11*pz2* in accordance with the selection of an article.

As mentioned before, contact *na8* (Fig. 2) operates over lead 24 relay CPP in the pricing unit PU (Fig. 5). It may be mentioned here that all the terminals designated by B1 are connected with the lead 18 which in turn connects them all with the key IKP (Fig. 2) and thus with battery. Relay CPP closes its contact *cpp* and thus puts earth on lead 25 and through cable 6 on to the contacts *cr2*, *crx2* (Fig. 4). If, for example, contact *cr2* is closed on selection of the relays CR, then this earth is extended through cable 6 back to the pricing frame PFR (Fig. 5) and may there be connected over the pricing bar B with the pricing wire 8, thus operating relay 2PZ. This relay closes a locking circuit from earth over contact *rp2*, slow release relay ZP, contact *rr1*, operated contact 2*pz1*, relay 2PZ to B1 and thus to battery. Relay ZP operates in this circuit when an article has been dispensed and earth is removed from lead 25 and thus from pricing wire 8. This relay by-passes at contact *zp5* the contact *rr1* and closes at contact *zp4* the circuit for the relay FP which in turn connects earth at its contact *fp* to the lead 23 and thus to the relay PF (Fig. 2), the function of which will be described later on. At contact *zp6* a circuit is

closed from earth over contact *rp1*, operated contact *zp6*, relay PS to B1 (battery) and this relay closes a locking circuit from B1 over its second winding, operated contact *ps1*, operated contact *zp2* to earth. At the contact *zp3* earth is removed from the wiper and arc PA2 and thus from the price indicating lamps PL. Furthermore, the relay 2PZ has operated its contact 2*pz2*, thus changing over from a connection with the arc PC1 to the arc PC2 of the same rotary switch. The relay PM is normally operated from B1 (battery) over relay PM, contact *tf2*, interrupter contact *pam*, to earth. Thus the contacts *pm4* and *pm6* are normally in the closed position.

Relay PS further closes its contacts *ps4* and *ps5*. Over contact *ps4* a circuit is closed from earth over contact *tf1*, wiper and arc PA1, closed contact *ps4*, arc and wiper PC1, closed contact *pm4*, contact *pr3*, interrupter contact *pcm*, contact *pr2*, relay PN, to B1 (battery). Contact *ps5* prepares a holding circuit for relay PR. Relay PN on operation closes its contact *pn1* and thus establishes a locking circuit from earth over closed contacts *pm6* and *pn1*, relay PN, to B1 (battery). Over contact *pn2* a circuit is closed for the magnet PCM, while contact *pn4* operates the magnet PAM. At the contact *pn3* earth is connected with the lead to contact *pr3*, thus replacing the earth from contact *tf1* mentioned before. As circuits are closed for the magnets PCM and PAM, both switches are stepped up one step. The circuit is so arranged that the switches must make an equal number of steps before relay PN can release again. Operation of magnet PCM interrupts at interrupter contact *pcm* one winding of relay PN and the operation of magnet PAM interrupts at interrupter contact *pam* the circuit for the relay PM, which breaks at contact *pm6* the locking circuit over the other winding of relay PN. As soon as both switches step up one step, relay PN releases, while at the same time a new circuit is closed for relay PN from earth over contact *tf1*, wiper and arc PA1, contact *ps4*, contact 1*pz2*, second contact of arc and wiper PC1, contact *pm4*, contact *pr3*, interrupter contact *pcm*, contact *pr2*, relay PN to B1 (battery). The same switching operations occur as mentioned before until the wiper PC1 reaches a contact of the arc which is connected with an operated contact of one of the relays 1PZ, 2PZ It was assumed before that contact 2*pz2* has been operated and thus a new circuit is established from earth over contact *tf1*, wiper and arc PA1, operated contact *ps4*, operated contact 2*pz2*, arc and wiper PC2, relay PR to B1 (battery). Relay PR locks itself over contact *pr1* and the previously operated contact *ps5* to earth. Contacts *pr2* and *pr3* change over and thus earth is connected from arc PC3 over the wiper, operated contact *pr3*, interrupter contact *pcm*, operated contact *pr2*, magnet PCM, to B1 (battery), thus stepping up the magnet step by step under the influence of the interrupter contact *pcm*. As soon as the rotary switch has reached zero position a circuit is closed from earth over contact *ps5*, contact *pr1*, wiper and arc PC2, relay RP, to B1 (battery). This latter relay interrupts at contact *rp1* the operating circuit for the relay PS and breaks at contact *rp2* the holding circuit for the relays 2PZ and ZP, thus releasing these relays as well as relay PS. As the switch magnet PAM has not been influenced by this operation the wiper PA2 remains in the position corresponding to the operation of

11

relay 2PZ and, as contact *ap3* is now closed, the corresponding lamp in the price indicator PL lights up to indicate the price of the selected article. If another article is selected thereafter, the price would be added on the rotary switch so that the indicator PL always indicates the added up prices for one order.

