



CHAD VALLEY

GIRDER & PANEL

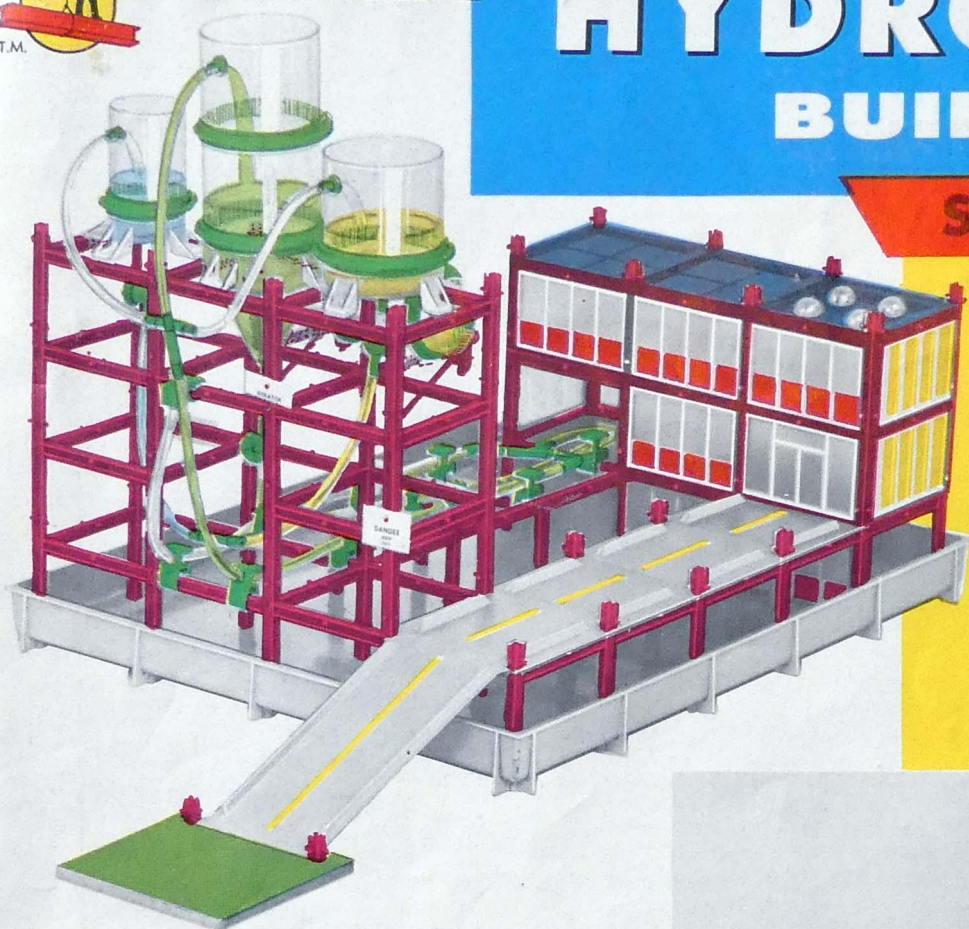
HYDRO-DYNAMIC BUILDING SETS

SPECIAL PROJECT BOOK

BUILD WONDERFUL INDUSTRIAL STRUCTURES
with EXCITING HYDRO-MECHANICAL EFFECTS

PIPE IT... PUMP IT...

Battery powered PUMPS,
TRANSPARENT PIPES and TANKS
... SEE THE FLOW and
CONTROL THE ACTION
... thousands of combinations.



DYE FACTORY

Built with Set No. 11

This is an example of an easy-to-build structure with a system of pipes that lets you "manufacture" colored dyes, then mix them into other colors in the tanks by using the valves to control the flow. See more details on Page 3.

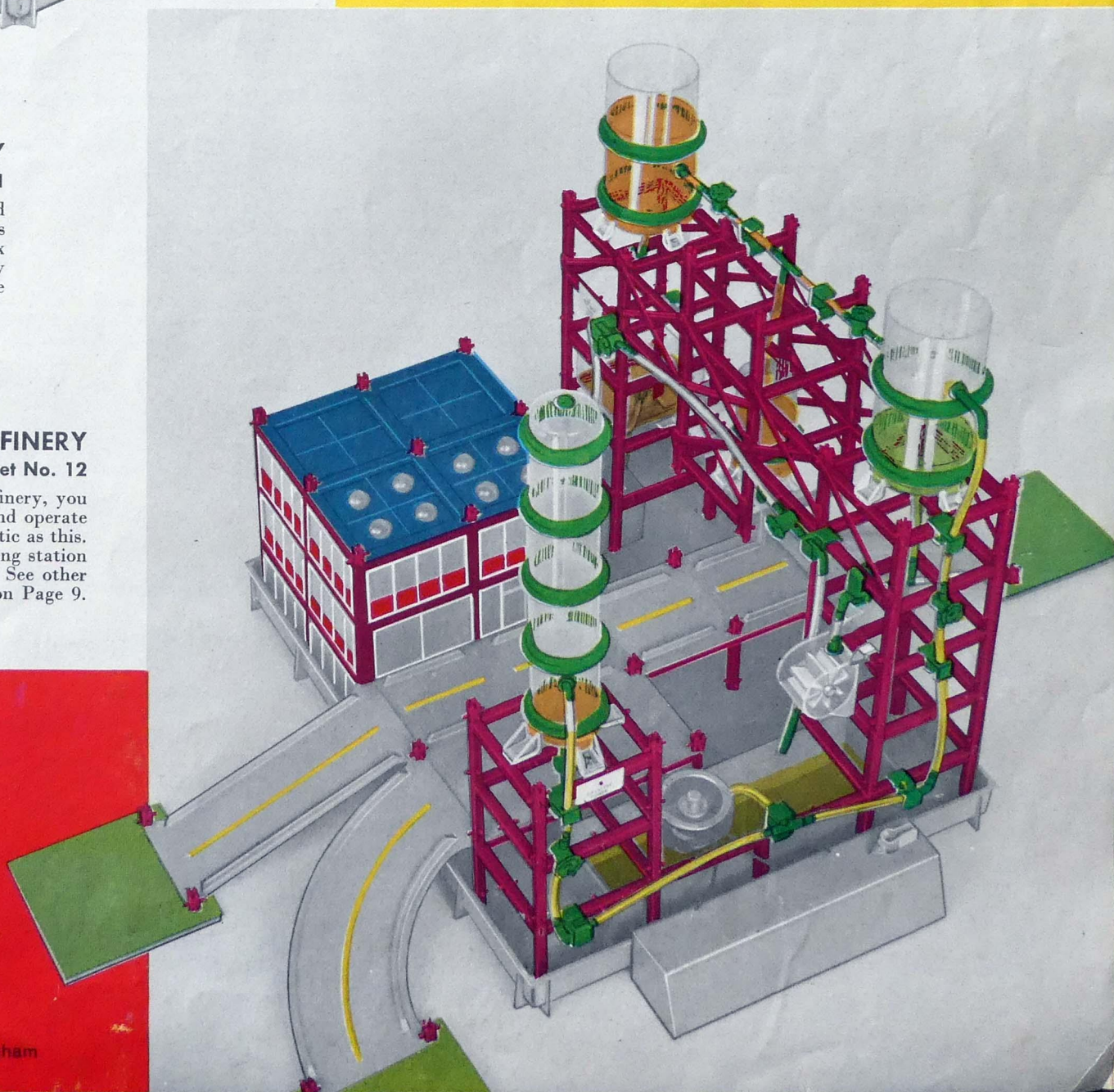
OIL REFINERY

Built with Set No. 12

If you have ever seen a real refinery, you will enjoy being able to build and operate one of your own that is as realistic as this. It is even equipped with a loading station for filling tank cars and trucks. See other view and detailed explanation on Page 9.

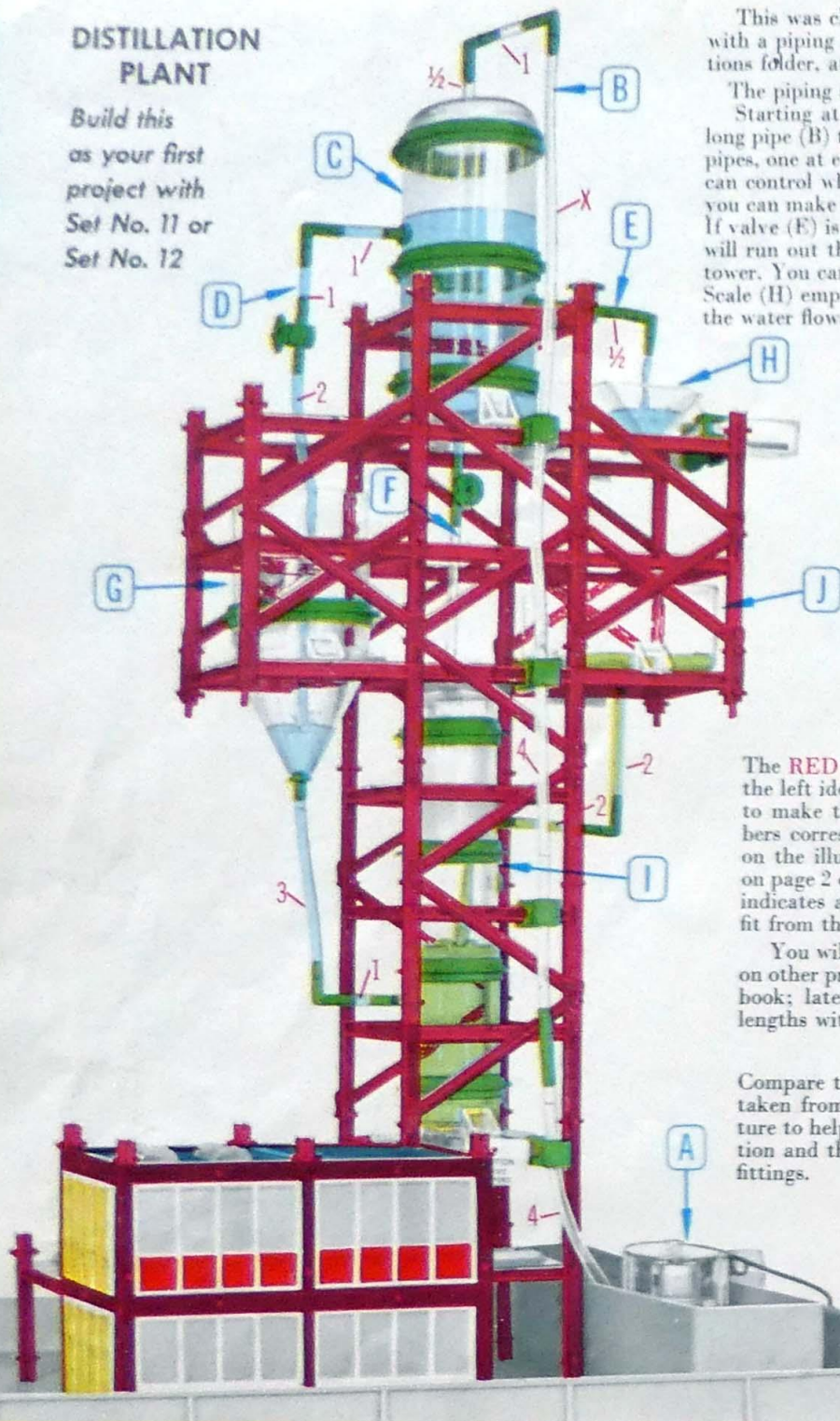
This book contains actual photos of structures built with Chad Valley Hydro-Dynamic Building Sets, with notes and detail instructions to aid you in building them.

