# United States Patent [19]

**Cohen**

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[54] **SLIDE RULE GUIDE TO INTRAVENOUS THERAPY**


[75] Inventor: **Melvin L. Cohen, Phoenix, Ariz.**

[73] Assignee: **St. Joseph's Hospital and Medical Center, Phoenix, Ariz.**



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[52] **U.S. Cl.** ..... **235/85,** 235/70 R, 235/89

[51] **Int. Cl.** ..... **G06c 3/00,** G06g 1/02

[58] **Field of Search** ..... 235/89, 85, 70 R



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*Primary Examiner*—Stephen J. Tomsky

*Attorney*—Eric P. Schellin and John A. Robertson

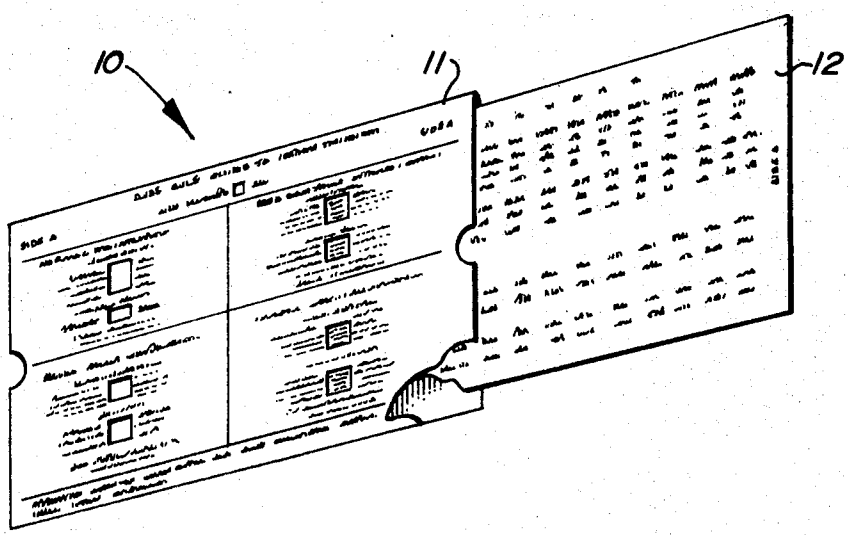


[57] **ABSTRACT**

This specification discloses a slide rule guide intended for use in intravenous therapy to aid a doctor or nurse in determining the character and quantities of materials to be injected into a patient's vein and the intervals between such injections as determined by the weight and condition of the patient. The guide consists essentially of an envelope providing two outer panels and a slide in said envelope presenting two effective faces. One of the panels is formed with a small opening with which is associated the designation "Body Weight", while one face of the insert displays a series of figures corresponding to weights of patients and any one of which may appear in said opening. The exposed face of each outer panel is divided into four rectangular sections. Each of these sections on one face is formed with an opening for body weight designation and the face of the slide, opposite to that mentioned above, carries four series of figures for weight designation, each of which cooperates with one of the openings in this panel.

Each section of each outer panel displays the heading for patient condition. Below this heading in each section are two windows in vertical alignment. Associated with one of these windows is a table for "Estimated 24 Hr. Therapy" and associated with the other window is a table for "Treatment Guide". Each face of the slide displays four groups of figures, each comprising a plurality of rows with the figures in the several rows in vertical alignment and any such vertically aligned figures may appear in the windows of a respective panel when the slide is moved relative to the envelope.