When all articles belonging to one order have been selected the operator presses the "order complete" key OK at the operator's panel OP. Over the key OK the relay OC is energised which closes its contacts *oc1*, *oc2* and *oc4* and opens its contact *oc3* thus removing earth from the keys K8 to K9 to prohibit further selection. Over contact *oc2* the "busy lamp" BL lights up. Relay OC locks itself from battery over relay OC, contact *oc1*, lead 3 (Fig. 2), contact *psr* in pricing unit PU to earth. At contact *oc4* a circuit is closed from earth via contact *oc4*, isolating key IKT, contact *pc4*, relay CO in totalling unit TU to battery. Relay CO transfers the total cost of the order into a message register or the like as for example shown in Fig. 5 and re-sets the totalling unit TU and the pricing unit PU thus interrupting temporarily the contact *psr* for the release of the OS relay and the OC relay (Fig. 1). Referring now to Fig. 5, the operation of relay CO over lead 21 causes over contact *co* the operation of relay FPP which in turn closes its contacts *fpp1*, *fpp2* and *fpp3*. A circuit is now closed from earth over contact *mp2*, contact *dp4*, interrupter contact *tpm*, contact *dp3*, relay BP, contact *fpp3*, relay AP, B2, lead 19, switch IKT (Fig. 2), switch IKP, to battery. A locking circuit for relay BP is established over contact *mp1* and operated contact *bp1*. Contact *bp2* puts earth on the connection between contacts *mp2* and *dp4* and contact *bp3* connects earth on to the magnet TPM to step up the wipers PU1, PU2 and PU3. At the same time, contact *bp6* closes a circuit for the message register GP to step this register up one step. A contact *gp* on the register operates the relay MP, which in turn breaks the locking circuit for the relay BP at contact *mp1*, while the operating circuit for this relay is broken at the interrupter contact *tpm*. The previously described operation repeats itself until the wiper PU2 reaches a contact which is connected with a corresponding contact of the arc on which the wiper PA3 in the pricing unit rests. In this case circuits are established from earth over contact *tf1*, wiper and arc PA3, arc and wiper PU1, contact *dp2*, operated contact *fpp3*, relay AP to B2 (battery) and from PA3 to arc and wiper PU2, operated contact *ap*, contact *bp4*, relay DP, to B2 (battery). Relay DP locks itself over its contact *dp1* and closed contact *fpp2* to earth. Contact *dp2* closes a direct circuit for the relay AP over contact *fpp3* while contacts *dp3* and *dp4* change over to establish a homing circuit for magnet TPM from earth over arc and wiper PU3, operated contact *dp4*, interrupter contact *tpm*, operated contact *dp3*, magnet TPM, to B2 (battery). In the meantime, the message register GP has made as many steps as correspond to the price of the order as indicated by the position of the wiper PA3. As soon as the wipers PU1, PU2 and PU3 have reached their home position earth is taken off at wiper PU3 and a circuit is closed for relay KP from earth over operated contact *fpp2*, operated contact *dp1*, contact *bp4*, operated contact *ap*, wiper and arc PU2, relay KP, to B2 (battery). Relay KP closes its contact *kp* to operate the relay TF in the pricing unit to return the adding

12

switch to its home position. At contact *tf1* earth is removed from the wipers PA1 and PA3 and at contact *tf2* a circuit is closed from earth over interrupter contact *pam*, operated contact *tf2*, wiper and arc PA4, magnet PAM, to B1 (battery). As soon as the switch has reached its home position this circuit is interrupted and a new circuit is closed from earth over interrupter contact *pam*, operated contact *tf2*, wiper and arc PA4, relay PSR, to B1 (battery). The relay PSR opens its contact *psr* and removes earth from lead 3, thus interrupting the circuit for the relays OS and OC (Fig. 1), as mentioned before. Relay OC thus opens again its contact *oc4* (Fig. 2) which in turn takes earth for the lead 21 leading to the totalling unit TU (Fig. 5), releasing the relay CO. Relay CO breaks the circuit for the relay FPP which releases, breaking the locking circuit for the relays DP, KP and AP at the contact *fpp2* and *fpp3*. Contact *fpp1* opens to avoid an operation of relay KP when the adding switch in the pricing unit PU has reached its home position. All circuits in the pricing unit PU and in the totalling unit TU are now ready to add up the prices of a new order and to transfer these added up prices to the message register. The first article for the following order can now be selected in the above described manner.