With Set No. 12 you can build any structure shown in this book; with Set No. 11 you can build any structure on pages 2 through 5. With either Set you can design and build as many different structures as your imagination can create.



DISTILLATION PLANT

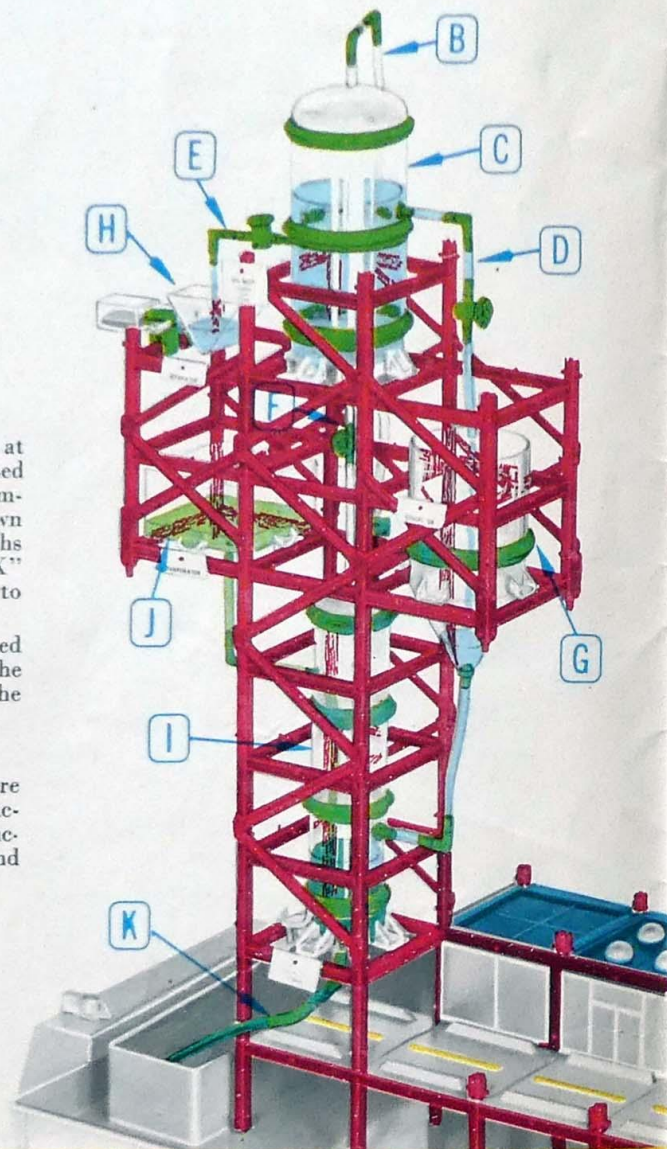
Build this
as your first
project with
Set No. 11 or
Set No. 12



This was chosen as the first project in the book because it is a large and impressive structure with a piping system which is easy to construct. Start to build as described in the Basic Instructions folder, and refer to the Instructions as you build.

The piping system as shown in these two views, is as follows:

Starting at the pump connection (A) in the bottom of the reservoir, the water travels up the long pipe (B) to the top of the tower and into the large round tank (C). This tank has three outlet pipes, one at each side (D and E), and one at the bottom (F). All three outlets have valves so you can control which way the water will flow from this tank; that is, by closing valves (E) and (F) you can make the water flow through the highest outlet (D) into the tank (G) with the cone base. If valve (E) is open, water will flow into the Tilting Scale (H), and if valve (F) is open, the water will run out the bottom connection into the top of the tall tank (I) inside the lower part of the tower. You can see in the picture that tank (G) also drains into the tall tank (I), and the Tilting Scale (H) empties into the square tank (J) which in turn also empties into tall tank (I). From (I) the water flows back into the reservoir through pipe (K).



The **RED NUMBERS** in the photos at the left identify the lengths of pipe used to make the connections. (These numbers correspond to the numbers shown on the illustrations of the pipe lengths on page 2 of the Instructions.) The "X" indicates a section that you will cut to fit from the long piece in your set.

You will find these red numbers used on other projects in the early part of the book; later on you will recognize the lengths without help.

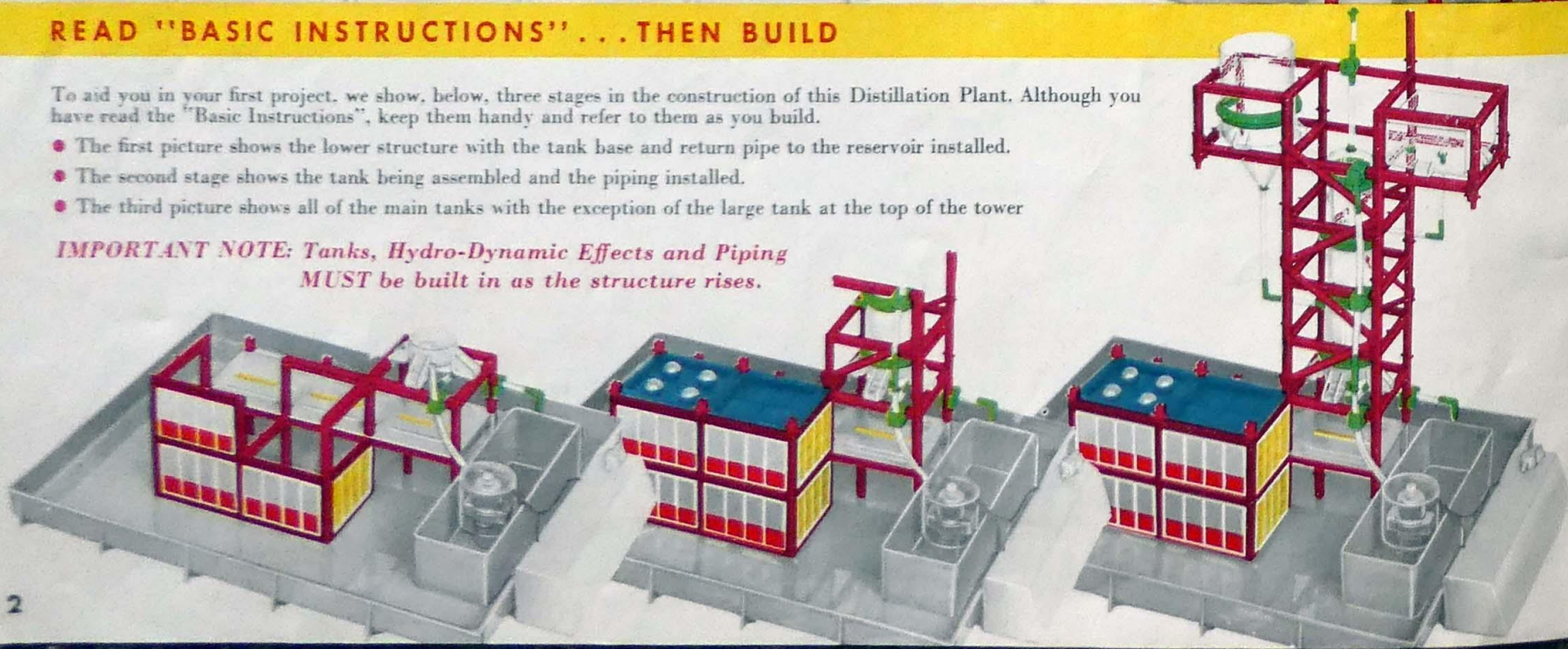
Compare these two photos, which were taken from opposite sides of the structure to help you work out the construction and the positions of the tanks and fittings.

READ "BASIC INSTRUCTIONS"... THEN BUILD

To aid you in your first project, we show, below, three stages in the construction of this Distillation Plant. Although you have read the "Basic Instructions", keep them handy and refer to them as you build.

- The first picture shows the lower structure with the tank base and return pipe to the reservoir installed.
- The second stage shows the tank being assembled and the piping installed.
- The third picture shows all of the main tanks with the exception of the large tank at the top of the tower

IMPORTANT NOTE: Tanks, Hydro-Dynamic Effects and Piping
MUST be built in as the structure rises.



DYE FACTORY

This is another view of the structure seen on the cover of this book. By referring to both pictures, the following explanation will become very clear.

The flow coming from the pump is divided at the "T" joint (A), going either to the large center tank (B) or to two smaller tanks (C) and (D). Valve (E) controls the flow to tank (B); valve (F) controls the pipe that leads to another "T" joint where the flow is divided between tank (C) and tank (D). Tank (B), when it becomes full, will flow into the horizontal tank (G).

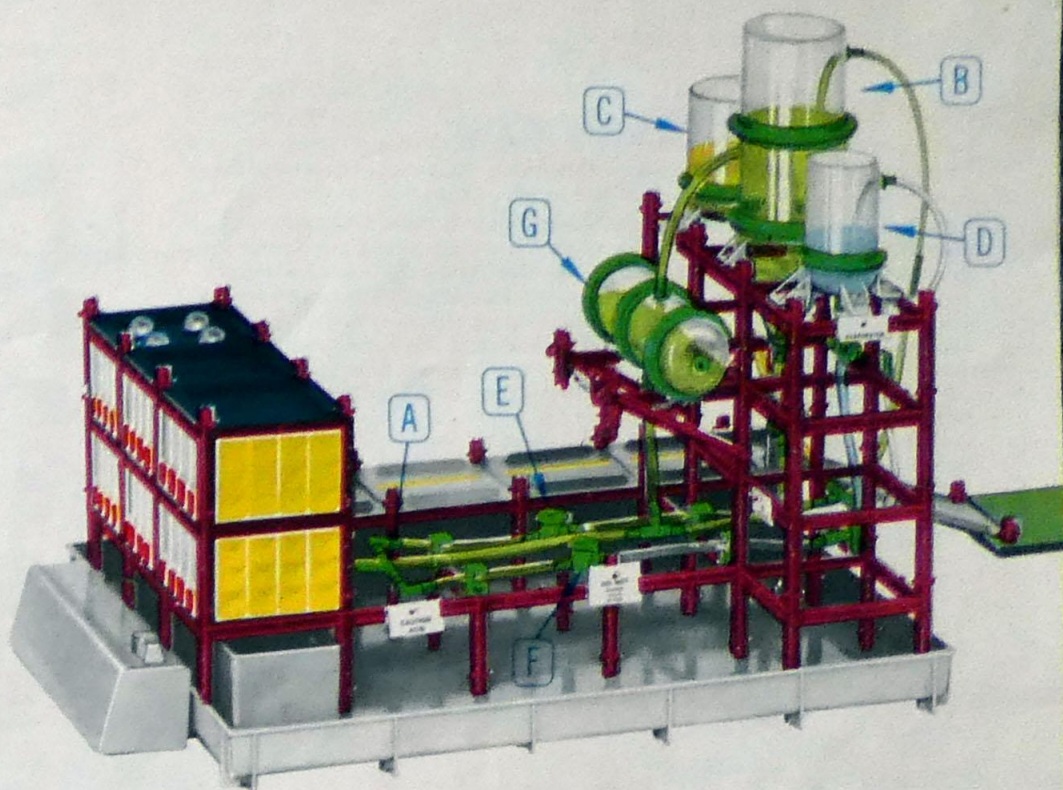
All the tanks are connected to pipes leading back to the reservoir but (B), (C), and (D) have valves in their bottom outlets to hold the water in until the tanks are filled.

