# United States Patent

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[54] **SYSTEM AND APPARATUS FOR THE ADMINISTRATION OF DRUGS**
**14 Claims, 10 Drawing Figs.**


[52] **U.S. Cl.** ..... **206/65 R,** 116/121, 206/1.5, 206/65 K, 206/72, 220/21, 220/97 R, 312/111
[51] **Int. Cl.** ..... **B65d 71/00,** B65d 1/34
[50] **Field of Search** ..... 116/121; 206/1.5, 17.5, 63.2 R, 65 R, 65 K, 72; 220/21, 97 R; 312/111



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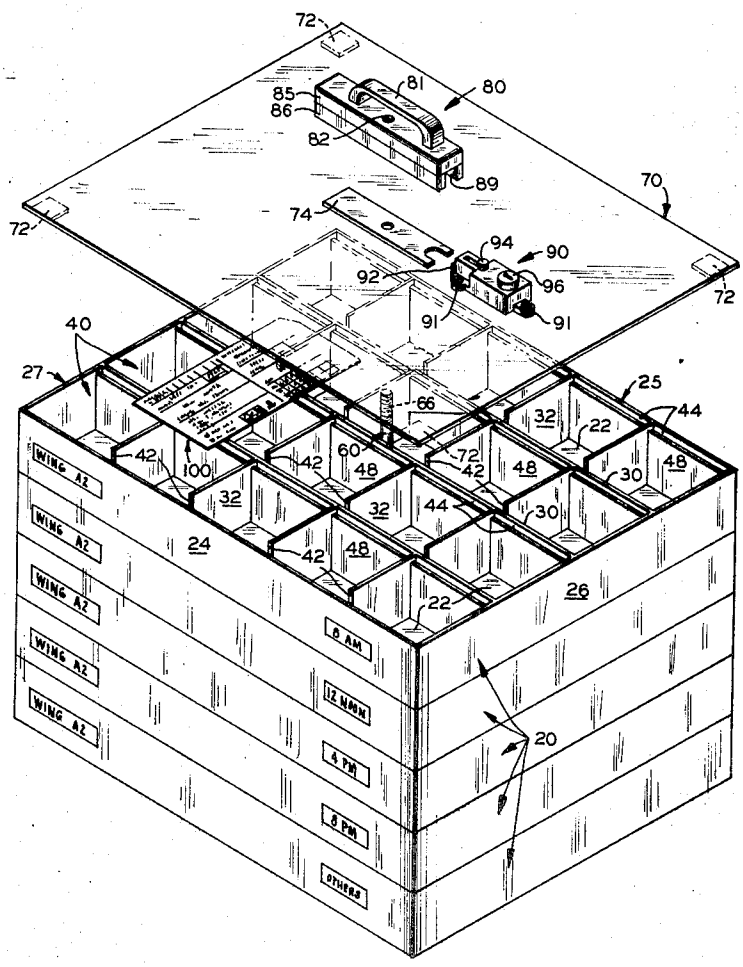
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**ABSTRACT:** Special drug-carrying trays and associated equipment for pharmacists and nurses for the administration of drugs to a plurality of patients, such as in hospitals or nursing homes, comprising the separate packaging, sealing, and labeling of each drug dose for each patient and arranging these individually packaged drugs in compartments in such trays. These compartments correspond to each room or bed and are labeled to correspond to each patient and each dose to be administered with separate trays being used for different dose times. These trays have specifically designed compartments for retaining the labels and drugs during transport, and for nesting and locking stacks of them together for transport between the pharmacy and the nursing facility. Thus the pharmacist prepares the trays and delivers one or more stacks of them to one or more nursing facilities all ready for the nurses to check and administer directly to their patients. This system also includes a form, slip, or card for checking the drugs, which form may be adapted for direct computerized billing.