In case the shelf corresponding to a wanted kind of article is empty when the operator keys up the corresponding stock number, the TC contact is not operated and the relays CR, CP, PA and NA remain energised. As the circuit for the relay A is interrupted at contact *na5* as described above, the relay A will release after a certain time, for example five seconds. At contact *a1* the circuit for relay TP is broken, while contact *a2* interrupts the circuit for relay CA. Contact *a3* closes but this has no effect on relay CS as contact *pc2* is open. Relay CA operates its contacts *ca1* to *ca5*. At contact *ca1* the circuit for relay TP is interrupted further. Contact *ca2* closes a circuit for the CS relay which opens its contact *cs* thus interrupting the locking circuit for the CR and CP relays and restoring these relays and thus the relays PA and NA as described above. At contact *ca3* a circuit is prepared for relay RS but this circuit is not completed in this instance. Contact *ca4* connects battery to the order checking relay CE which closes its contacts *ce1* and *ce2*. Contact *ce1* completes a locking circuit for relay CE over operated contact *os3* and contact *ce2* lights up the checking lamp CHL, to indicate to the operator that the keyed up article is not available. The contact *ca5* (Fig. 2) closes over lead 22 a circuit for relay RR in the pricing unit PU which opens its contact *rr1* (Fig. 5), thus interrupting the operating circuit for relay ZP and preventing operation of the pricing switches. The relay CE (Fig. 1) and the checking lamp CHL are held operated until the "order complete" key has been pressed thus causing the operation of contact *psr* (Fig. 2) in the pricing unit PU. The opening of this contact breaks the locking circuit for relay OS and thus for relay CE.

In the case where a stock number is keyed up and the corresponding trip contact TC or any other contact in the locking circuit for the CR and CP relays is faulty, these relays would release immediately when contact *pa3* is changed over in the abovementioned manner. Contact *cp2* opens the circuit of relay PA which re-established the circuit for the relays CR and CP. Thus all these relays start to oscillate. Relay IR how-

ever remains locked over contacts *ir2*, *n2* and *td2*, as relay N cannot operate. Relay ER and NA cannot be energised either and no battery is thus provided for the clutch magnet CM and the pricing unit PU (Fig. 2). Contact *ir3* (Fig. 1) has opened the circuit for relay A, and after a certain time relay CA releases. Relay RS is now operated from earth over contact *ir4*, contact *ca3*, relay RS to battery and at the same time relay CE is energised over contact *ca4* and lights up the checking lamp CHL over contact *ca2* to indicate that the wanted article is not released from storage. The re-setting of all circuits proceeds now in the same way as described before and another article can be selected by the operator.

The time delay in the re-setting of the circuits is necessary for the following reasons: As mentioned before a new stock number can be keyed up on the key set while the article selected before is released from its shelf. If the same article is keyed up again while the previous article is just falling out the trip contact TC is temporarily opened thus showing the same condition as mentioned above for a faulty locking circuit. However owing to the time delay in re-setting of all circuits the article will have left the trip contact TC which closes again before all the circuits are released and thus the next article can be released in the usual manner. As the operation of the relay NA depends on the closing of the contact *tp1*, this relay cannot operate until the time delay circuit with the relays A and CA energising the TP relay over the contacts *a1* and *ca1* is in its normal operated condition. The contact *tp2* of the TP relay controls the operation of the IR relay which thus cannot operate until relay TP is energised again. At the same time contact *tp3* (Fig. 2) keeps the relay T energised while the contacts *ir5* and *na6* are open.

Provision is made to release the circuits when a stock number is keyed up for which no CR relay is connected with the selecting relays in the selection unit SU. This might happen either when a wrong stock number reserved for future extensions is keyed up or while the shelf is re-loaded with articles and for this purpose the relay CR is disconnected by a loading switch (not shown). In this case the third digit pilot relay TD is operated but relay CP cannot be energised. Thus relay IR remains in the unoperated position. As the circuit for relay T (Fig. 2) is now interrupted at contact *td5* (contact *tp3* being normally open), this relay will release after a time delay, for example 200 milliseconds. At contacts *t1* and *t2* circuits are closed for the relay RS and CE respectively which fulfil the same functions as described above to re-set the circuits and to indicate at the checking lamp CHL that the order must be checked before delivery.

In case the operator wants to cancel the selection of one or more digits keyed up on the keys K0 to K9 he presses the "cancel" key CK at the operator's position OP. Over this key CK the relay CE is directly energised while the RS relay is energised over contact *td5* in case the third digit was not keyed up yet. When, however, all three digits constituting the stock number are already keyed up on the key set a cancellation is only possible when the relay NA is still operated e. g. the previously selected article is just being discharged from its shelf. In this latter case the RS relay is operated via the contact *na4* and operated contact *td5*. Relays RS and CE restore all circuits in the usual manner.