To have fun with *color*, do this:

With all tanks empty, place a *blue* color tablet into tank (D) and a *yellow* tablet into tank (C). Close the outlet valves under all tanks and close valve (E) so no water will flow into tank (B). Start the pump and as soon as tanks (C) and (D) are full, close valve (F) and open valve (E).

Next, open the outlet valves below tanks (C) and tank (D). As the *yellow* from tank (C) and the *blue* from tank (D) start to recirculate, tank (B) will become filled with *green* water.

By manipulating the valves in various ways you can control the mixing of colors until the tablets are completely dissolved and all the water has become green. You can, of course, use different color tablets to get different color effects.



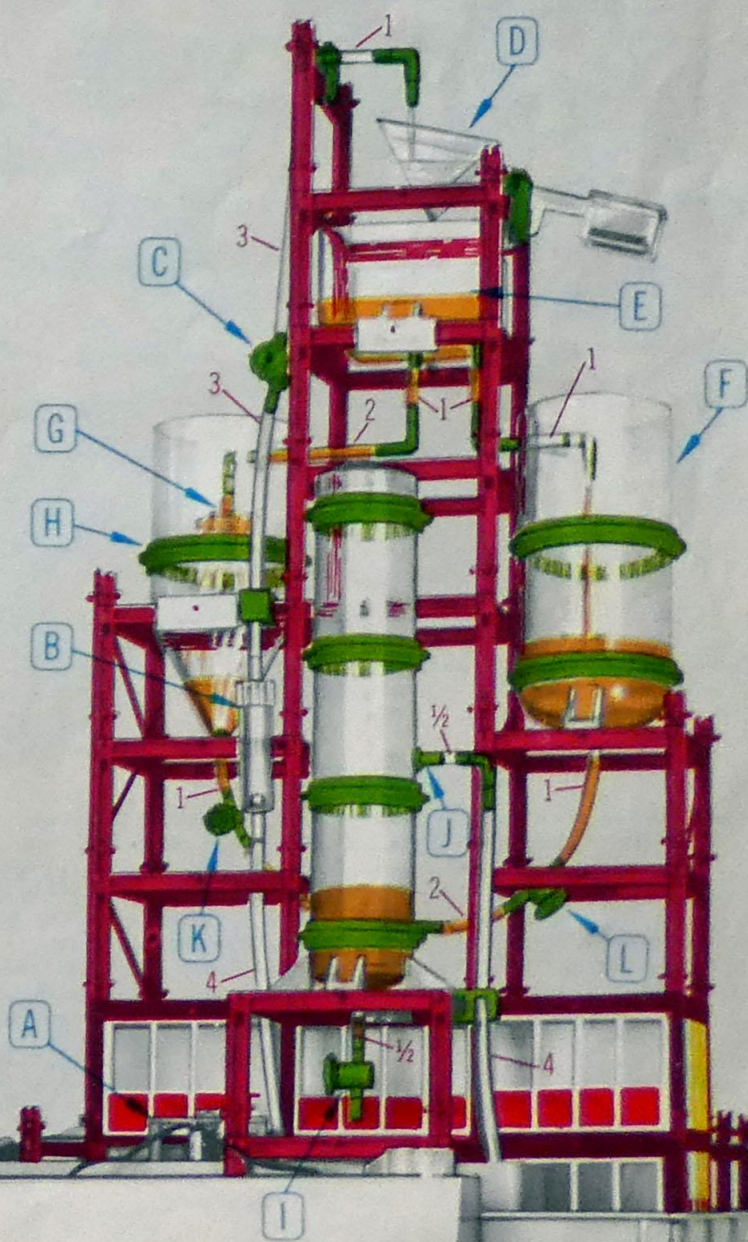
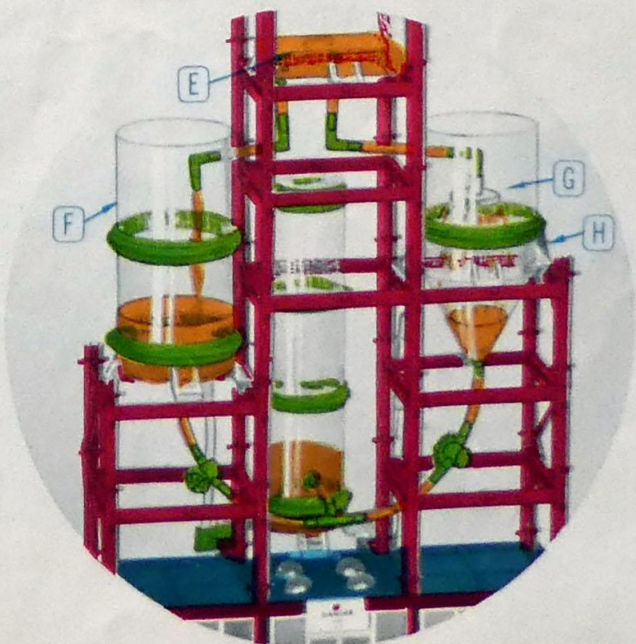
AMMONIA PLANT

Here is a good opportunity for you to get acquainted with some of the hydro-mechanical effects, in a simple structure.

Starting at the pump (A) the water goes up the long pipe and through the Ball Flow Meter (B) (see page 4 of the Instructions) to the very top of the tower. The valve (C) can be used to regulate the flow of water into the Tilting Scale (D). From the Tilting Scale the water runs into the square tank (E) which has two outlet pipes connected in the flat bottom. One of these drains into the large round-base tank (F); water from the other flows through the Aerator Spray (G) into tank (H). These two pipes can be plainly seen in the detail below which is a view from the other side.

Note: These pipes go into tank (F) and tank (H) *without* the use of double connectors. They are simply passed through the holes in the tank walls. This may be done in instances such as this where the connection with the tank does not have to be water-tight.

Pipes from tank (F) and tank (H) are joined by means of a "T" to a short pipe connected near the base of the tall tank in the center (see detail photo). When the valve (I) under this tall tank is closed the water will rise to the level of the side outlet (J). If valves (K) and (L) are controlled closely, the level of water that you desire can be held in tanks (F) and (H).