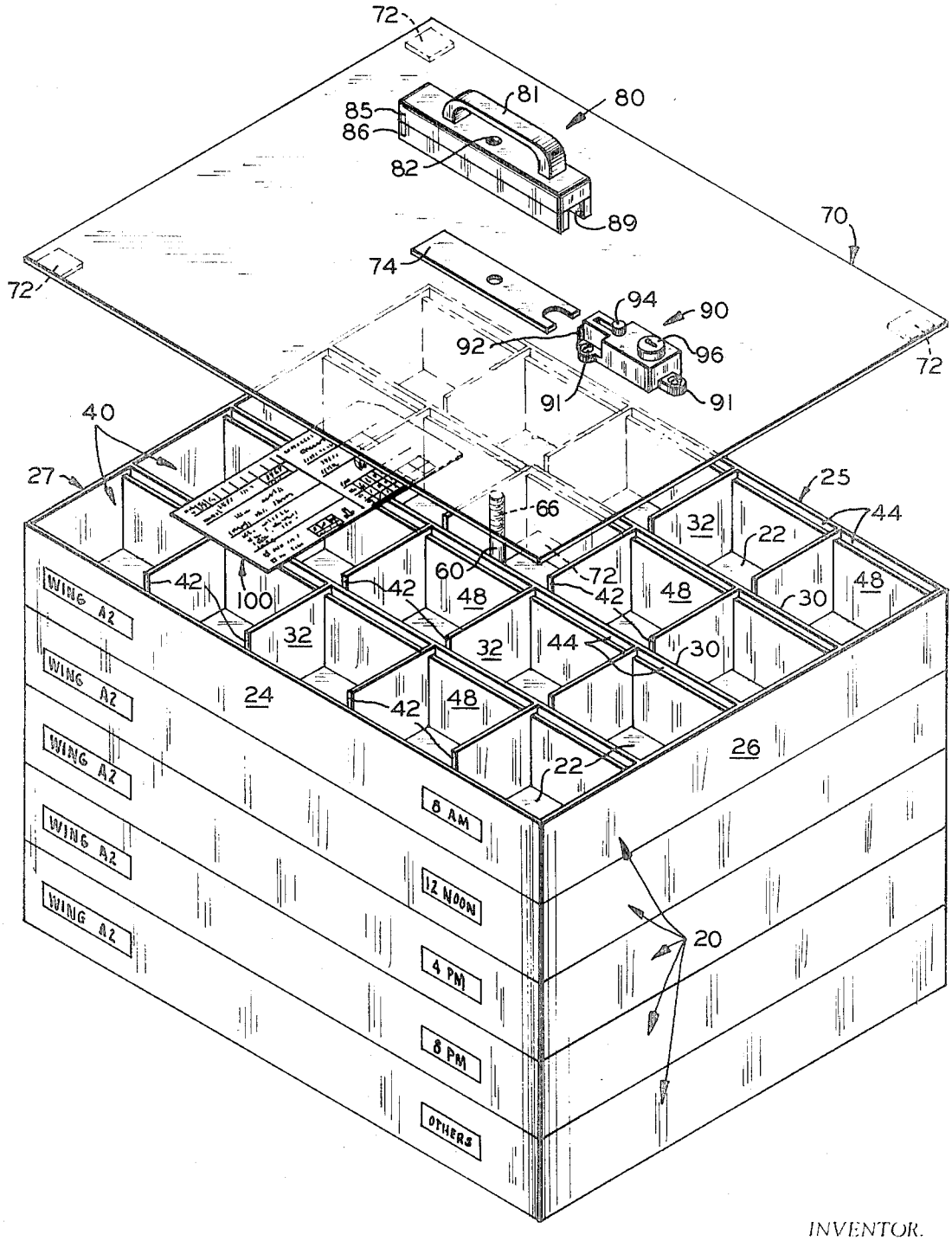



FIG. 1