If the operator keys up a number which is not provided for in the system or if he keys up only

two digits of the stock number, the TD relay will not operate. The KD relay thus remains locked and at contact *kd3* (Fig. 2) releases the slow releasing relay X and thus the relay Z after a time delay of for example 1 or 2 seconds. Relay Z closes its contact *z* (Fig. 1) and starts the buzzer BZ which indicates to the operator that he has to press the "cancel" key CK to restore all circuits to normal before he can proceed with further selections.

Although the pricing unit PU (Fig. 2) can be provided with relay storage groups which store the price indications for articles selected in quick succession, it might happen that the pricing unit is not able to take any more price indications. If the pricing unit PU is full the contact *fp* in the pricing unit PU is closed. Over contact *fp* the pricing relay PF is energised and at contact *p/2* (Fig. 1) interrupts the energising circuit for the relays CR and CP to hold up any further selection. Contact *p/1* (Fig. 2) closes another circuit for the T relay to keep this relay energised during the waiting period. Immediately the pricing unit PU is ready to take the next price indication contact *fp* releases relay PF and the further operations proceed in the described manner.

To give a possibility to check up on price indications without the actual release of articles from the corresponding shelves a separate price checking key PK (Fig. 1) is provided at the operator's panel OP. This key is operated before the stock number of an article, the price of which is to be checked on a price indicator, is keyed up on the key set. Over key PK and contact *os2* the PC relay is energised, which locks itself over contact *pc1*, lead 3 (Fig. 2) and contact *psr*. At contact *pc3* (Fig. 1) the circuit for the ER relay is interrupted, so that this relay cannot operate during the keying up of a stock number and no articles can be discharged. At contact *pc4* (Fig. 2) the circuit for totalling unit TU (relay CO) is broken and contact *oc4* is now connected over key IKT with the relay TF in the pricing unit PU to re-set the adding arrangement in the pricing unit PU when the "order complete" key OK (Fig. 1) is pressed after the prices of the articles concerned have been checked. Contact *pc2* (Fig. 1) prepares a circuit for relay CS. When the stock number of an article is now keyed up relay NA will energise as described before and break at contact *na5* the circuit of relay A which will release after a certain time delay. Relay CA is ultimately de-energised (a chain of slow release relays can be inserted between relay A and relay CA) and relay CS will operate at the same time from earth via contact *pc2*, contact *a3*, relay CS to battery, and thus all circuits including the pricing unit are set back to normal.

To prohibit the operator from operating the price checking circuits immediately after having keyed up the stock number of a wanted article to suppress marking of the price of this article in the message register, the contact *os2* is inserted in the circuit of the PC relay. As soon as the first digit of a stock number has been selected the "order start" relay OS has been operated and locked thus making the operation of key PK ineffective until the whole pricing and totalling operation is finished and the OS relay is de-energised again.

As mentioned before provision is made to release more than one article of the same kind by pressing a quantity key before keying up the stock number on the key set. For example quantity keys 2QK . . . 4QK (Fig. 1) at the op-

erator's panel OP are connected with the quantity unit QU (Fig. 2) over leads 17 . . . 2 for the selection of up to four articles of the same kind. It must be understood however that the arrangement can be used for the discharge of any other quantity if the necessary keys and circuit arrangements are provided. In the quantity unit QU dotted lines indicate how, for example, additional relay contacts have to be connected for the release of three articles.

When, for example, the quantity key 4QK is pressed prior to the keying up of a stock number, the relay 4QR (Fig. 2) is energised via key IKQ and closes over contact 4qr1, relay PQ and contact qs1 to earth a locking circuit for its second winding. In the same manner relay 2QR is energized on the operation of the quantity key 2QK and closes its contacts 2qr1 and 2qr2. Over contact 4qr2 relay 4Q is energised from earth via contact pa4, operated contact 4qr2, contact 4qa1, relay 4Q to battery (via key IQK). This relay closes its contacts 4q1 and 4q2, but relay 4QA cannot operate yet as it is earthed on both sides (via contact pa4 and contact qs2). As the relay PQ has been energised contact pq is closed and thus relay QP is energised from earth via contact pq, contact cp4, relay QP to battery. At contact qp1 a parallel circuit to contact cp4 is closed to make relay QP independent of the operation of contact qp4. At contact qp2 (Fig. 1) the energising circuit for the relays CR and CP is switched over via lead 4 (Fig. 2) to the train of contacts 2qa2, 3qa2, 4qa2, 4q2 in the quantity unit QU. Contact qp3 (Fig. 1) makes the operation of the RS relay dependent on the contact ca3 instead of contact n1, to prohibit a release of the selection unit SU when the first article has been discharged.