**7 Claims, 5 Drawing Figures**



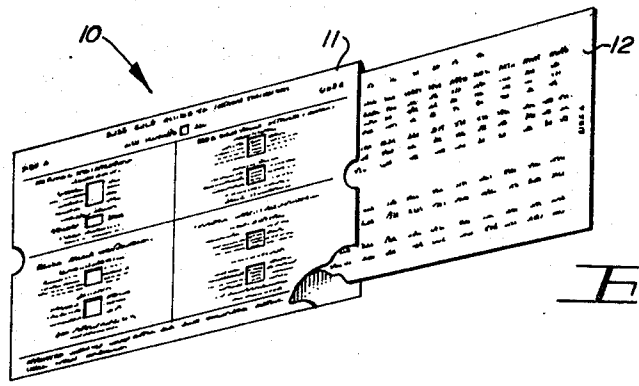



Fig-1

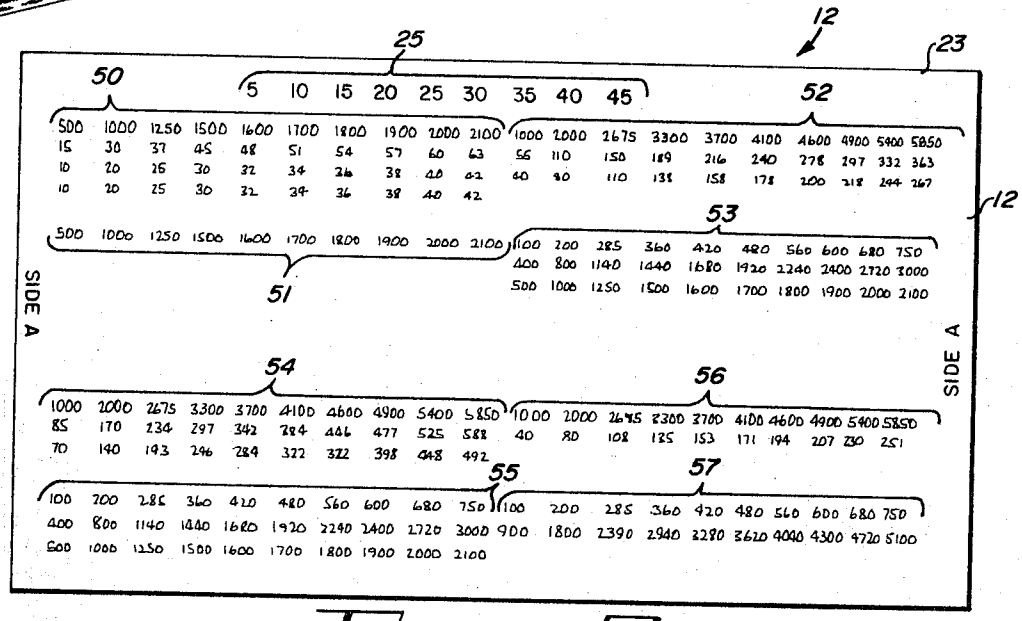



Fig-2

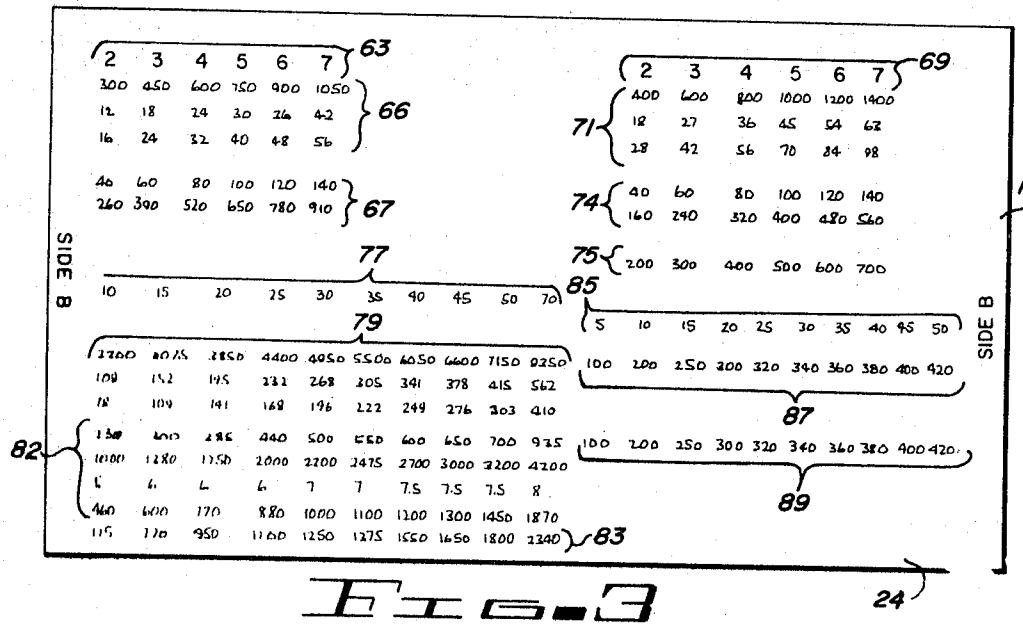



Fig-3

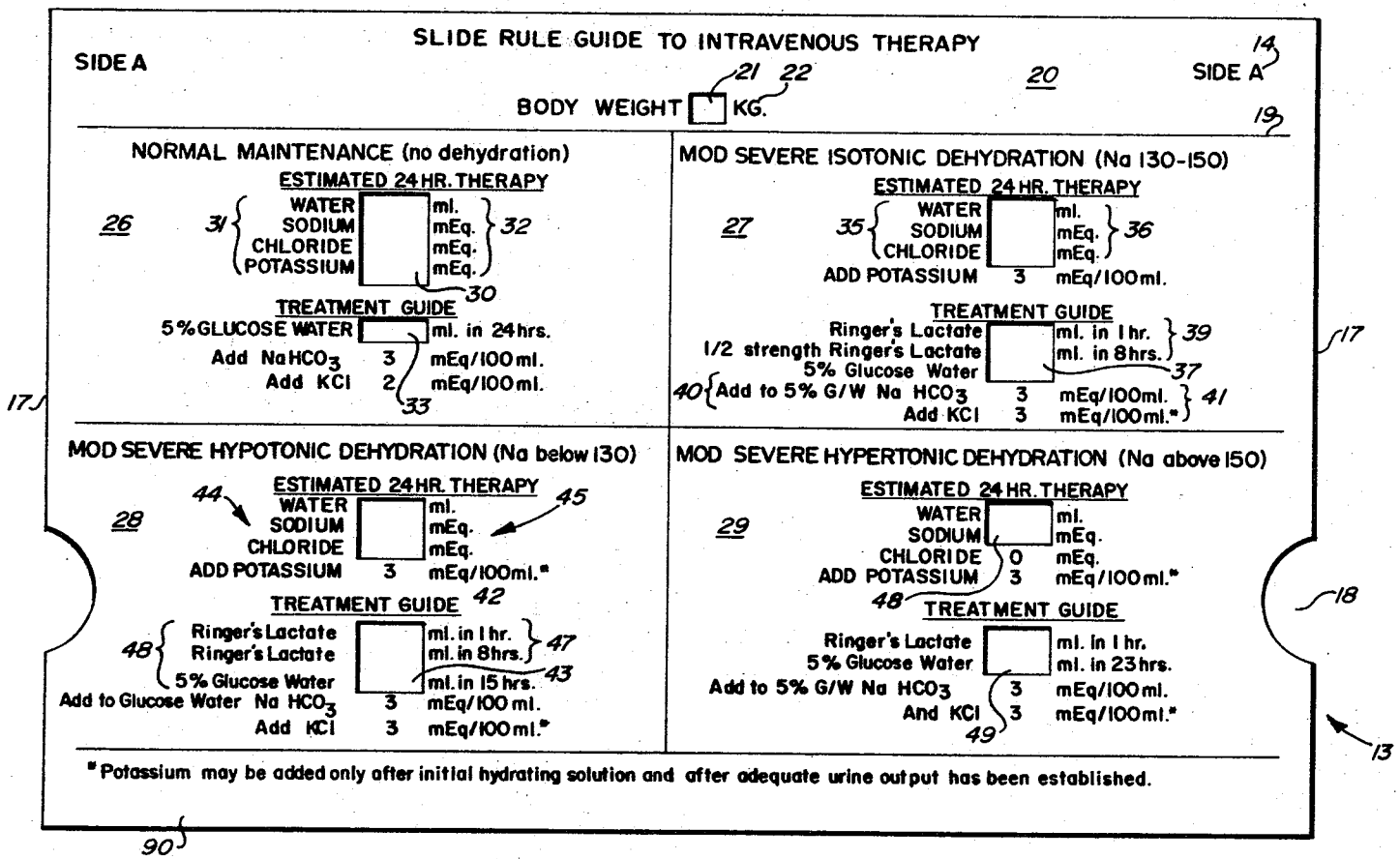

SLIDE RULE GUIDE TO INTRAVENOUS THERAPY
SIDE A
SIDE A
BODY WEIGHT KG.
NORMAL MAINTENANCE (no dehydration)
ESTIMATED 24 HR. THERAPY
WATER ml.
SODIUM mEq.
CHLORIDE mEq.
POTASSIUM mEq.
TREATMENT GUIDE
5% GLUCOSE WATER ml. in 24 hrs.
Add NaHCO3 3 mEq/100 ml.
Add KCl 2 mEq/100 ml.
MOD SEVERE ISOTONIC DEHYDRATION (Na 130-150)
ESTIMATED 24 HR. THERAPY
WATER ml.
SODIUM mEq.
CHLORIDE mEq.
ADD POTASSIUM 3 mEq/100 ml.
TREATMENT GUIDE
Ringer's Lactate ml. in 1 hr.
1/2 strength Ringer's Lactate ml. in 8 hrs.
5% Glucose Water
Add to 5% G/W Na HCO3 3 mEq/100 ml.
Add KCl 3 mEq/100 ml.*
MOD SEVERE HYPOTONIC DEHYDRATION (Na below 130)
ESTIMATED 24 HR. THERAPY
WATER ml.
SODIUM mEq.
CHLORIDE mEq.
ADD POTASSIUM 3 mEq/100 ml.*
TREATMENT GUIDE
Ringer's Lactate ml. in 1 hr.
Ringer's Lactate ml. in 8 hrs.
5% Glucose Water ml. in 15 hrs.
Add to Glucose Water Na HCO3 3 mEq/100 ml.
Add KCl 3 mEq/100 ml.*
MOD SEVERE HYPERTONIC DEHYDRATION (Na above 150)
ESTIMATED 24 HR. THERAPY
WATER ml.
SODIUM mEq.
CHLORIDE 0 mEq.
ADD POTASSIUM 3 mEq/100 ml.*
TREATMENT GUIDE
Ringer's Lactate ml. in 1 hr.
5% Glucose Water ml. in 23 hrs.
Add to 5% G/W Na HCO3 3 mEq/100 ml.
And KCl 3 mEq/100 ml.*
* Potassium may be added only after initial hydrating solution and after adequate urine output has been established.
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Fig. 4