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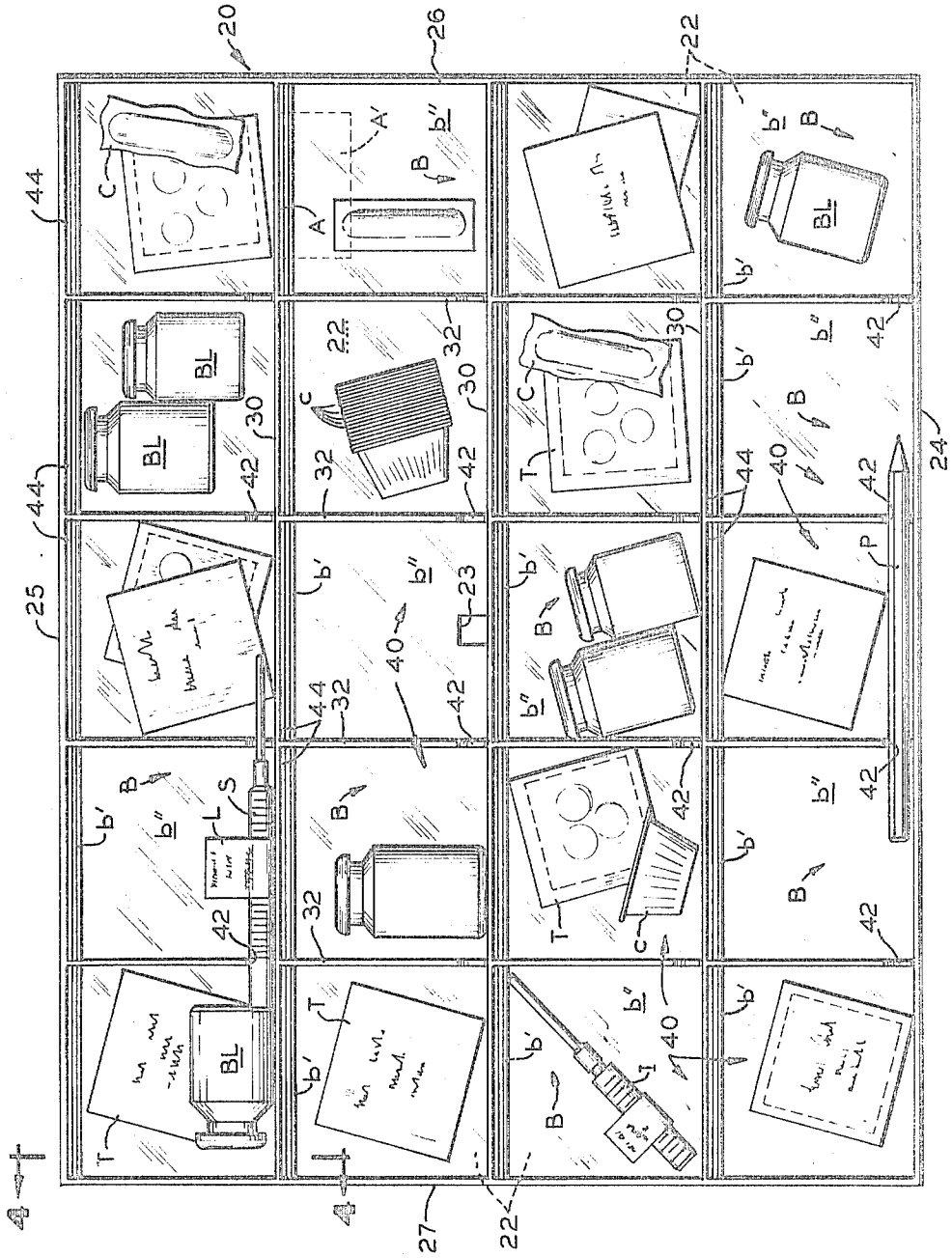