When following the operation of the quantity key 4QK a stock number is keyed up on the key set in the usual manner, the selected CR relay and the CP relay will be energised via the contact train in the quantity unit QU as mentioned before. Relay IR then operates closing its contact ir6 (Fig. 2) to maintain earth on contact 4qr2 in the quantity unit QU when subsequently relay PA (Fig. 1) is energised and opens its contact pa4 (Fig. 2). At contact pa3 (Fig. 1) relay N is now included in the circuit and relays CR, CP, and N are dependent on the operation of the trip contact TC. As relay N interrupts the locking circuit for relay IR at contact n2, relay IR opens its contact ir6 and relay 4QA can now operate in series with relay 4Q from earth via contact qs2, contact 4q1, relay 4QA, relay 4Q to battery. Contact 4qa1 of relay 4QA changes the lead via contact 4qr2 over to contact 3qa1 and relay 3Q. Contact 4qa2 breaks the circuit for relay N which thus releases. The release of an article continues now in the manner described before. As soon as relay CP is de-energised again and relay PA has fallen back, contact pa4 (Fig. 2) closes a circuit for relay 3Q from earth over contact 4qr2, operated contact 4qa1, contact 3qa1, relay 3Q to battery. The operation is now the same as outlined before. Contact 3q2 closes the circuit for the CR relay and the CP relay. As soon as the earth is removed again from contact 4qr2, relay 3QA operates in series with relay 3Q over contact 3q1, switches at contact 3qa1 the circuit over to contact 2qa1 and interrupts the circuit for relay N at contact 3qa2. When the next article is discharged the relay 2Q with contacts 2q1 and 2q2 and subsequently the relay 2QA with contacts 2qa1, 2qa2

and 2qa3 are operated and the third article will be discharged. At contact 2qa3 a circuit is prepared for relay QS which operates as soon as relay NA (Fig. 1) is energised in the normal way and closes its contact na7 (Fig. 2). Contact qs2 of relay QS removes earth from the QA and Q relays to release this relay train. At contact qs1 the locking circuit for the relay PQ and 4QR is broken and these relays are de-energised. Relay PQ releases at contact pq the relay QP. At contact qp2 (Fig. 1) the original energising circuit for the relays CR and CP is re-established and these relays initiate now the release of the fourth article from its shelf. As relay RS is again dependent on the operation of relay N (as contact qp3 has returned to its normal position), all circuits are set back to normal as soon as the fourth and last article has been discharged. During the discharge of this article the operator can start already to key up the next stock number.

When, for example, only two articles of the same character are required, relay 2QR is operated from key 2QK over lead 27. The operation of the quantity unit QU proceeds in the same manner as described above with the exception that the relay 2QA is directly operated over the closed contact 2qr2.

In case the operator wants to cancel the quantity selection he operates the "cancel key" and thus the RS relay as described before. At contact rs4 (Fig. 2) a circuit is then closed for the QS relay to release all the relays in the quantity unit QU.

To avoid a complete failure of the system when one of the additional units gets faulty, these units can be isolated by the operation of the isolating keys. The isolating key IKQ takes battery off the quantity unit QU. When a fault develops in the totalling unit TU operation of the key IKT takes battery off this unit and furthermore connects contact oc4 with the relay TF of the pricing unit to restore the adding arrangement of this unit directly to normal when the "order complete" relay OC is energised. In case the pricing unit PU becomes faulty battery is disconnected by key IKP from the pricing unit PU as well as the totalling unit TU to avoid a false operation of the message registers connected therewith.

To avoid a check through all selected articles in big order in case the checking lamp indicates that one or the other of these articles is missing an order checking arrangement can be used, which indicates the missing articles by reference to the sequence in which they have been selected so that the missing articles can easily be identified. A circuit for such an order checking arrangement is shown in Fig. 3.

The circuits for the operation of the relays CP, QP, TD, CA, OS and the slow release relay T have been described above in connection with Figs. 1 and 2.

The checking arrangement consists of a rotary switch with the contact banks GS1 and GS2, the magnet GSM and the interrupter contact gs. The indication of missing articles is performed by the lamps L1, L2 . . . L15 which thus enable a check of an order of 15 different articles. Whenever an article is missing in the order, the lamp, corresponding to the sequence of this article in the order, lights up, thus indicating clearly which of the selected articles is missing.

The circuit will now be described in detail.