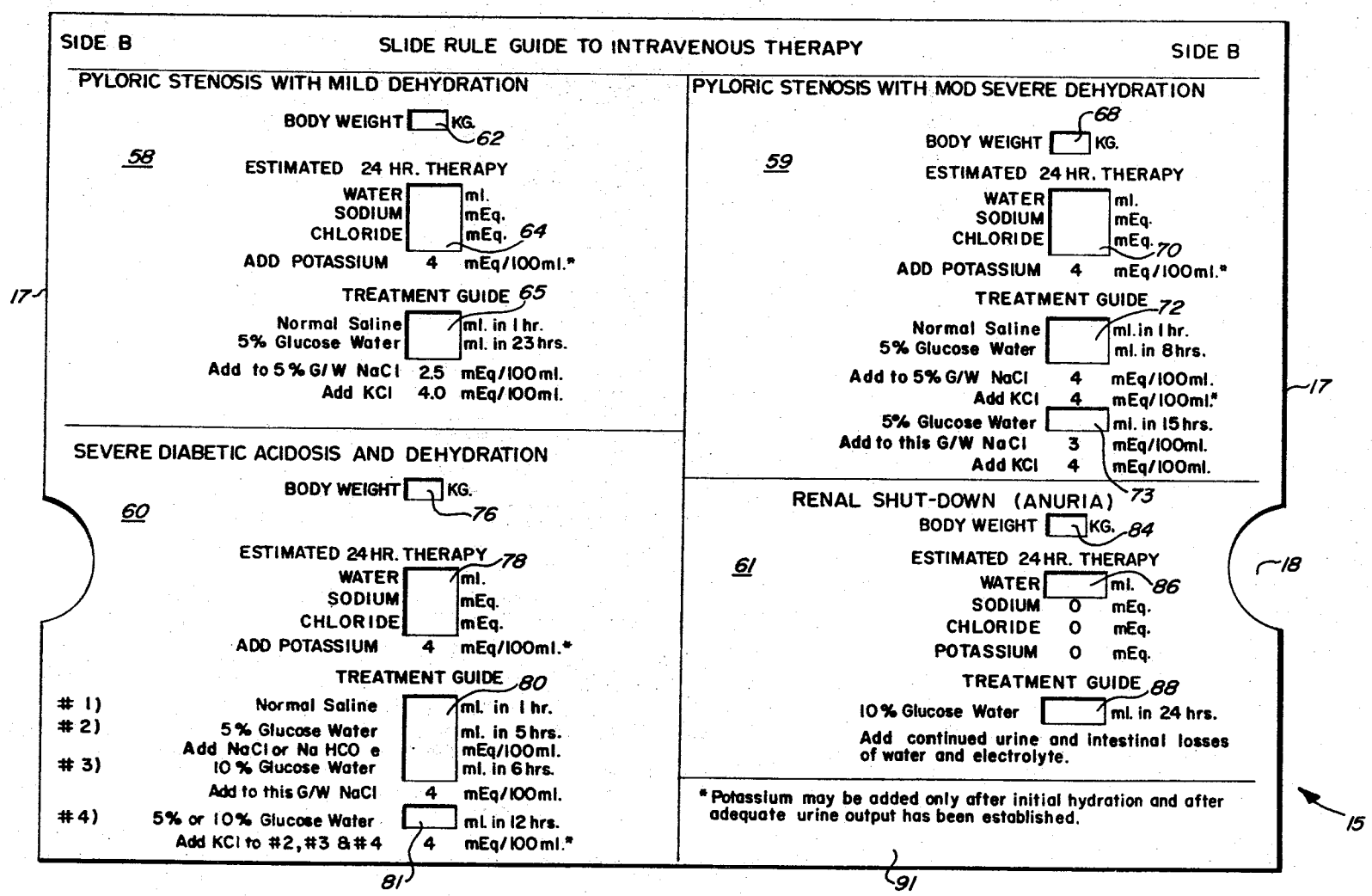

SIDE B
SLIDE RULE GUIDE TO INTRAVENOUS THERAPY
SIDE B
PYLORIC STENOSIS WITH MILD DEHYDRATION
BODY WEIGHT KG.
62
58
ESTIMATED 24 HR. THERAPY
WATER ml.
SODIUM mEq.
CHLORIDE mEq.
64
ADD POTASSIUM 4 mEq/100ml.*
17
TREATMENT GUIDE
65
Normal Saline ml. in 1 hr.
5% Glucose Water ml. in 23 hrs.
Add to 5% G/W NaCl 2.5 mEq/100 ml.
Add KCl 4.0 mEq/100ml.
PYLORIC STENOSIS WITH MOD SEVERE DEHYDRATION
68
BODY WEIGHT KG.
59
ESTIMATED 24 HR. THERAPY
WATER ml.
SODIUM mEq.
CHLORIDE mEq.
70
ADD POTASSIUM 4 mEq/100ml.*
TREATMENT GUIDE
72
Normal Saline ml. in 1 hr.
5% Glucose Water ml. in 8 hrs.
Add to 5% G/W NaCl 4 mEq/100ml.
Add KCl 4 mEq/100ml.*
5% Glucose Water ml. in 15 hrs.
Add to this G/W NaCl 3 mEq/100ml.
Add KCl 4 mEq/100ml.
73
17
SEVERE DIABETIC ACIDOSIS AND DEHYDRATION
BODY WEIGHT KG.
60
76
ESTIMATED 24 HR. THERAPY
78
WATER ml.
SODIUM mEq.
CHLORIDE mEq.
ADD POTASSIUM 4 mEq/100ml.*
TREATMENT GUIDE
80
#1) Normal Saline ml. in 1 hr.
#2) 5% Glucose Water ml. in 5 hrs.
Add NaCl or Na HCO e mEq/100ml.
#3) 10% Glucose Water ml. in 6 hrs.
Add to this G/W NaCl 4 mEq/100ml.
#4) 5% or 10% Glucose Water ml. in 12 hrs.
Add KCl to #2, #3 & #4 4 mEq/100ml.*
81
RENAL SHUT-DOWN (ANURIA)
BODY WEIGHT KG.
84
61
ESTIMATED 24 HR. THERAPY
WATER ml.
86
SODIUM 0 mEq.
CHLORIDE 0 mEq.
POTASSIUM 0 mEq.
18
TREATMENT GUIDE
88
10% Glucose Water ml. in 24 hrs.
Add continued urine and intestinal losses of water and electrolyte.
*Potassium may be added only after initial hydration and after adequate urine output has been established.
91
15

Fig-8