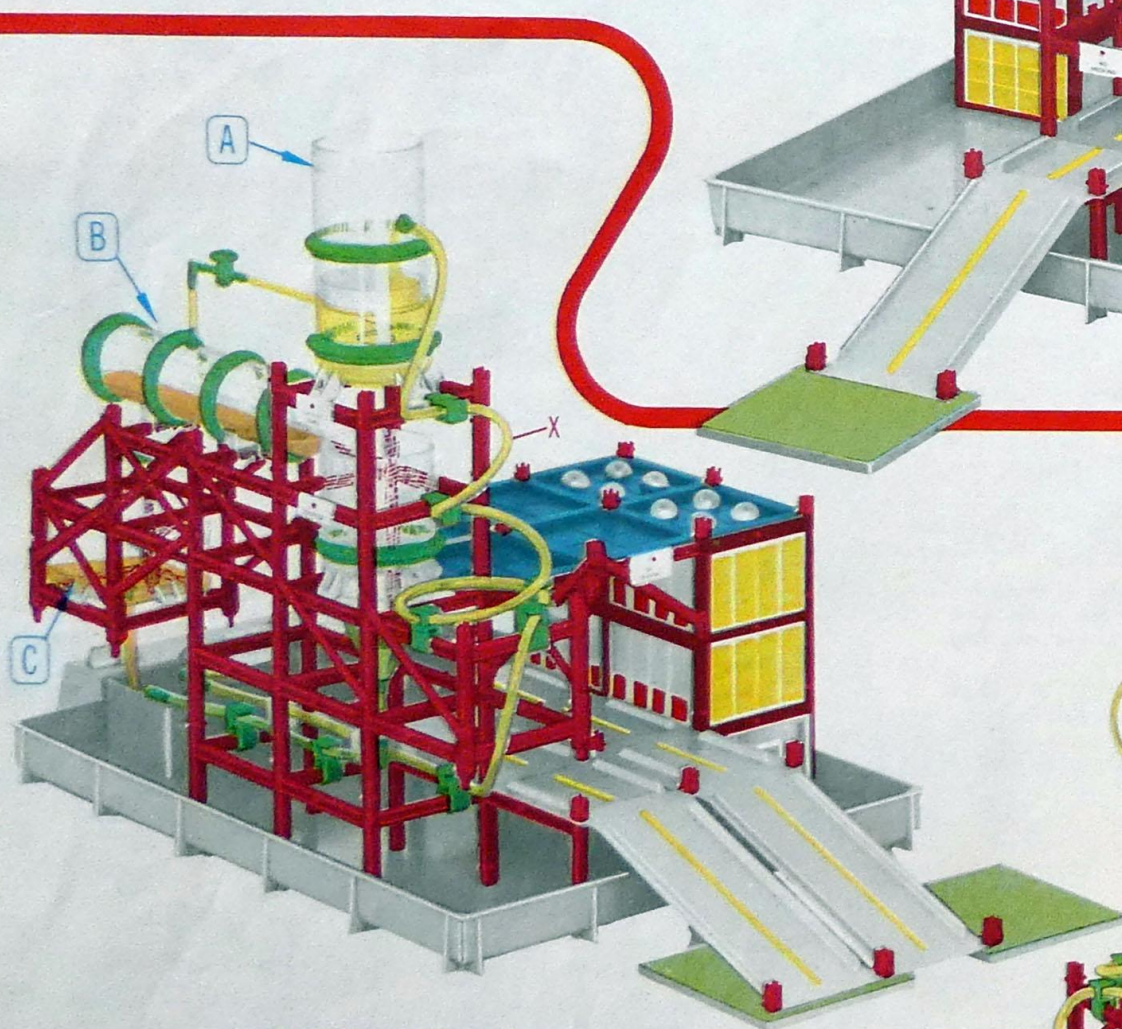
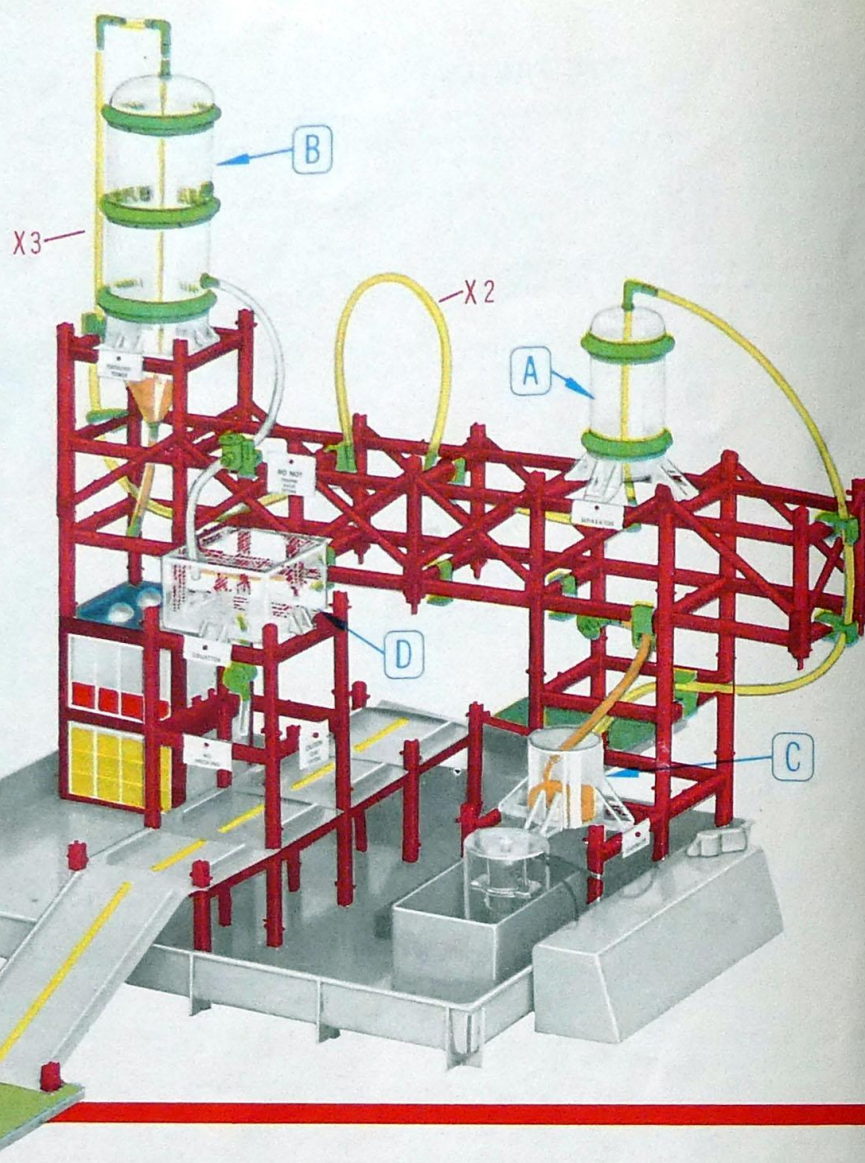


GLYCERINE PLANT

This structure uses several lengths of pipe that you will cut from the long piece in the set. These are marked "X" in the picture.

From the pump connection in the reservoir, the liquid travels up the long pipe (X1). The small tank (A) is a cooler, not used to contain liquid; the pipe goes directly through it from top to bottom without the use of tank connectors. Loops of pipe, like (X2), are used in refinery piping to take up expansion or contraction caused by temperature changes. After loop (X2) another long piece (X3) swings around the big tank (B) and connects to the dome cap. From the cone base of tank (B) another long pipe (made of pre-cut lengths of pipe, and connectors), suspended beneath the bridge of girders, brings the liquid to the siphon (C) over the reservoir. An alternate outlet in tank (B) drains into the square tank (D) where the liquid collects until valve under the tank is opened and water runs into a tank truck.

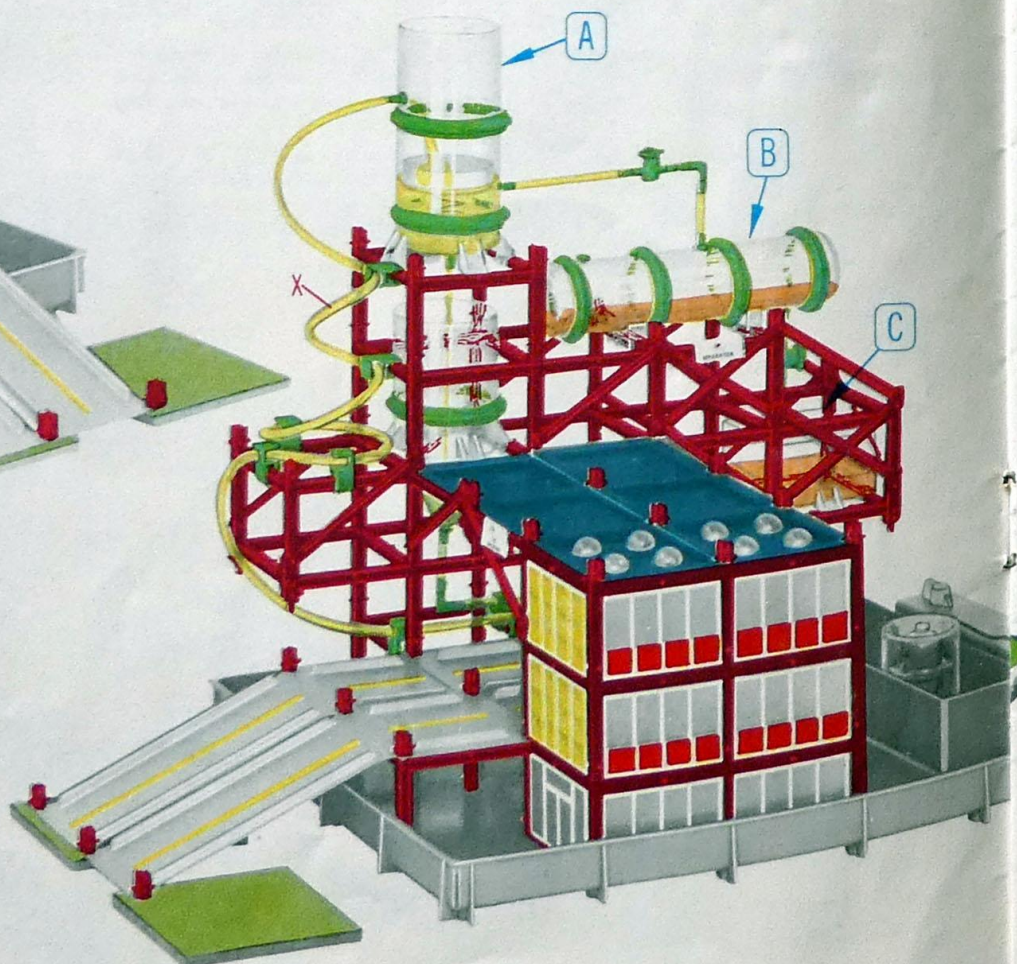
Valves in all the outlet pipes control the flow, directing it either to the square tank or through the siphon back into the reservoir to be recirculated.



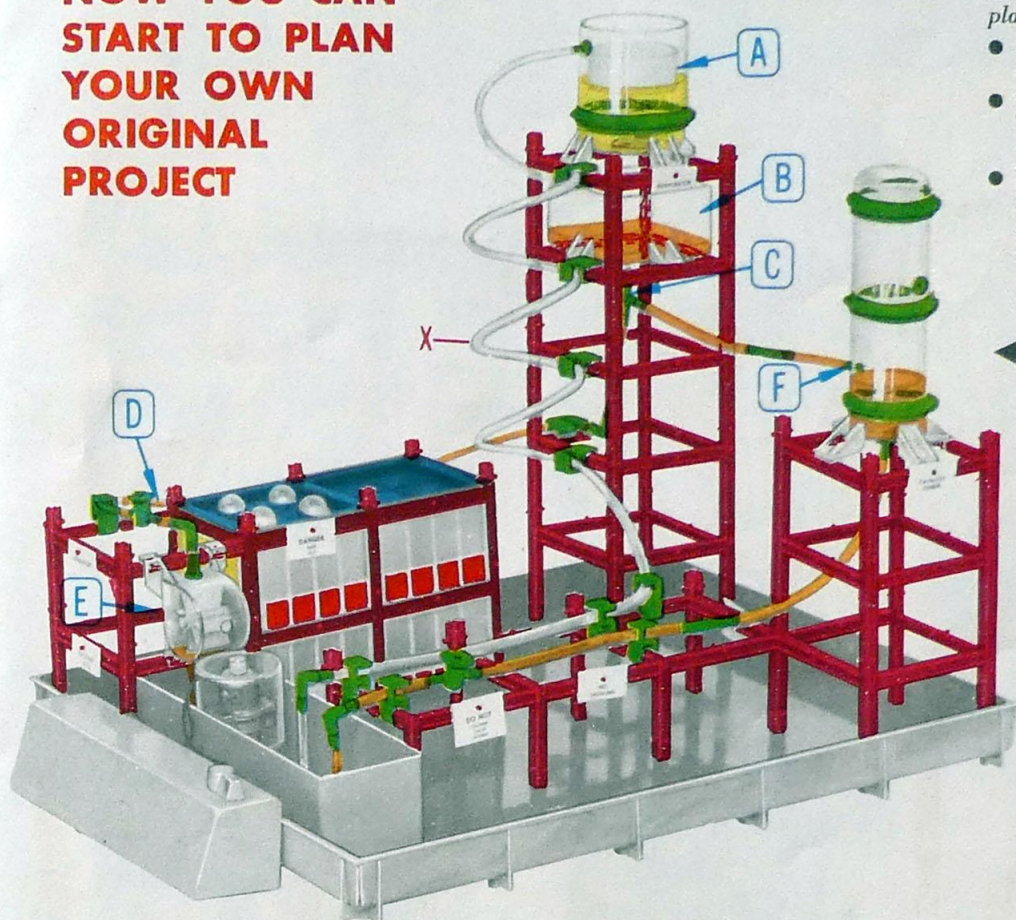
DETERGENT FACTORY

Here are two views to help you in building this plant. Note particularly the girder construction as it employs some structural methods you may not have tried before: for instance, the cantilever structure (far left in photo above) that holds the square tank (C), also the method of supporting the roof over the double-width platform. (See page 2 of Instructions.)