FIG. 2

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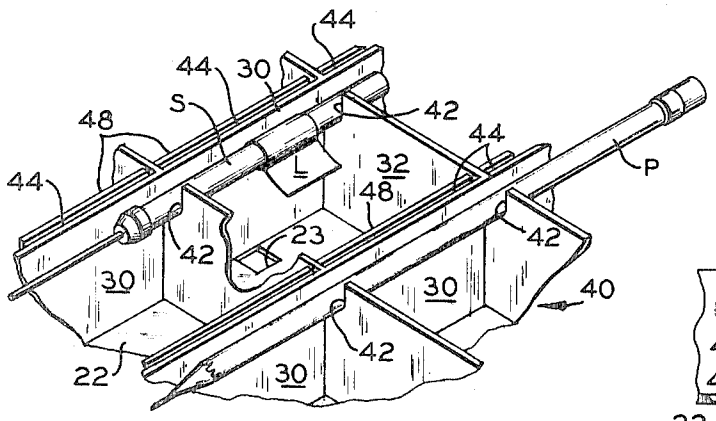



FIG. 3

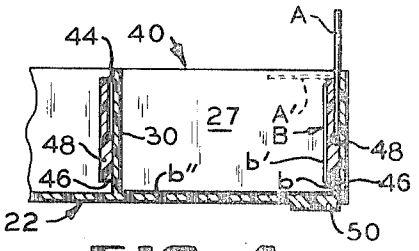



FIG. 4

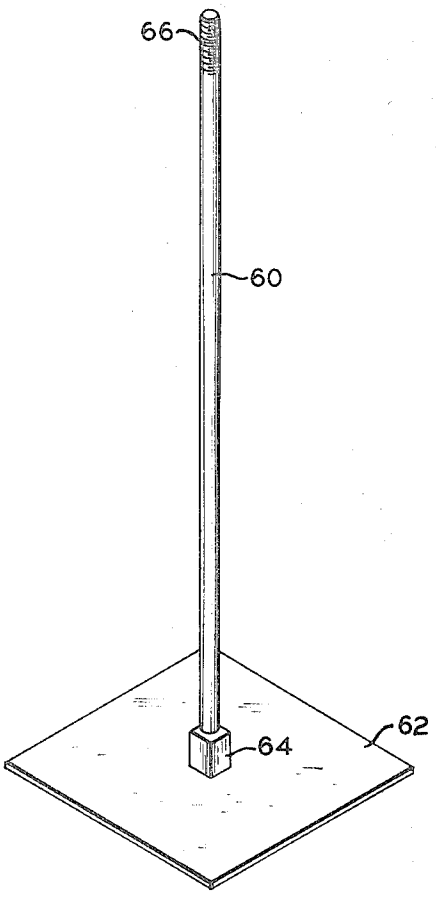



FIG. 8

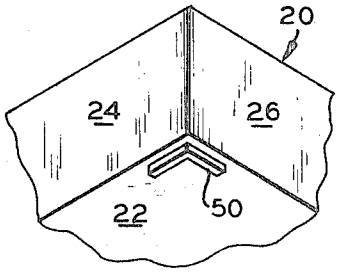



FIG. 5

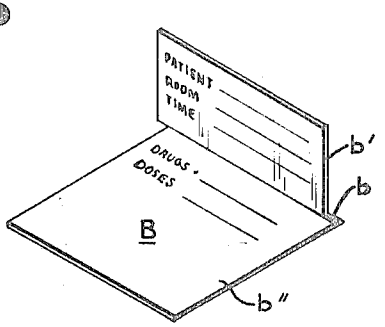



FIG. 6

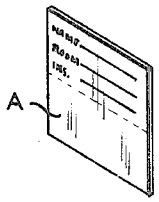



FIG. 7

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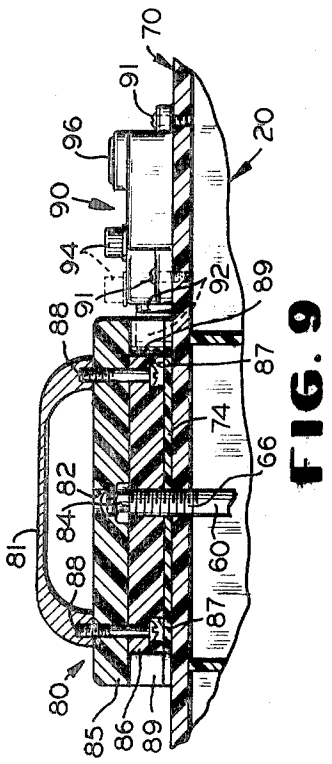



FIG. 9

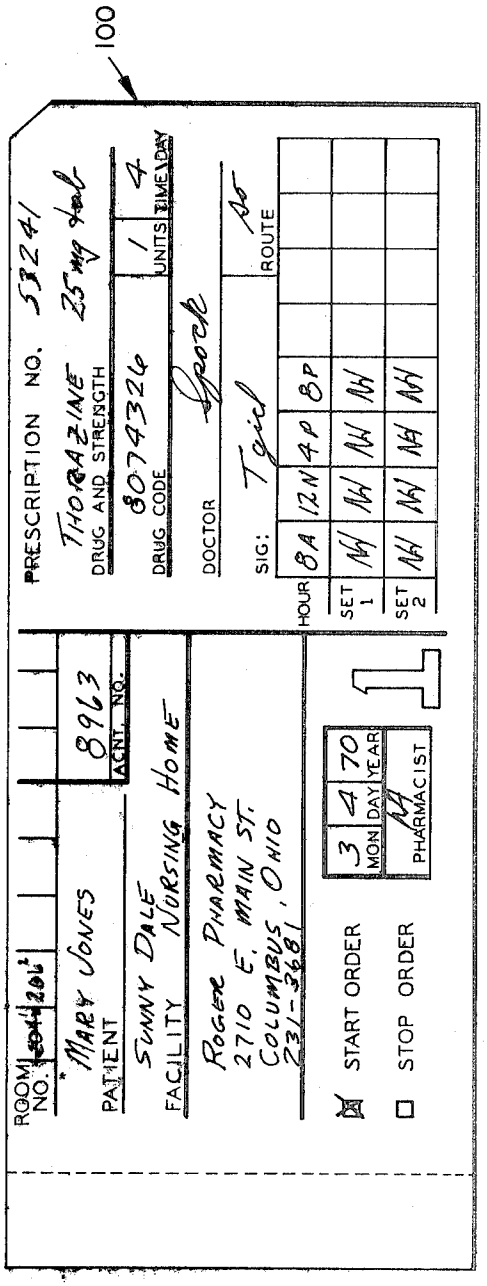



FIG. 10

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# SYSTEM AND APPARATUS FOR THE ADMINISTRATION OF DRUGS

## BACKGROUND OF THE INVENTION

Previously drugs for a plurality of patients such as in a hospital or nursing home usually have been prepared from bulk containers at the nursing facility, placed in individual open paper cups resting on identifying cards on a flat tray. Previous improvements in this system include the use of open trays with pluralities of cavities with means for inserting labels at each cavity, and to individually package at least some of the drugs.

All of these prior systems have disadvantages of being quite time consuming and involving a high possibility of error (sometimes as high as 20 percent). These errors occur due to human errors, poor checking procedures, possibility of doses and/or labels moving from one compartment of the tray to another during transport of the tray, etc.