# SLIDE RULE GUIDE TO INTRAVENOUS THERAPY

The present invention relates to a slide rule guide to intravenous therapy and is concerned primarily with a guide which may be readily used by a doctor, nurse or other attendant giving intravenous therapy to readily ascertain the character and quantities of materials or medicines which are to be injected into a patient's vein and the interval between such injections.

## BACKGROUND OF THE INVENTION

At the present time, intravenous therapy is now widely practiced. Such therapy involves the injection of certain materials into a patient's vein with the quantity of the material being determined by the patient's weight, the intervals at which the injections are made, and the particular condition being treated.

There are eight well recognized conditions which are treated by intravenous therapy. One of these is normal maintenance, in which there is no dehydration. Another is moderately severe isotonic dehydration. A third is moderately severe hypotonic dehydration; a fourth is moderately severe hypertonic dehydration; a fifth is pyloric stenosis with mild dehydration; a sixth is pyloric stenosis with moderately severe dehydration; a seventh is severe diabetic acidosis and dehydration, and an eighth is renal shut-down (anuria).

Under present day conditions, when a patient is to be subjected to intravenous therapy, the doctor or nurse, after identifying the patient's weight and the particular condition being treated, must refer to various tables or catalogues to determine in the first instance the particular materials to be injected, secondly the quantities of each of the materials for the injection, and finally the intervals at which injections should be made. This need for referring to various compilations is carried out only with a high degree of inconvenience.