The piping is very simple. One extra-long piece of pipe (X) takes the water from the pump outlet in the reservoir all the way to the big tank (A) at the top. This long pipe is arranged in a graceful spiral, held in place by pipe hangers. Tank (A) contains the float valve that lets water down at intervals into the lower tank and from there back to the reservoir. The overflow pipe in tank (A) can be used to drain off part of the water into the horizontal tank (B), which in turn drains into the square tank (C). A pipe from the square tank goes straight down to the reservoir. The flow can be controlled, of course, by valves in the various pipes.



NOW YOU CAN START TO PLAN YOUR OWN ORIGINAL PROJECT

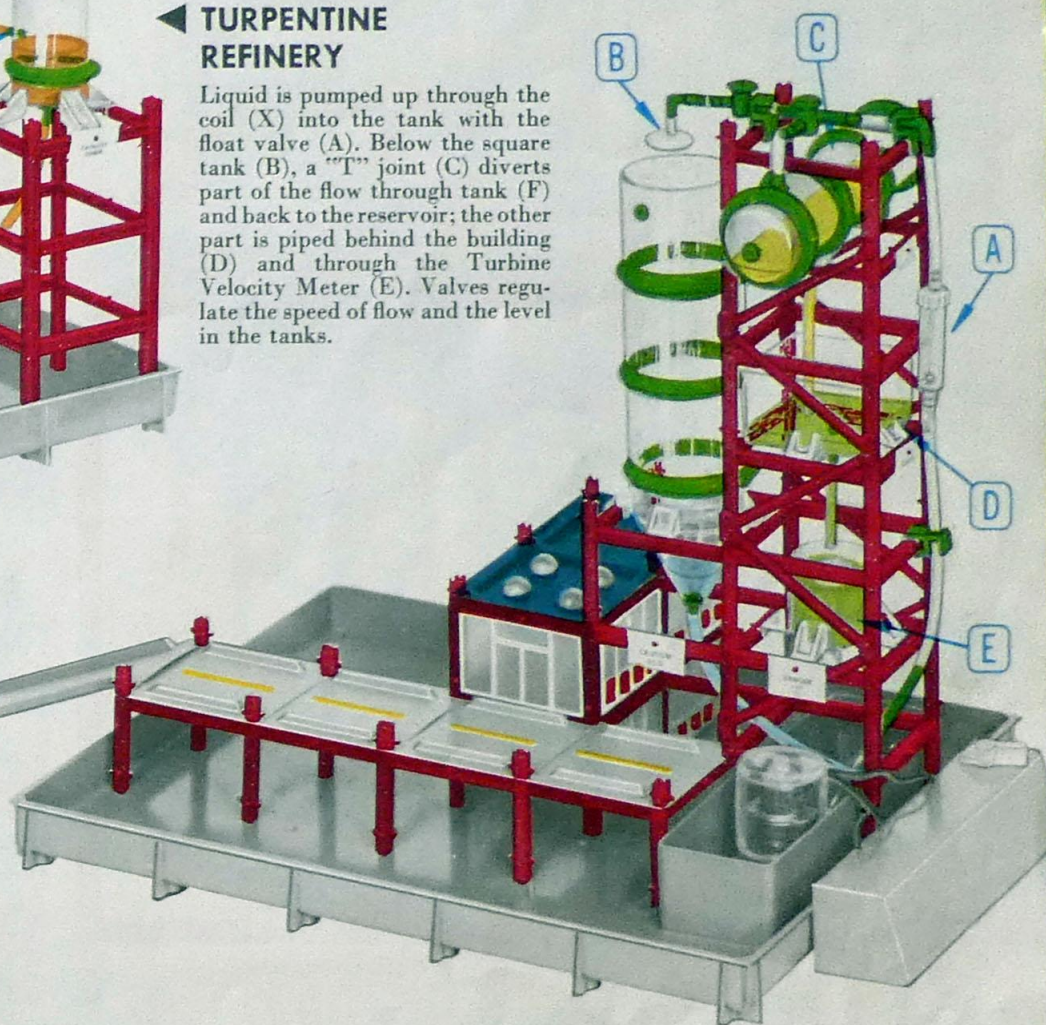


The three structures on this page provide a perfect example of three stages in planning to build with Hydro-Dynamic Set No. 11.

- On the left is a simple structure with tanks, features and all piping fully exposed on top of the framework, easy to work with.
- On the right, is a structure with features contained within the framework. These should be installed as the framework is being built, as the larger tank parts especially, cannot be inserted later.
- The bottom structure contains almost all the hydro-mechanical features, in two separate circulating systems, all contained within two towers. Projects such as this must be carefully thought out before you start to build as it is difficult to make changes later.

◀ TURPENTINE REFINERY

Liquid is pumped up through the coil (X) into the tank with the float valve (A). Below the square tank (B), a "T" joint (C) diverts part of the flow through tank (F) and back to the reservoir; the other part is piped behind the building (D) and through the Turbine Velocity Meter (E). Valves regulate the speed of flow and the level in the tanks.



LYE PROCESSING PLANT

Water is forced, by the pump, up the pipe at the right of the tower where the Ball Flow Meter (A) indicates the amount of pressure the pump is generating. At the top of the tower the flow can be diverted by means of a "T" joint and two valves. It can be forced through the Aerator Spray (B) into the big tank at the left, to flow back into the reservoir, or it can be sent into the horizontal tank (C). From here it flows into the square tank (D) and down into the Siphon (E). From the siphon it pours into the reservoir. The valves can be set so that any part of the flow goes each way.

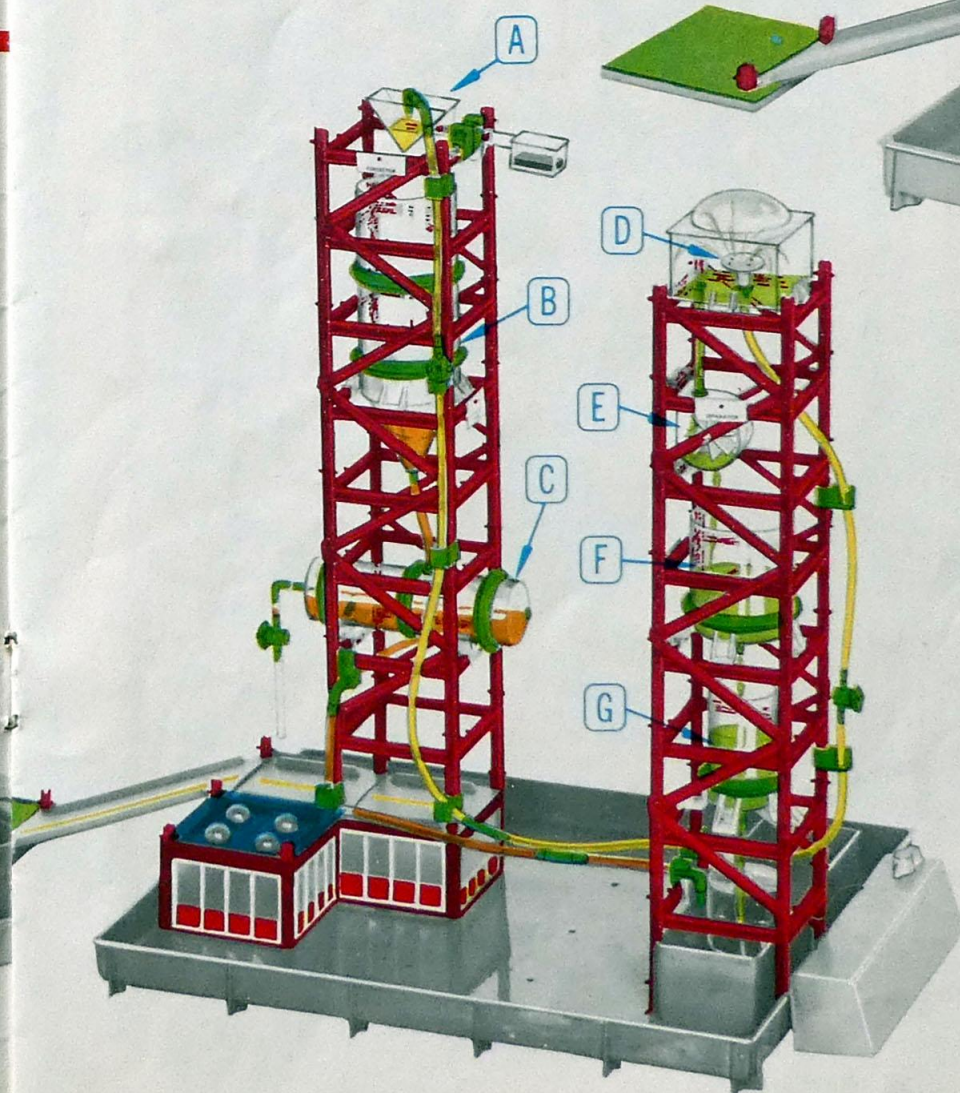
SYNTHETIC RUBBER FACTORY

As explained above, this structure has two separate circulating systems. As you have seen in previous examples, a "T" joint (not visible in this photo) divides the flow, while valves divert it into one system or the other.

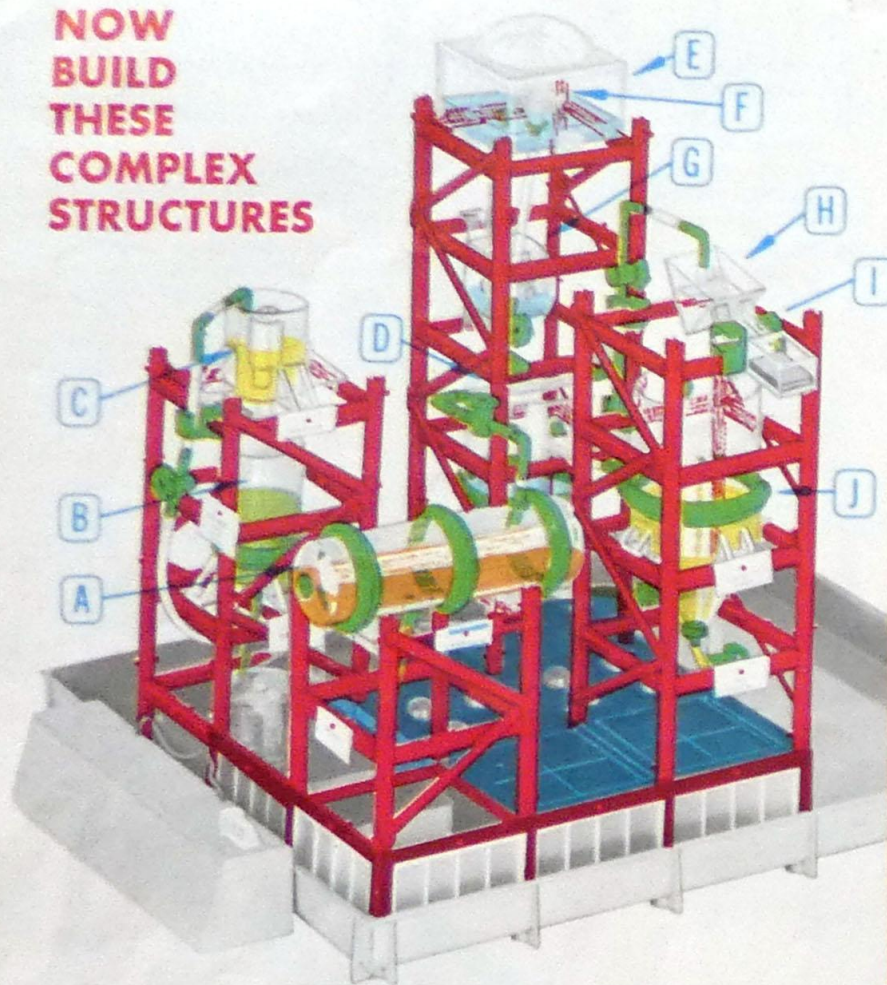
The system in the left hand tower consists of:

(A) Tilting Scale, (B) large tank with cone base, (C) small horizontal tank. From here the liquid can either return to the reservoir or be drawn off into tanks or drums by means of the pipe and valve in the center of the raised roadway.