## SUMMARY OF THE INVENTION

The system of the present invention comprises means or facilities at a pharmacy for separately packaging and labeling and/or storing pluralities of different doses of the same and different drugs, in the forms of tablets, capsules, liquids, injectables, suppositories, ophthalmics, powders, etc. into individually sealed containers, such as plastic heat or zip-lip sealable envelopes or bags, ampuls bottles, syringes, and the like. The individual packages for the drugs are usually transparent so as to give an additional appearance check of the kind of drug that is being administered, such as its color code, shape, consistency, and the like. Since the same drug is often administered at several different hours and for several days in the same amounts to the same patient, a plurality of packages of each of these drugs are prepared and stored in properly labeled drawers or containers at the pharmacy. Of course many of the drugs may be purchased already individually prepackaged and labeled with the dosage therein, but if not, machines may be used by the pharmacist in making up these individual packages and properly labeling each with the name of the drug and the dosage in the package.

Since this system is adapted primarily for the administration of a plurality of different drugs to a plurality of patients at one or more remote locations, such as in a number of beds in one or more sections or wards in a hospital or a nursing home, the pharmacist receives the orders for each of these patients and makes out a patient profile record sheet, card, or form for each drug for each patient. These records include all the identifying information for the patient and drug including its cost, and separate copies of this record may be used by the pharmacist, by the nursing facility, and/or by a computer for billing purposes. Since patients in a nursing home or hospital pay their bills in several different ways, in that some may be on Medicare, some on Welfare, some covered by insurance, and some pay directly, each payment method usually requires a different method of billing. The drug profile record, however, is adapted for use with all billing systems and may be used for direct billing or in conjunction with computerized billing.

Other apparatus employed in this system than the drugs, their packages, and their information records or forms, includes a plurality of trays which may be nested together, each of which trays has compartments with full equal height walls, and means for stacking the trays together. A lid for the top tray includes means for clamping all of the trays together once they are stacked, and for locking them together so that the drugs placed in any of the compartments cannot easily be changed nor moved from one compartment to another in the transport of the stack from the pharmacy to the nursing facility. Thus only the pharmacist and the nursing facility have means such as keys for unlocking the stacks. Each compartment in these trays is provided with aligned notches in its opposite sidewalls for receiving individual syringes, and with pockets for labels for flagging special treatment instructions, or to hold medication cards used by nurses to check the drug



or drugs placed in the compartment by the pharmacist. Such a medication card can be the nurses up-to-date reference of medication changes. These pockets also are designed to have means for snapping in the labels identifying each patient and his drugs, so these latter labels cannot be easily removed. Separate trays are prepared and labeled for each different time during the day when drugs are to be administered to all of patients such as eight o'clock in the morning, noon, four o'clock in the afternoon, and eight o'clock in the evening, together with possibly another tray for other hours for special circumstances. Each compartment in the tray corresponds to a bed, room, or patient in the hospital or home, or ward or wing thereof, and different stacks are provided for the different sections or wards as required.

From the drug prescriptions which may be telephoned to the pharmacist, the patient profile record sheets and labels are made out with this information. The pharmacist then places in the corresponding compartments in the trays, the proper labels and drugs. Different colored labels may be used for different hours of administration, and compartments which do not correspond to patients in certain beds or rooms may have blank labels placed therein as a further check that no patient was forgotten. After the trays are labeled and filled for a given period, such as a day, they are stacked, locked and delivered to the nursing facility, where they are unlocked and may be checked by a nurse both before and at the side of the patient when being administered, since these trays are carried directly by the nurses on their rounds to the patients. When the trays are empty they are restacked and returned to the pharmacist when the next trays are delivered for the following period or day. In the event a change in dosage or cancellation of a dosage is required, all that has to be done is to telephone the pharmacist, and the proper record or form card will be made out by the pharmacist and the label in the compartment in the tray for that patient will be so marked.

Thus the systems and apparatus of this invention is adapted for use of all dosage forms and is accurate, flexible, economic, time and space saving, and easy to set up, operate, check, recheck, change, administer, and bill.

BRIEF DESCRIPTION OF THE VIEWS: —PP The above-mentioned and other features, objects, and advantages, and the manner of attaining them are described more specifically below by reference to an embodiment of this invention showing in the accompanying drawings, wherein:

FIG. 1 discloses a perspective view of a stack of trays according to this invention, with its transparent cover and locking handle therefor spaced above the top of the stack;

FIG. 2 is an enlarged plan view of one of the trays from the stack in FIG. 1, showing the different doses and labels located in its different compartments;

FIG. 3 is a perspective view showing the central compartment of the tray shown in FIGS. 1 or 2, through which the clamping rod for holding the trays together projects, and showing the use of the notches in the opposite sidewalls for holding a syringe and/or a pencil;

FIG. 4 is a vertical section taken along line 4—4 of FIG. 2 through one of the corner compartments of a tray, showing a signal label or nurses medication card A in the pocket at its rear edge, and how the identification label B is snapped in and held under the overhanging bottom of the pocket;

FIG. 5 is a perspective underside view of one of the corners of the tray in FIGS. 1, 2 or 4, showing a foot for the nesting of the trays one upon another;

FIG. 6 is a perspective view of one of the identification labels B which is snapped into the bottom of each compartment;