## OBJECTS OF THE INVENTION

With the foregoing conditions in mind, the present invention has in view the following objectives:

1. To provide a slide rule guide to intravenous therapy which may be manipulated with a high degree of simplicity to indicate the nature and quantities of materials to be injected into a patient's vein, the prescribed intervals as determined by the body weight of the patient and the condition being treated.

2. To provide a slide rule guide of the character aforesaid which consists essentially of an envelope providing two outer panels and a slide within said envelope presenting two effective faces.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above ideas in a practical embodiment will, in part, become apparent, and, in part, be hereafter stated as the description of the invention proceeds.

## SUMMARY OF THE INVENTION

The foregoing objects are achieved by providing a slide rule guide conprising an envelope consisting of two outer panels which are separately identified such as panel "A" and panel "B" and a slide within said envelope presenting two effective faces which are separately identified in a manner corresponding to that of the identification to that of the panels, thus, "Side A" and "Side B".



One of the panels, such as side A is marked off to define a top margin and four rectangular sections therebeneath. Formed in this top margin is a small opening with the term "Body Weight" on one side and a unit of weight on the other side. Side A of the slide, which is intended to cooperate with panel side A displays a series of figures, any one of which will closely approximate the weight of a patient and which will appear in said opening when the slide is properly adjusted in the envelope.

Panel side B is marked off into four rectangular sections, each of which is formed with a small opening with the term "Body Weight" on one side thereof and a designation of unit of weight on the other. Side B of the slide which cooperates with panel side B displays four series of figures, with each figure approximating the weight of a patient and any figure of which will appear in the small opening when the slide is properly adjusted. Each rectangular section of each outer panel displays a heading indicating the condition being treated. Below this heading each section is formed with two windows in vertical alignment. A table for estimated 24 hour therapy is associated with one window and comprises the names of the materials on one side of the window and units of quantity on the other side. A table for treatment guide is associated with the other window and comprises an identification of a particular material on one side of the window, units of quantity on the other side, and time intervals on the latter side. Both faces of the slide display groups of figures which in a sense might be said to be complemental to the tables on the sections of the outer panels. Thus, when the slide is moved to bring a weight designation thereon into alignment either with the single opening on side A of the panel or one of the four openings on side B of the panel, depending on the condition being treated, the number of units of quantity for each material will be displayed in one of the windows.

For a full and more complete understanding of the invention, reference may be had to the following description and the accompanying drawings wherein:

FIG. 1 is a perspective of a slide rule guide to intraveneous therapy embodying the precepts of this invention and depicting the slide on a scale less than that of actual size;

FIG. 2 is a plan view of one side of the slide;

FIG. 3 is a plan view of the other side of the slide;

FIG. 4 is a plan view of one of the outer panels, and

FIG. 5 is a plan view of the other of the outer panels.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, wherein like reference characters denote corresponding elements throughout the several views, the slide rule guide of this invention is illustrated in FIG. 1 and referred to in its entirety by the reference character **10**. It comprises an envelope **11** and a slide **12**. Envelope **11** comprises a panel **13** (FIG. 4) which bears suitable identifying indicia such as the term "Side A" illustrated at **14**, and another panel **15** which is similarly identified by the term "Side B" at **16** (FIG. 5). Panels **13** and **15** have end edges **17** formed with recesses **18** which facilitate a user engaging slide **12** for manipulative purposes.

While envelope **11** may be made of any preferred material, it is preferable that it is of a material which may be coated with a plastic after the various indicia to

be hereinafter described have been printed thereon. If desirable, the panels may be of paper or cardboard and covered by a transparent plastic casing.

Referring now more particularly to FIG. 4, the exposed face of side A is shown as having inscribed thereon a line 19 which defines a margin 20. Formed in the panel 13 intermediate the ends of margin 20 is a small opening 21. On one side of the opening 21 is displayed the term "Body Weight" and on the other side is a unit of weight 22, such as "KG.".

Referring now to FIGS. 2 and 3, slide 12 presents one face 23 which bears suitable indicia such as "Side A" to identify it; the opposite face 24 also has indicia such as "Side B" to identify it. Spaced inwardly from the edge of face 23, which corresponds to the edge of panel 13, which defines margin 20, are a plurality of FIGS. 25. Each of the figures in the series 25 will approximate the weight of a patient. Thus, the slide 12 may be moved relative to envelope 11 to bring the figure in group 25 which most closely approximates the weight of a patient into position beneath opening 21 in panel 13.