The right hand tower contains: (D) Aerator Spray, (E) Turbine Velocity Meter, (F) large collecting tank, (G) small tank. Tank (G) drains through a pipe into the reservoir.



NOW BUILD THESE COMPLEX STRUCTURES



SULPHURIC ACID PLANT

This complex structure uses all the features in Set No. 11:

(A) small tank on saddles; (B) small tank on round base; (C) the siphon; (D) at bottom of tower, large tank on round base, with the float valve; (E) square tank; (F) aerator spray; (G) turbine velocity meter; (H) tilt scale; (I) behind the tower, the ball flow meter; (J) large tank on cone base.

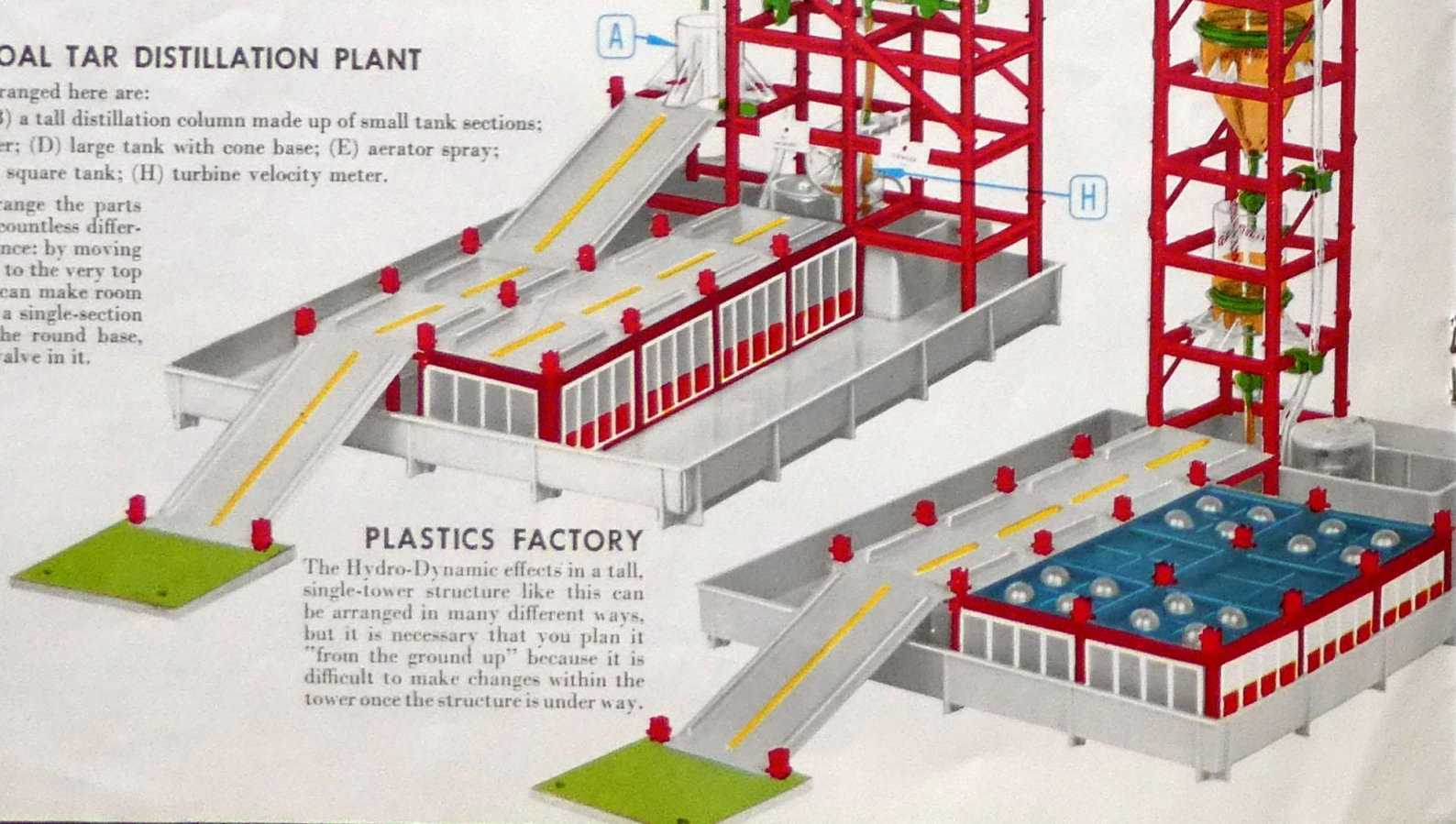
Using the experience gained in building earlier structures, you can arrange the piping as you choose, making a system in which you can vary the hydro-mechanical action.

COAL TAR DISTILLATION PLANT

The features as arranged here are:

(A) the siphon; (B) a tall distillation column made up of small tank sections; (C) ball flow meter; (D) large tank with cone base; (E) aerator spray; (F) tilt scale; (G) square tank; (H) turbine velocity meter.

You may re-arrange the parts and the piping in countless different ways, for instance: by moving the large tank (D) to the very top of the tower, you can make room below it to install a single-section large tank with the round base, and use the float valve in it.



PLASTICS FACTORY

The Hydro-Dynamic effects in a tall, single-tower structure like this can be arranged in many different ways, but it is necessary that you plan it "from the ground up" because it is difficult to make changes within the tower once the structure is under way.

These three projects use most of the parts and perform almost all the hydro-mechanical actions possible with your No. 11 Set.

- At the left is a compact four-tower arrangement. By using valves and "T" joints, the circulating system can be controlled to operate each of the effects individually or in a number of different combinations. For this reason it can be made to produce wonderful color effects; start with a different color tablet in each tank and then blend the colors in various ways.
- Below, center, is a taller type of structure with all the features visible at the same time, but separately controlled by valves.
- Below, right, is the tallest tower that can be built with Set No. 11. In this type of structure, the water would be pumped into a tank at the top, and from there it would flow down through all the tanks and features, making everything operate at the same time.

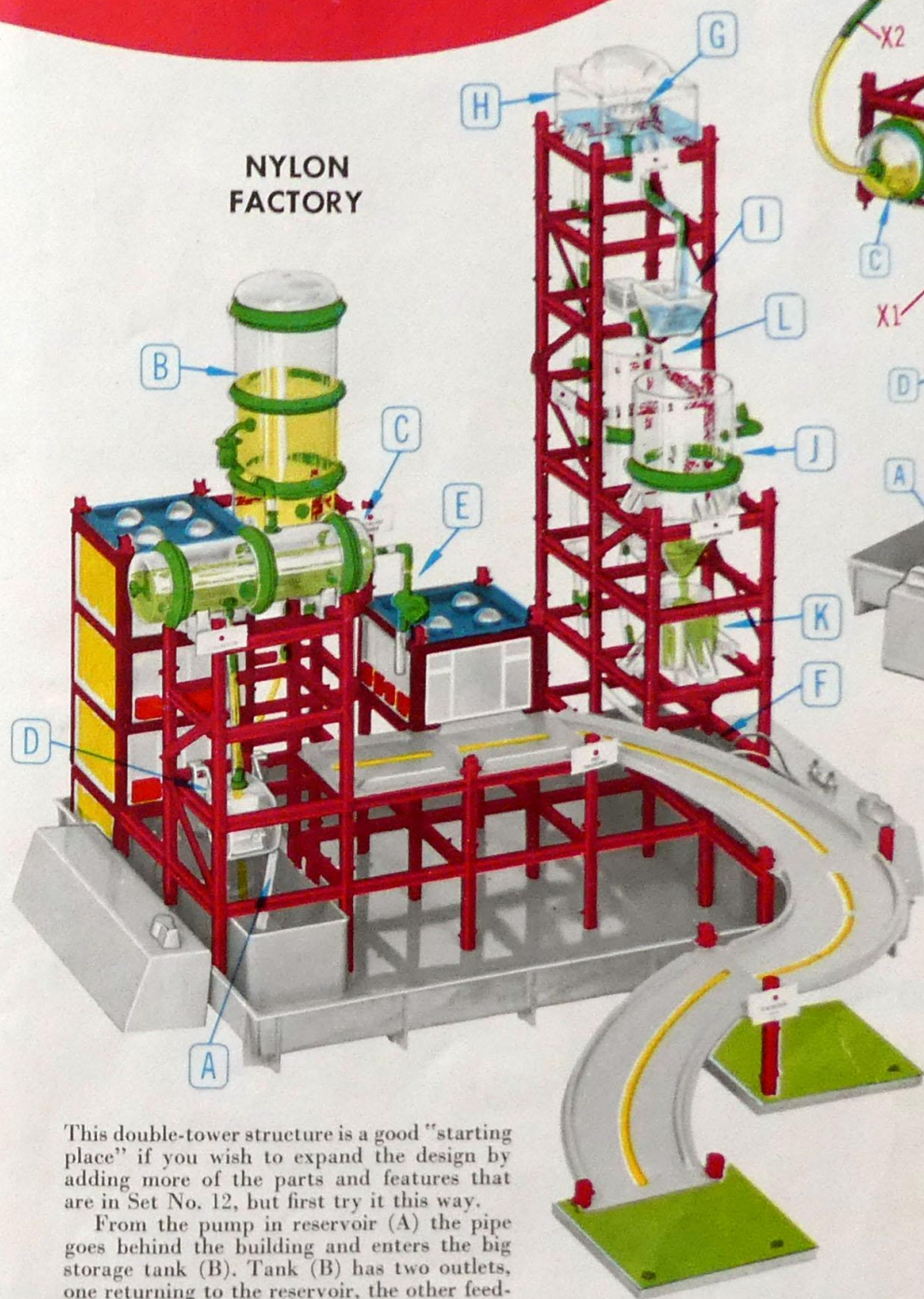
Another structure that uses all of the Hydro-Mechanical parts is the plant shown on the right hand side of the lid of your No. 11 Set.