When an article is keyed up on the keyboard of the article dispensing system the relay CP is energised as described above, and over contact *cp5* operates the relay AC. This relay closes its contact *ac* and energises magnet GSM from earth over contact *bc2*, operated contact *ac*, magnet GSM to battery. The rotary switch is so arranged that it steps its wipers GS1 and GS2 around on the release of magnet GSM after operation. Thus when an article is released from its bin and relay CP has released again, relay AC, being de-energised, opens its contact *ac*, interrupts the circuit for magnet GSM and steps the wipers one step forward. This stepping of the wipers GS1 and GS2 continues for each article selected and released.

When a quantity of the same kind of article is keyed up, the relay QP operates together with the relay CP and closes over its contact *qp4* a circuit for the relay BC which interrupts at its contact *bc2* the circuit for the magnet GSM to prohibit a stepping up of the switch at the release of each individual article of the same kind. At the same time relay BC closes over its contact *bc1* a holding circuit for itself over a contact *td7* of relay TD which is operated while the discharge of articles of a quantity selection is in progress. The relay TD releases when the last but one article of a wanted quantity is released and thus breaks the locking circuit for relay BC, which closes its contact *bc2* again, so that magnet GSM can step up one step at the release of the last article of the wanted quantity.

When the selection of articles is in progress the relay OS is operated until the order is delivered and thus the contact *os4* is changed over, disconnecting earth from the interrupter *gs*. When an order is complete the relay OS releases and connects earth again with the interrupter *gs*. As the wiper GS2 has left its first contact and all the other contacts of its bank are connected in parallel to the stepping magnet GSM this magnet steps now the wipers GS1 and GS2 around over the self-interrupting contact *gs* until the wiper GS2 reaches its first contact again and interrupts the stepping circuit. Thus the whole arrangement is re-set ready for the selection of the next order.

The relays CA and T are normally operated and keep their contacts *ca6* and *t3* respectively open. If a selected article, however, is out of stock relay CA releases and closes over contact *ca6* a circuit for the relay CC from earth over operated contact *os4*, contact *ca6*, relay CC to battery. Relay CC closes its contacts *cc1* and *cc2*. Over contact *cc2* a holding circuit is closed for magnet GSM, to keep it energised until relay CC releases again. Over contact *cc1* earth is applied to the wiper GS1 and, according to the position of this wiper, to one of the relays IG . . . 15G connected to the contact bank of wiper GS1. Thus the relay corresponding to the sequence of the article within the order is energised, for example the relay 2G, if the second article in this order has been missing. Relay 2G closes a locking circuit for itself from earth over operated contact *os4*, operated contact *2g1*, relay 2G to battery. This circuit is interrupted again when the whole order is completed and relay OS is de-energised. Over contact *2g2* the lamp L2 lights up thus indicating that the second article of the current order is missing. While the selection of articles of one order is in progress the lamps corresponding to missing articles

in this order remain alight, so that at the completion of an order it is easy to ascertain which articles are missing from this order.

When a bin is in the process of re-loading or when a stock number is keyed up, which is reserved for future extensions no articles are available. In these cases the relay T, which is normally energised, releases after a short time delay and closes its contact *t3* which is normally kept open. As this contact is connected in parallel to contact *ca6* the operations of the circuits are performed as described above for the case of any empty bin when contact *ca6* closes.

The foregoing description shows the invention by way of example only. As stated before the quantity unit can be arranged for any other quantities. Besides the pricing and totalling units additional similar units can be provided to indicate and register other particulars of the released articles, for example their coupon value. Further changes in the circuit can be made to suit individual requirements, for example for supervision, without departing from the spirit of the invention.

I claim:

1. In a system for dispensing articles of varied character according to coded designations thereof; a plurality of electrically actuated release mechanisms one for releasing each type of article to be dispensed; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto; a switch relay associated with each of said release mechanisms and electrically connected therewith; and a relay circuit arrangement electrically connected with and operable by said selection device to operate a selected switch relay said relay circuit arrangement including relay means connected with said switch relays and operable therewith, to free said selection device for further operation and to keep said selected switch relay in its operated condition and means operable upon the release of an article by a corresponding release mechanism to release said selected switch relay and said relay means.

2. In a system for dispensing articles of varied character according to coded designations thereof; a plurality of electrically actuated release mechanisms for discharging articles for dispensing and indicating means, to indicate the discharge of each article; a selection device for selectively preparing a circuit for any of said release mechanisms; a switch relay associated with each of said release mechanisms and electrically connected therewith; and a relay circuit arrangement connected with and operable by said selection device to operate a selected switch relay, said relay circuit arrangement including indicating relay means, control relay means, locking relay means and release relay means, said indicating relay means being operated at the operation of a selected switch relay and initiating the operation of said control relay means, said control relay means disconnecting the circuit for said indicating relay means and energizing said release relay means for the release of said selection device and said control relay means, said control relay means upon its release energizing said locking relay means and said selected release mechanism and deenergizing said release relay means, said indicating means upon discharge of an article from said release mechanism deenergizing said locking relay means.