Below margin 20 panel 13 is marked off into four rectangular sections 26, 27, 28 and 29. Each of these sections displays an identification of the particular condition of a patient being treated. Thus, section 26 displays "Normal Maintenance (no dehydration)", section 27, "Mod Severe Isotonic Dehydration (Na 130–150)", section 28, "Mod Severe Hypotonic Dehydration (Na below 130)", and section 29, "Mod Severe Hypertonic Dehydration (Na above 150)". Section 26 is formed with a window 30 above which is the title "Estimated 24 Hr. Therapy". On one side of the window 30 is a group of names of materials, which is identified as 31, and on the opposite side of window 30 are abbreviations of volumetric units. These are designated in their entirety as 32. Below window 30 is a second window 33 on one side of which is the term "5% Glucose Water" and the other side bears the language "ml. in 24 hrs.". This window 33, with the above designatiOns, constitutes part of a treatment guide including the identification of materials and quantities thereof. Thus, window 33 and the accompanying designations constitute a treatment guide.

Section 27 is formed with a window 34, on one side of which is a group 35 of material identifications, and on the other side, a group of abbreviations denoting units of volume. This group is designated 36. The window 34, group 35 and designations 36 constitute a part of the estimated 24 hour therapy with the remainder being supplied by the fixed determination of potassium displayed immediately below window 34. Section 27 also is formed with a window 37 below window 34, with a group 38 of material identifications on one side, and a group 39 of volumetric unit designations and time intervals on the other side. Window 37, and groups 38 and 39, constitute part of a treatment guide, the remainder of which is supplied by the materials in group 40 and the indicated number of units 41.

Section 28 is formed with windows 42 and 43. Materials are identified by a group of designations 44 on one side of window 42 and designations of volumetric units 45 on the other side. Window 42 and designations 44 and 45 are a part of the estimated 24 hour therapy with the remainder being supplied by the fixed amount of potassium indicated. The treatment guide is provided by window 43, the designations of materials on one side at 46 and designations of volumetric units and time intervals in the group 47 on the other side. Window 43 and groups 46 and 47 are a part of the treatment guide which is completed by the fixed designation of materials indicated therebelow.

Section 29 is formed with windows 48 and 49 which are accompanied by designations substantially corresponding to those applied to the windows 42 and 43 of section 28.

Referring now to FIG. 2, face 23 of panel 12 is formed with a group of FIGS. 50 comprising four rows corresponding to the group 31 of material identifications of section 26. The figures in the four rows are arranged in vertical columns and any column will appear in window 30 when the slide is adjusted to bring the particular figure of the series 25 opposite opening 21. Face 23 also includes another row of FIGS. 51, any one of which is adapted to appear in window 33 of section 26. Face 23 of slide 12 displays another group of FIGS. 52, any column of which will appear in window 34 of section 27. It also displays another group 53 of figures, any column of which will appear in window 37 of section 27.

Face 23 of slide 12 is provided with another group 54 of figures, any column of which may appear in window 42 of section 28, another group 55, any vertical column of which may appear in window 43 of section 28, still another group 56, any column of which will appear in window 48 of section 29, and finally, a group 57 of figures, any column of which will appear in window 49 of section 29.

Referring now to FIG. 5, outer panel 15, which is identified as "Side B", is marked off to provide four rectangular sections 58, 59, 60 and 61. Section 58 displays the title "Pyloric Stenosis with Mild Dehydration" and immediately therebeneath is a small opening 62 accompanied by the designation for body weight. Referring for the moment more particularly to FIG. 3, face 24 of slide 12 displays a series of FIGS. 63, any one of which is adapted to appear in opening 62. Below opening 62 is a table for estimated 24 hour therapy, comprising a window 64 with designations of materials and volumetric units, and a table for treatment guide comprising a window 65 with designations of materials on one side and volumetric units and time intervals on the other side. The treatment guide also includes the designations of fixed quantities of certain materials. Referring again to FIG. 3, face 24 of slide 12 presents a group 66 of figures, any column of which may appear in window 64, and another group 67, any column of which may appear in window 65.

Section 59 displays the title "Pyloric Stenosis with Mod Severe Dehydration" and immediately therebeneath is a small opening 68 accompanied by the designation "Body Weight" and which cooperates with a series of numbers 69 which appear on face 24 of slide 12. Below opening 68 is a table for estimated 24 hr. therapy comprising a window 70 accompanied by the same designations as window 64 of section 58 and which cooperates with a group 71 of figures displayed on face 24 of slide 12. Below window 70 is a table for treatment guide comprising windows 72 and 73 and accompanying designations of materials, volumetric units and time intervals. Cooperating with window 72 is a group 74 of figures on face 24 of slide 12, while another group of FIGS. 75 cooperates with window 73.