Set No. 12 with 2 pumps, 2 reservoirs, builds bigger, more complex plants with
TWICE AS MUCH ACTION, DOUBLE THE INTEREST...even automatic control

INTRODUCTION TO CHAD VALLEY HYDRO-DYNAMIC SET NO. 12

The larger set will, of course, build anything that Set No. 11 will build. If you have Set No. 12, begin by building some of the more simple projects designed for Set No. 11, as pictured and described earlier in this book.

NYLON FACTORY

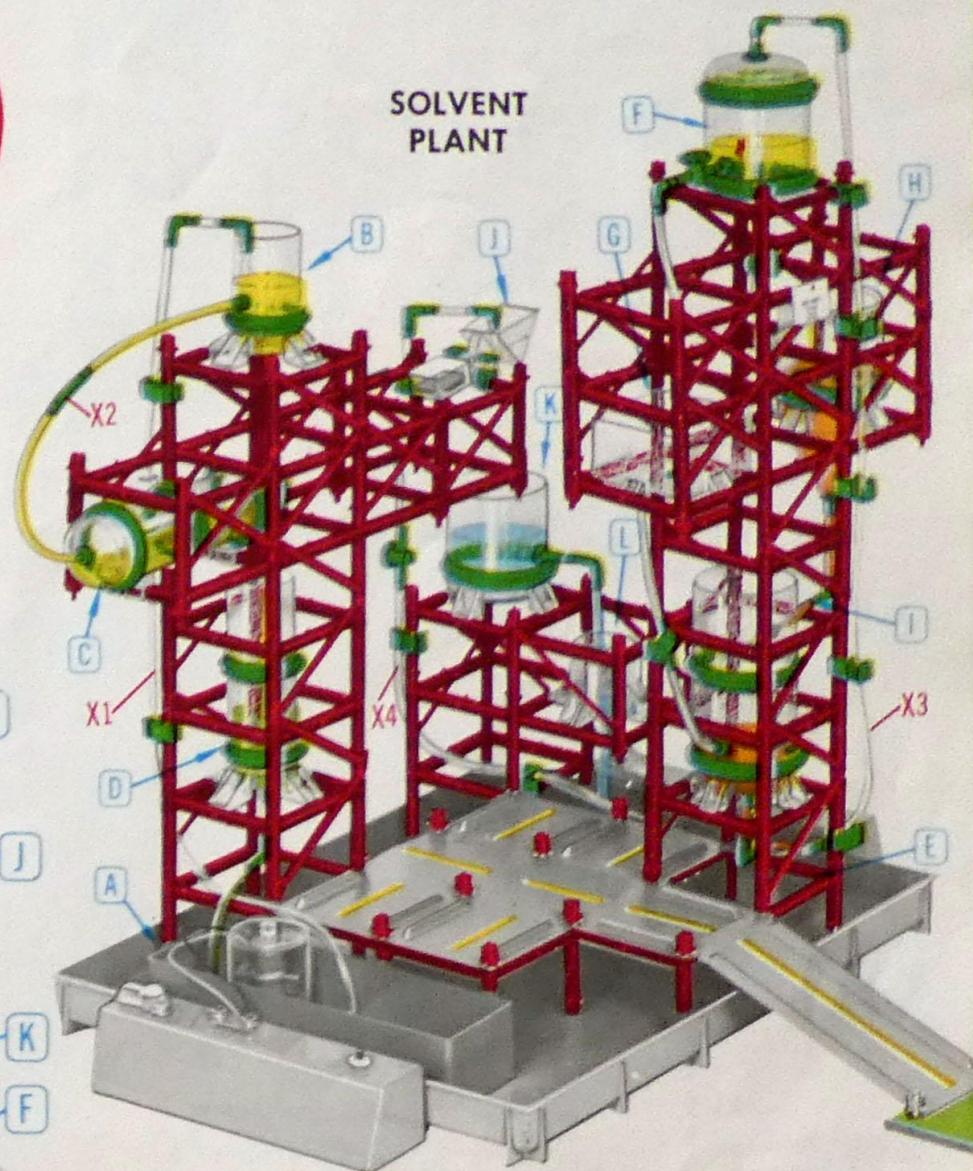


This double-tower structure is a good "starting place" if you wish to expand the design by adding more of the parts and features that are in Set No. 12, but first try it this way.

From the pump in reservoir (A) the pipe goes behind the building and enters the big storage tank (B). Tank (B) has two outlets, one returning to the reservoir, the other feeding into horizontal tank (C). Tank (C) also has two outlets, one flowing down through turbine meter (D) into the reservoir, the other (E) leading out the end of the tank with valve for filling barrels or tank trucks.

From the right-hand reservoir (F), water is pumped to the spray (G) in square tank (H). From here it flows to the tilt tank (I), to the cone-base tank (J), to the siphon (K) and back to the reservoir. An alternate outlet in the side of tank (J) feeds into the small storage tank (L) in the tower, which drains into the reservoir.

SOLVENT PLANT



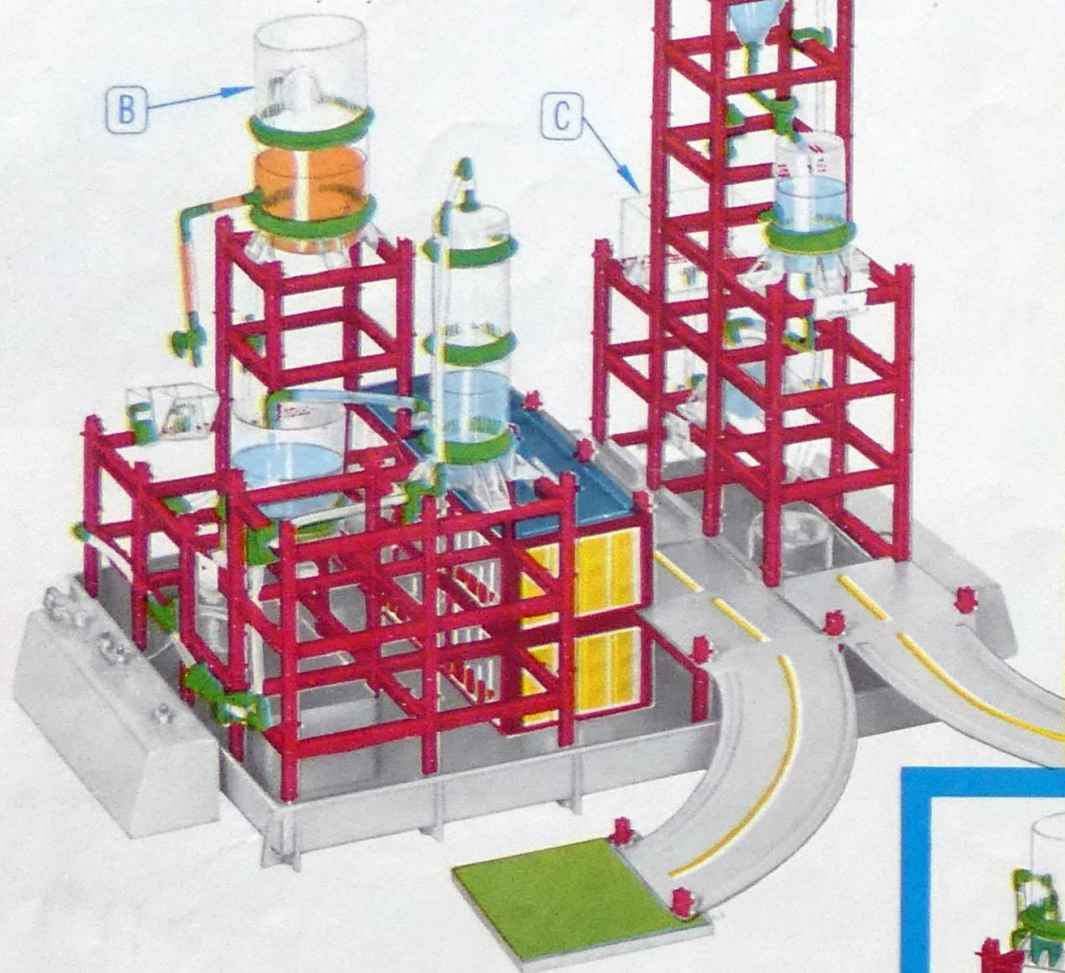
"STARTERS" FOR SET NO. 12

Here are two projects that you will find are easy to build. They are similar in many ways to the two-tower, double flow system of the "Synthetic Rubber Factory" on page 5, except that in these structures each half of the double system is served by its own pump and reservoir. To aid you with these, the flow systems are described as follows:

FOR THE PICTURE ABOVE • Flow from the reservoir nearest you (A) goes up pipe (X1) to the small tank (B), then down through pipe (X2), through the horizontal tank (C) into tank (D), and back into the reservoir (A).

From the other reservoir (E) at the far end of the tank, it is pumped up pipe (X3) to tank (F). From here it is piped either to the square tank (G) or the large cone-base tank (H), both of which feed into large round-base tank (I) which has a pipe going back to the reservoir. A "T" connection near the pump diverts part of the flow up the long pipe (X4) to the cantilevered arm on the other tower. This cantilevered arm extends toward the far side so that the tilt scale (J), which is mounted at the end of the arm, is located above the round base tank (K) so that the water from the tilt scale will pour into tank (K). From there it flows through the siphon (L) back into the far reservoir.

SOMETHING NEW IS ADDED • On these pages you will find a new kind of piping arrangement in which the two separate systems, as described on Page 7, are joined into one "intermixing" system. The structure at the bottom of this page has such a system, which is fully explained; the one in the structure at the top, however, has two separate systems. You can convert these into one "intermixing" system by following the description in the paragraph below. As shown here it has two separate systems, but it is designed so that you can inter-connect them in many ways.