3. In a system for dispensing articles of varied

character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed, and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a selection device for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto; a switch relay associated with each release mechanism and electrically connected with said selection device, with said contacting device and with said release mechanism to operate said release mechanism; and a relay circuit arrangement including control relay means and connections therefrom to said switch relays and said contacting devices for the operation of a selected switch relay and its associated release mechanism, said control relay means being connectable with and operable by each contacting device depending on the working condition of said contacting device and the corresponding switch relay to complete the circuit for said release mechanism, said control relay means upon failure in the working condition of said contacting device and the corresponding switch relay initiating the release of said selection device for further operation.

4. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a selection device for selectively preparing a circuit for any of said release mechanisms; and a relay circuit arrangement connected with and operable by said selection device to operate a selected release mechanism, said relay circuit arrangement including indicating relay means, control relay means and a timing device, so electrically connected that said timing device is operable by said indicating relay means after failure in the operation of said control relay means over the contacting device of a selected release mechanism to release after a predetermined time said selection device for further operation.

5. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed, and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a selection device for selectively preparing a circuit for any of said release mechanisms; and a relay circuit arrangement connected with and operable by said selection device to operate a selected release mechanism, said relay circuit arrangement including locking relay means and a timing device electrically connected with each other and said contacting device and said selection device, said timing device being operable by said locking relay means to release said selection device a predetermined time after failure in the operation of the contacting device associated with a selected release mechanism.

6. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto; a switch relay

associated with each of said release mechanisms and electrically connected therewith; and a relay circuit arrangement electrically connected with and operable by said selection device to operate a selected switch relay, said relay circuit arrangement including signalling means adapted to be actuated when said set of contact members is operated in accordance with coded designations other than those allotted to any of said release mechanisms.

7. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of actuated release mechanisms, one for releasing each type of article to be dispensed; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto and a further contact member operable for the release of said selection device; and a relay circuit arrangement electrically connected with an operable by said selection device to operate a selected release mechanism, said relay circuit arrangement including a time delay circuit adapted for actuation when said set of contact members is operated in accordance with coded designations other than those allotted to any said release mechanism, signalling means electrically connected with and operated by said time delay circuit, and releasing means electrically connected with and operable by said further contact member for the release of said selection device, said time delay circuit and said signalling means.

8. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed; a switch relay associated with each of said release mechanisms and electrically connected therewith; a selection device including a set of contact members for selectively preparing a circuit for any of said switch relays in accordance with the code allotted thereto; and a relay circuit arrangement electrically connected with and operable by said selection device to operate a selected switch relay, said relay circuit arrangement including time delay means adapted for actuation when said set of contact members is operated in accordance with the coded designation of an article whose corresponding switch relay is disconnected from said selection device, and releasing means electrically connected with said selection device and said time delay means and operated by said time delay means for the release of said selection device.

9. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto; and a relay circuit arrangement electrically connected with and operable by said selection device to operate a selected release mechanism, said relay circuit arrangement including timing means, releasing means and order checking means, said timing means being adapted for actuation upon failure in the operation of one of said contacting devices following actuation of said set of contact members to operate after a predeter-

mined time said order checking means and said releasing means for the release of said selection device.

10. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms and a further contact member operable after completion of an order; and a relay circuit arrangement electrically connected with and operable by said selection device to actuate a selected release mechanism, said relay circuit arrangement including first relay means operable at the start of the selection of an order by said set of contact members; a locking circuit for said first relay means actuated during the further selection of said order; second relay means electrically connected with said further contact member and operable thereby at the completion of said order to interrupt said locking circuit and release said first relay means; indicating means adapted for actuation a predetermined time after failure in the discharge of a selected article, and a locking circuit for said indicating means electrically connected with said first relay means to retain said indicating means in the operated state during selection of an order and to release said indicating means at the completion of said order.

11. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed; a switch relay associated with each of said release mechanisms for the operation thereof; a quantity keyset for keying up the quantity of an article to be dispensed and a quantity counting unit settable thereby; a selection device including a keyset for selectively preparing a circuit for any of said switch relays; and a relay circuit arrangement electrically connected with and operable by said selection device and said quantity counting unit and including quantity relays for actuating a selected switch relay under control of said counting unit for locking said selected switch relay and for releasing said selection device for operation in accordance with the coded designation of an article of another character while the last article of the prior selection is being discharged.

12. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed, and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto; and a relay circuit arrangement electrically connected with and operable by said selection device to actuate a selected release mechanism, said relay circuit arrangement including switching means adapted for actuation upon failure in the operation of one of said contacting devices following actuation of said set of contact members, and an order checking arrangement including indicating means electrically connected with and operated by said switching means to indicate said failure in accordance with the se-

quence of said failure in the selection of one order.

13. In a system for dispensing articles of varied character according to coded designations thereof, a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a selection device including a set of contact members for selectively preparing a circuit for any of said release mechanisms in accordance with the code allotted thereto; and a relay circuit arrangement electrically connected with and operable by said selection device to actuate a selected release mechanism, said relay circuit arrangement including first switching means operable at the start and at the completion of an order; further switching means adapted for actuation upon failure in the operation of any one of said contacting devices following actuation of said set of contact members; and an order checking arrangement electrically connected with and operated by said first and said further switching means and comprising: a rotary switch; stepping means electrically connected with said selection device to advance said switch step by step at each operation of said set of contact members in accordance with a code; a relay electrically connected with each contact of said switch, and operable by said further switching means; a locking circuit for each of said relays controlled by said first switching means; and indicating means electrically connected with each of said relays and operable thereby upon failure in the operation of said contacting device, said first switching means releasing said relays and said associated indicating means at the completion of an order; said first switching means being electrically connected with said stepping means and adapted to return said rotary switch to its initial position.

14. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of electrically actuated release mechanisms, one for releasing each type of article to be dispensed and a contacting device associated with each release mechanism and momentarily actuated by the discharge of each article by said release mechanism; a switch relay associated with each of said release mechanisms and electrically connected therewith for the operation of said release mechanism; a quantity keyset for keying up the quantity of an article to be dispensed and a quantity counting unit settable thereby; a selection device including a keyset for selectively preparing a circuit for any of said switch relays; and a relay circuit arrangement electrically connected with and operable by said selection device and said quantity counting unit and including quantity relays for actuating a selected switch relay under control of said counting unit, and an order checking arrangement including a stepping mechanism stepped up step by step by the operation of said contacting device and means connected with and operated by said quantity relays to step the stepping mechanism up only one step for the successive operation of the same contacting device under the control of said quantity counting unit.

15. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of releasing devices, one for releasing each type of article to be dispensed; a

selection device adapted to select any one of said releasing devices; a pricing unit; a switch relay associated with each of said releasing devices and electrically connected therewith and with said pricing unit and operable under control of said selection device to release a selected article by its associated releasing device and to indicate the price of said article in said pricing unit; and a relay circuit arrangement connected with and operable by said selection device to further control said switch relays and including switching means electrically connected with and operable by said pricing unit, said switching means being included in the energizing circuit of said switch relays to interrupt said circuit at busy periods of said pricing unit.

16. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of releasing devices, one for releasing each type of article to be dispensed; a selection device adapted to select any of said releasing devices; a pricing unit; a price checking key associated with said selection device; a switch relay associated with each of said releasing devices and electrically connected therewith and with said pricing unit and operable under control of said selection device to release a selected article by its associated releasing device and to indicate the price of said article in said pricing unit and a relay circuit arrangement connected with said switch relay and with said selection device and operable thereby, including price checking relay means electrically connected with and operable by said price checking key to interrupt the operating circuits of said releasing devices and contact means interposed in the electrical circuit of said price checking relay means to disconnect said price checking relay means from said price checking key at the selection of an order and to connect said price checking relay means again at the completion of an order.

17. In a system for dispensing articles of varied character according to coded designations thereof: a plurality of releasing devices, one for releasing each type of article to be dispensed; a selection device for selecting a wanted type of article and electrical connections therefrom to said releasing devices; a quantity counting unit settable in accordance with the quantity required of said wanted type of article; a pricing unit to indicate the price of each article released by said releasing devices; a totalling unit to add up the prices of released articles belonging to one order; and a relay circuit arrangement including relay switching means and electrical connections therefrom to said selection device, said releasing devices, said quantity counting unit, said pricing unit and said totalling unit to operate a selected releasing device for the release of articles in accordance with the quantity controlled by said quantity counting unit, and to operate said pricing unit and said totalling unit in accordance with the price of each released article and the added-up prices of released articles of one order respectively, and manually operable contact members and electrical connections therefrom to said quantity counting unit, said pricing unit and said totalling unit respectively to disable independently said quantity counting unit and said totalling unit and to disable jointly said pricing unit and said totalling unit.

PETER LINCOLN LAW.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,813,887	Adams	Aug. 4, 1931
1,981,783	Bussey	Nov. 20, 1934
2,276,293	Farmer	Mar. 17, 1942
2,276,294	Farmer	Mar. 17, 1942
2,353,002	Armbruster	July 4, 1944
2,374,537	Goldsmith	Apr. 24, 1945