FIG. 7 is a perspective view of a signal label or nurses medication card or tag which is placed in the pocket at the back of each compartment shown in FIGS. 1, 2 or 4;

FIG. 8 is a perspective view of the post or pedestal upon which a stack of trays are placed for enabling them to be clamped and locked together;

FIG. 9 is an enlarged longitudinal sectional view of the central portion of the cover or lid for the stack of trays shown in FIG. 1, showing the handle latch mechanism for clamping, carrying and locking a stack of trays together; and

FIG. 10 is a view of one sheet of one embodiment of a multisheet order form which may be filled out by the pharmacist for each drug for each patient in carrying out a computerized billing system according to this invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENT:

Before describing the steps of the system of this invention the details of the apparatus involved in this system will first be described, one of the most important pieces of which is the stack of nestable trays and the means for locking them together as disclosed in perspective in FIG. 1.

### I The Trays

Referring specifically to these trays shown in FIGS. 1 through 5, each tray 20 comprises a rectangular full bottom 22, frontside and backside 24 and 25, and right and left ends or sides 26 and 27, all of which sides 24 through 27 are at right angles to the rectangular edges of the bottom 22, of the same height, and preferably formed integral therewith, such as of a white easily cleanable lightweight, plastic. Between the frontside and backside 24 and 25 are a plurality of parallel integral partitions 30 parallel to the sides 24 and 25 and equally spaced from each other and said sides, and perpendicular thereto and parallel to the end sides 26 and 27 are another plurality of equally spaced partitions 32. All of these partitions are of the same height as the sides 24 through 27. Thus a tray is formed which, when covered by another tray or a cover plate 70, substantially completely closes each of the compartments 40 therein formed by these partitions 30, 32 and sides 24, 25, 26, 27.

In each of the partitions 32 there is provided, preferably adjacent the front wall of each compartment 40, a notch 42 which is preferably adjacent the front wall 24 and the back of each of the partitions 30, which notches 42 are aligned on opposite sides of each compartment so as to provide means for holding a pencil P or a syringe S as shown in FIGS. 2 and 3. This syringe S contains a flag-shaped label L fastened thereon by the pharmacist which prevents the syringe S from sliding longitudinally or axially too far through its holding notches 42 and out of the compartment in which it is placed, in that the edges of the label L will abut against the side partitions 32.

Also each compartment 40 is provided with a back card pocket 44 attached to its back wall (see specifically FIGS. 1, 2 and 4). This pocket 44 has a front wall 48 parallel to its backwall formed by the partition 30 or sidewall 25. The bottom 46 of this pocket 44 (see FIG. 4) is spaced above the top of the bottom 22 of the tray. This pocket 44 may be used for a special signal or nurse medication check label, tag, or card A as shown in FIGS. 2, 4, and 7 which may be of an attractive color, such as red, to signal the nurse administering the drugs to that patient to check the drugs and/or only to administer the drugs under certain conditions, such as after checking the blood pressure or temperature of the patient. These tags or cards A may be bent over as shown in dotted lines A' in FIGS. 2 and 4 when the trays 20 are stacked. The inner top edge of the pocket 44 is slightly below the top edge of its adjacent tray partition 30 so that the label A may be bent over into its position A' without obstructing this stacking.

Referring specifically to FIGS. 4 and 6, the label B which is snapped into each compartment, has a double bend portion *b* which snaps under the space below the bottom 46 of the pocket 44, so this label B cannot easily be shaken out or removed from its compartment. This label contains on its vertical upright portion *b'* the name of the patient, his bed or room number, and the time the drugs are to be administered. The bottom or base portion b''of this label B shown in FIG. 6 is printed with the name of each drug and its amount or dose that is to be administered to that patient at that time. Thus each of the compartments 40 are semipermanently labeled for each patient with his drugs and the time it is to be given, so it may be rechecked by the nurse at the time each drug is administered. Also these labels B for all the drugs delivered at one particular time may have a corresponding color, which is different from the color of the labels B for drugs to be administered at other times.

### II The Stacking Means

At the outside bottom corner of each tray 20 there may be provided a foot 50 (see FIGS. 4 and 5) which fits into the outer upper corners of the compartments 40 of the tray below it, to permit even and interlocked stacking of the trays 20 as shown in FIG. 1. These feet have outward rectangular angles inset the thickness of the sides 24, 26 and 25, 27 so as to fit closely into the upper outer corners of the corner compartments 40 and accurately align the trays 20 in the stack.

In the bottom 22 of each of the trays 20 adjacent the center of the center partition wall 30, there is a noncircular or square hole 23 (see FIGS. 2 and 3), through which the rod 60 (see FIGS. 1 and 8) can project. This rod 60 is attached or welded to a baseplate or pedestal 62 via a noncircular or square portion 64 which fits into the square hole 23 of the bottom tray 20 of the stack. The length of the rod 60 may vary depending upon the number of trays to be stacked, which number is usually between four and ten trays. The upper end 66 or the rod 60 is threaded and projects slightly above the top edge of the top tray as shown in FIG. 9, so as to project through and above the cover 70 into the wingnut-acting locking handle 80.