Section 60 bears the title "Severe Diabetic Acidosis and Dehydration" and beneath this title is a small opening 76 bearing the designation "Body Weight" and which cooperates with a series of FIGS. 77 on face 24 of slide 12. Below opening 76 is a window 78 with which is associated the same indicia which is associated with windows 64 and 70 of sections 58 and 59 respectively and constituting the table for estimated 24 hour therapy. Cooperating with window 78 is a group of FIGS. 79 on face 24 of slide 12. Below the table for estimated 24 hour therapy is a treatment guide comprising windows 80 and 81. Associated with each of these windows is a material designation on one side and a designation of volumetric units and time intervals on the other side. Window 80 cooperates with a group of FIGS. 82 on face 24 of slide 12, while another row of FIGS. 83 on face 24 cooperates with window 81.

Section 61 displays the title "Renal Shut-Down (Anuria)", below which is a small opening 84 for body weight designation and which cooperates with a series of figures 85 on face 24. Immediately below opening 84 is a table for estimated 24 hour therapy which includes a window 86 which cooperates with a row of figures 87 on face 24. Below the table for estimated 24 hour therapy is a table for treatment guide, including a window 88 which cooperates with a series of figures 89 on face 24. Panel 13 (FIG. 4) also includes a lower margin 90 which displays certain directions involving the use of potassium, while FIG. 5 displays similar directions in a space 91 at the lower right hand corner.

## OPERATION

While the manner of using the above described slide rule guide to intravenous therapy is believed to be obvious from the illustration of the drawings and description of the elements thereof, it is briefly described as follows:

The particular condition which is being treated and the weight of the patient are first ascertained. Such information is usually available on the patient's chart. The doctor or nurse then turns the envelope 11 to the proper position in which the title identifying the condition of the patient comes into view. Slide 12 is now moved to bring the figure in either of the series 25, 63, 69, 77 or 85 into a position in which it is seen through its respective opening 21, 62, 68, 76 or 84. When this condition is achieved, the correct amount for each of the materials will be displayed in the windows of the particular section for that treatment.

While a preferred specific embodiment is herein disclosed, it is to be clearly understood that the invention is not to be limited to the exact construction, devices and indicia illustrated and described because various modifications of these details may be provided in putting the invention into practice.

What is Claimed is:

1. In a slide rule guide to intravenous therapy,

a. an envelope providing two separately identified panels;

b. a slide within said envelope between said panels and presenting two faces, each of which is identified in relation to one of said panels and in engagement with the panel with which it is related;

c. one of said panels being formed with an opening for indicating the body weight of a patient;

d. the face of said slide engaging the panel formed with said opening displaying a series of figures, any one of which may appear in said opening;

e. said outer panel with said opening including four sections, each of which bears a title indicating a particular patient condition to be treated;

f. a table for estimated therapy for a fixed period on each of said sections and including a window;

g. a table for treatment guide on each of said sections and including a window;

h. the face of said slide engaging said panel formed with said windows displaying eight groups of figures, with two of said groups cooperating with the two windows of each section;

i. the other of said panels including four sections, each of which is formed with an opening indicating body weight of a patient and displaying a title of a patient's condition;

j. the face of said slide engaging said last mentioned panel bearing four series of figures with each series cooperating with one of said four openings;

k. each of said last mentioned four sections including a table for estimated therapy for a fixed period and including a window, and a table for treatment guide including a window, and

l. the face of said guide engaging said last mentioned panel displaying groups of figures, certain of which appear at certain of said last mentioned windows upon adjustment of said slide.

2. The slide rule guide to intravenous therapy of claim 1 in which the fixed period for estimated therapy in each of said tables for estimated therapy is 24 hours.

3. The slide rule guide of claim 1 in which each of said tables for estimated therapy for a fixed period includes designations of materials on one side of the window for that table and designations of units of volume on the other side of that window.

4. The slide rule guide of claim 1 in which each of said tables for treatment guide includes designations of materials on one side of the window for that table and designations of volumetric units and time intervals on the other side of that window.

5. The slide rule guide of claim 4 in which some of said tables for treatment guide include the designation of a fixed quantity of material below the window of that table.

6. The slide rule guide of claim 1 in which one of the sections identified in element (e) includes a third window, which is a part of the table for treatment guide of that section, material designations on one side of said third window and designations of volumetric units and time intervals on the other side.

7. The slide rule guide of claim 1 in which each of said outer panels displays a rule concerning the administering of potassium.

* * * * *