The cover or lid 70 for the top tray of the stack may be of a translucent or transparent plastic material, and is provided with feet 72 (see FIG. 1) at its corners, corresponding to the feet 50 at the bottom corners of the trays 20, for nesting the cover 70 in place. At the center of this cover 70 there is provided a raised portion 74 (see FIGS. 1 and 9) on which the locking handle 80 seats and which prevents scratching of the cover 70 when the handle 80 is rotated to screw it on to the top end of the rod 60.

Referring more specifically to FIGS. 1 and 9, the handle 80 acts also as a wingnut for the top end 66 of the rod 60 for clamping the stack of trays 20 and their cover 70 together. Thus the handle 80 has an aperture 82 in its center, which may be threaded or may contain an embedded nut 84. This nut 84 may be inserted and held between two pieces 85 and 86 of the base portion of the handle 80, which pieces may be of plastic and are held or clamped together by screws 88 which screw into the ends of the bail portion 81 of the handle 80. These screws 88 may be countersunk into apertures 87 in the lower piece 86, which lower piece 86 also may be provided at each of its ends with notches 89 for the latch 92 of the locking device 90.

This locking device 90 is attached to the cover 70 adjacent one end of the handle 80 by means of screws 91. Thus after the handle 80 has been rotated to snug the cover 70 onto the top tray and has one of its ends aligned with the latch 92, the latch 92 may be manually slid by knob 94 into its dotted line locking position shown in FIG. 9. The locking device 90 may have a key lock 96 to lock the latch in its handle locking position, to which lock access may be had only by the pharmacist and a registered nurse at the nursing facility. Thus once the handle 80 is latched and locked, the stack of trays 20 cannot be separated, since neither the handle 80 nor the rod 60 through its base 62 can be turned, because its square portion 64 is locked into the square hole 23 of the bottom tray 20.

### III The System

According to the system of this invention, the prescriptions are first received by the pharmacist, which may be by telephone or slip from the doctor in charge of the patient, and from this prescription a patient profile record sheet is made out, which sheet is the pharmacist's master record of the patient's medications.

If a computerized billing system is used, one of the forms **100** shown in FIG. **10** may be made out for each drug for each patient. This form **100** preferably is a multicopy form and may be of a size and shape for computerization, such as for direct billing. On this form **100** are provided spaces for the patient's name, room or bed number, his account number, the name of the nursing facility, the name and address of the pharmacy and its registration number, directions indicating the starting or cancelling of this drug order, the date, the administering times and spaces for the initials of the checking pharmacist, the prescription number, the name of the drug and its dose, and a billing code number for the drug. This code number may be made up by the pharmacist of several digits, the first two of which may indicate the number of days for which the drug is to be administered, the second the number of times per day, the fourth and fifth the price per dose in cents, and the last two of which may be reference numbers to prevent duplications in case another drug may have the same price and administering times to prevent the computing machine from rejecting this number as a duplicate. The separate copies of this form **100** are for the pharmacist's file, the nursing facility, and for computer billing. The copy for the nursing facility may be sent with the stack of trays to the nursing facility under the cover **70** when that drug is initiated or stopped for check purposes to the nursing facility.

The pharmacist after making out the patient profile record sheets, and/or the forms **100**, then has to obtain or prepare the drugs in separate or unit dose packages and make out the labels B, and also the labels A, if required. Pluralities of these separate drug packages for all of the patients serviced are arranged in boxes or containers in alphabetical order so that adequate supply thereof will be had for at least the number of times that each drug is to be administered to all of the patients who are to take it. Each separate package is labeled with the name of the drug and its dose or amount so that no error will occur therein.

Next the pharmacist lays out the trays **20** for the next period's or day's administerings, one tray for each different administering hour for all the patients in one section or nursing facility, and labels the outside of each tray **20** with this information such as with replaceable adhesive labels as shown in FIG. **1**. Then each tray **20** is filled as shown in FIG. **2**, by placing first therein all of the labels or slips B, shown in FIG. **6** in the bottoms of each compartment **40**, which labels B correspond to each particular bed or room in that section or facility, and if a patient is in that location, putting a properly filled out and colored label B therein. Then these labels B are checked by the pharmacist and/or may be initialed as checked on the spaces provided on the form **100** mentioned above.

Next the compartments are filled with the drugs according to what is on these labels B therein, such as with separate packages of tablets T, capsules C, bottles of liquids BL, injectables I, and even extra paper cups *c* for the patient to use if he wishes not to touch the drug or to take more than one dose of a tablet or pill at one time. The filled trays **20** are then stacked together on the rod **60**, clamped and locked together by the handle **80** and locking device **90**, and sent to the nursing facility and the former period's or day's stack of empty trays are collected for refilling.

For each new drug or change in a drug, a new form **100** may be made out and a copy thereof sent with the stack as shown in FIG. **1** on the top tray **20**. Thus the transparent cover **70** enables these order changes to be easily seen and checked at the nursing facility. Since the nursing facility has copies of all the forms **100**, it can recheck and immediately correct any errors before any drugs are taken to the patients. In fact there are several ways to operate this system, depending upon the extent the pharmacy or nursing home wishes to utilize or not utilize special forms, computers, existing record systems, individual preferences, state laws, etc. Thus application of the system of this invention is each facility requires consideration of all of these variables.

While there is described above the principles of this invention in connection with specific apparatus and a system for using this apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of this invention.

I claim:

**1.** Apparatus for the preparation and administration of a plurality of individual doses of drugs to a plurality of patients, comprising:

A. a plurality of identical trays for different times during a predetermined period, each tray having a plurality of compartments with at least one compartment for each patient for his dose at a given time, each compartment comprising:

1. four sidewalls at right angles to each other and a bottom,
2. a longitudinal pocket in one wall for a signal identification card, said pocket having a bottom spaced from and overhanging the bottom of said compartment, and
3. a patient and dose identification card covering said bottom and having a folded portion extending under said bottom of said pocket for holding said card in place,

B. means for nesting said trays when stacked one on top of the other,

C. means for covering the top tray of said stack, and

D. means for fastening said trays and covering means together.

**2.** An apparatus according to claim **1** wherein said trays are rectangular and said compartments in said trays are all substantially of the same size.

**3.** An apparatus according to claim **1** wherein the opposite sidewalls of each compartment are provided with notches for receiving syringes.

**4.** An apparatus according to claim **1** wherein said nesting means comprises feet on the bottom corners of each of said trays and of said covering means.

**5.** An apparatus according to claim **1** wherein said means for fastening said trays together comprises a rod means extending through all of said trays.

**6.** An apparatus according to claim **5** wherein each tray has a noncircularly shaped aperture in the bottom of a center compartment and a correspondingly shaped means on one end of said rod means to prevent its rotation, and a wingnut means for screwing onto the other end of said rod means.

**7.** An apparatus according to claim **1** including handle means for said stack attached to said fastening means.

**8.** An apparatus according to claim **7** including means for said covering means for engaging said handle means for locking said covering means and trays together.

**9.** An apparatus according to claim **8** wherein said locking means comprises a latching key mechanism mounted on said covering means adjacent said handle means.

**10.** A tray for use in the administration of drugs comprising:

A. a rectangular bottom,

B. four sides of equal height around the edges of said bottom,

C. a plurality of partitions between opposite pairs of sides of equal height to said sides and each other to form a plurality of rectangular compartments of substantially the same size, with the partitions between one pair of sides being notched in their upper edges between adjacent compartments, and

D. a pocket in each compartment on the partitions between the other pairs of sides, said pockets being spaced from said bottom to form an overhanging portion.

**11.** A tray according to claim **10** including feet at each corner of the bottom of said tray, which feet fit into the upper corners of the corner compartments of another tray below it.

**12.** A stack of trays for use in the administration of drugs wherein each tray comprises:

A. a rectangular bottom having a noncircular-shaped hole near its center,

B. four sides of equal height around the edges of said bottom,

C. a plurality of partitions between opposite pairs of sides of equal height to said sides and each other to form a plurality of rectangular compartments of substantially the same size, the partitions between one pair of sides having notches in their upper edges aligned between adjacent compartments,

D. a pocket in each compartment on the partitions between the other pair of edges and spaced from said bottom to form an overhanging portion,

E. feet at each corner of the bottom which fit into the corners of the corner compartments of another tray below it, and wherein said stack comprises:

1. a transparent rectangular cover for the top tray with a hole near its center, comprising

a. feet on each corner which fit into the corners of the corner compartments of said top tray,

b. a raised portion in its center with a hole therein aligned with said hole in said cover, and

c. a latch and lock mechanism attached to said cover adjacent said raised portion,

2. a pedestal and rod having a noncircular portion adjacent said pedestal for fitting into and extending through all said noncircular shaped holes in the bottom of said trays in said stack, and said rod having a threaded upper end which extends through said hole in said cover and slightly above said raised portion of said cover, and

3. a handle means having a threaded socket therein for receiving said threaded upper portion of said rod, which handle means clamps said cover and stack of trays together.

13. A stack of trays according to claim 12 wherein said handle means has a keeper portion, and said cover has a locking mechanism mounted thereon for engagement with said keeper portion.

14. A stack of trays according to claim 13 wherein said locking mechanism includes means for locking said locking mechanism into engagement with said keeper portion.

* * * * *