ATOMIC ENERGY LABORATORY

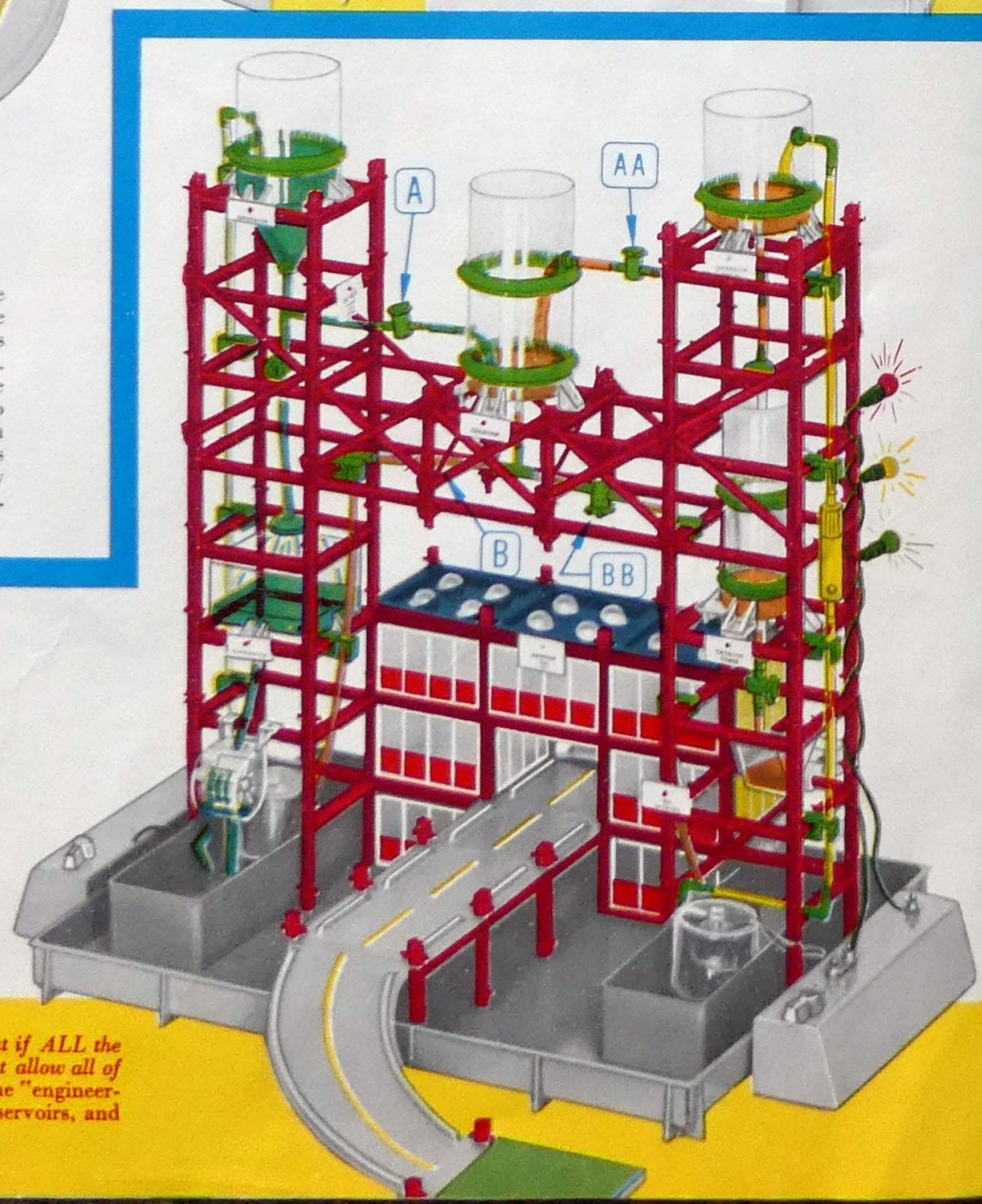
The two different views of this structure will help you figure out the piping systems. The picture at the left clearly shows the two separate tower arrangements; the other picture, looking through the towers, shows how the tanks and special effects in the separate systems are connected. To inter-connect the two systems you could do this: By a change at the "T" joint beneath tank (A), run a pipe across to tank (B) instead of into the square tank (C) as now shown. Then run another pipe from the bottom of tank (B) back to square tank (C), putting a valve into each pipe. This will let you transfer water from either system into the other. See how many other intermixing arrangements you can design for this structure.



PAINT FACTORY

This double intermixing system is inter-connected by means of pipes leading into and away from the large tank mounted in the center of the bridge span, between the two towers. Valve (A) admits water into the tank from the left-hand tower, valve (AA) from the right. Valve (B) lets water out of the tank into the reservoir at the left, valve (BB) into the reservoir at the right. You can let it flow in and out in both directions at the same time, or can shut it off altogether, by turning the valves.

This is a fine example of an arrangement for using color tablets to best advantage. Put a different color tablet in each of the four tanks in the towers. You can mix two colors in the left tower, two others in the right, then all together in the center tank.

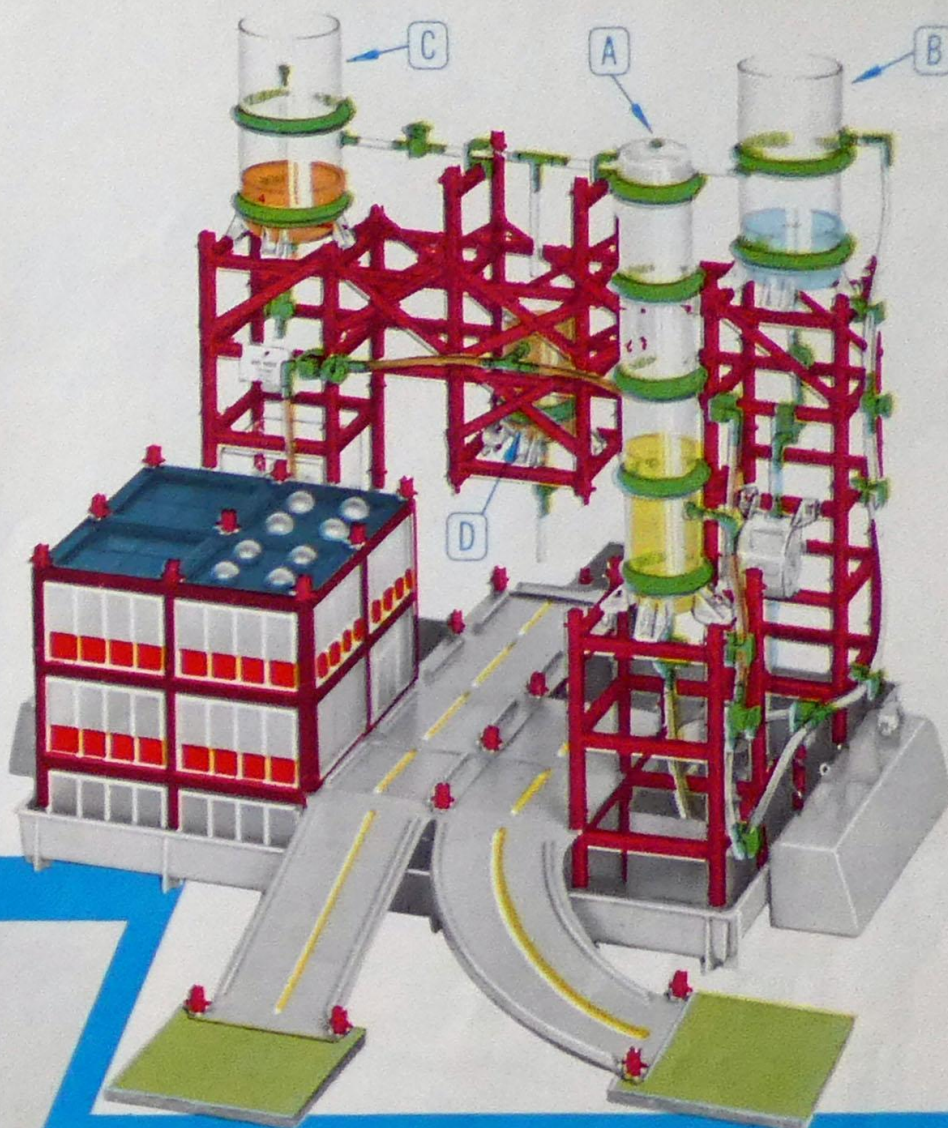


In operating inter-connected systems such as this, you must bear in mind that if ALL the water from BOTH reservoirs, has been pumped up into the tanks, you cannot allow all of it to drain back into just ONE reservoir as it will overflow into the tray. As the "engineer-in-charge" you must keep an eye on the water levels in all tanks and reservoirs, and manipulate the valves and pump switches to maintain proper levels.

OIL REFINERY

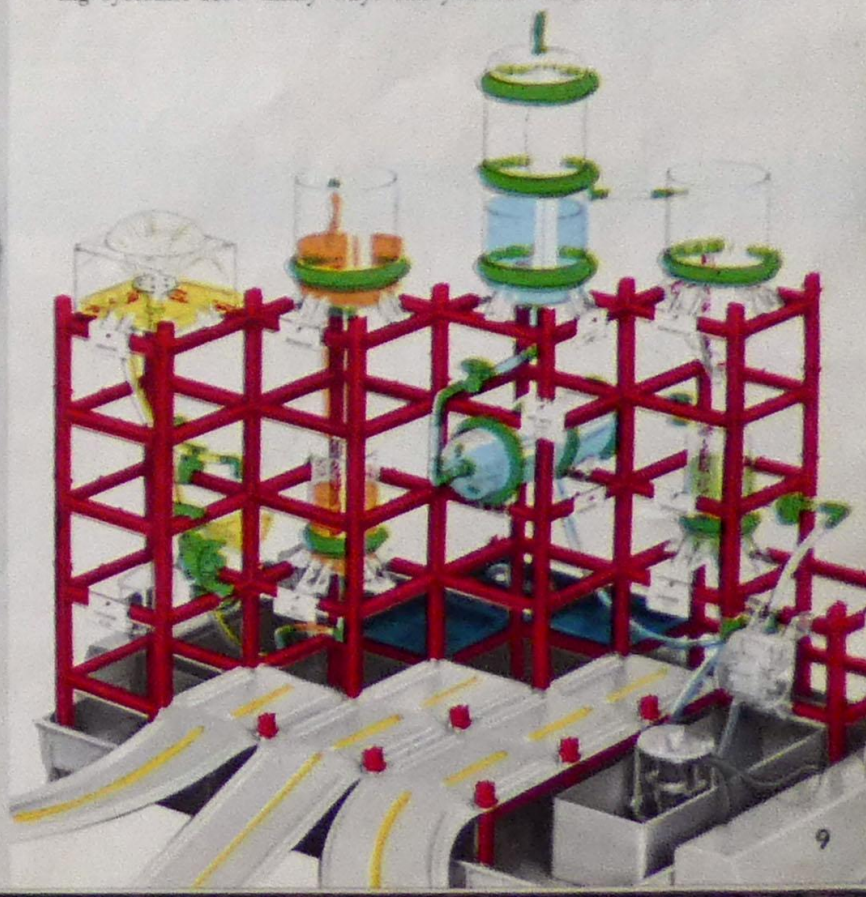
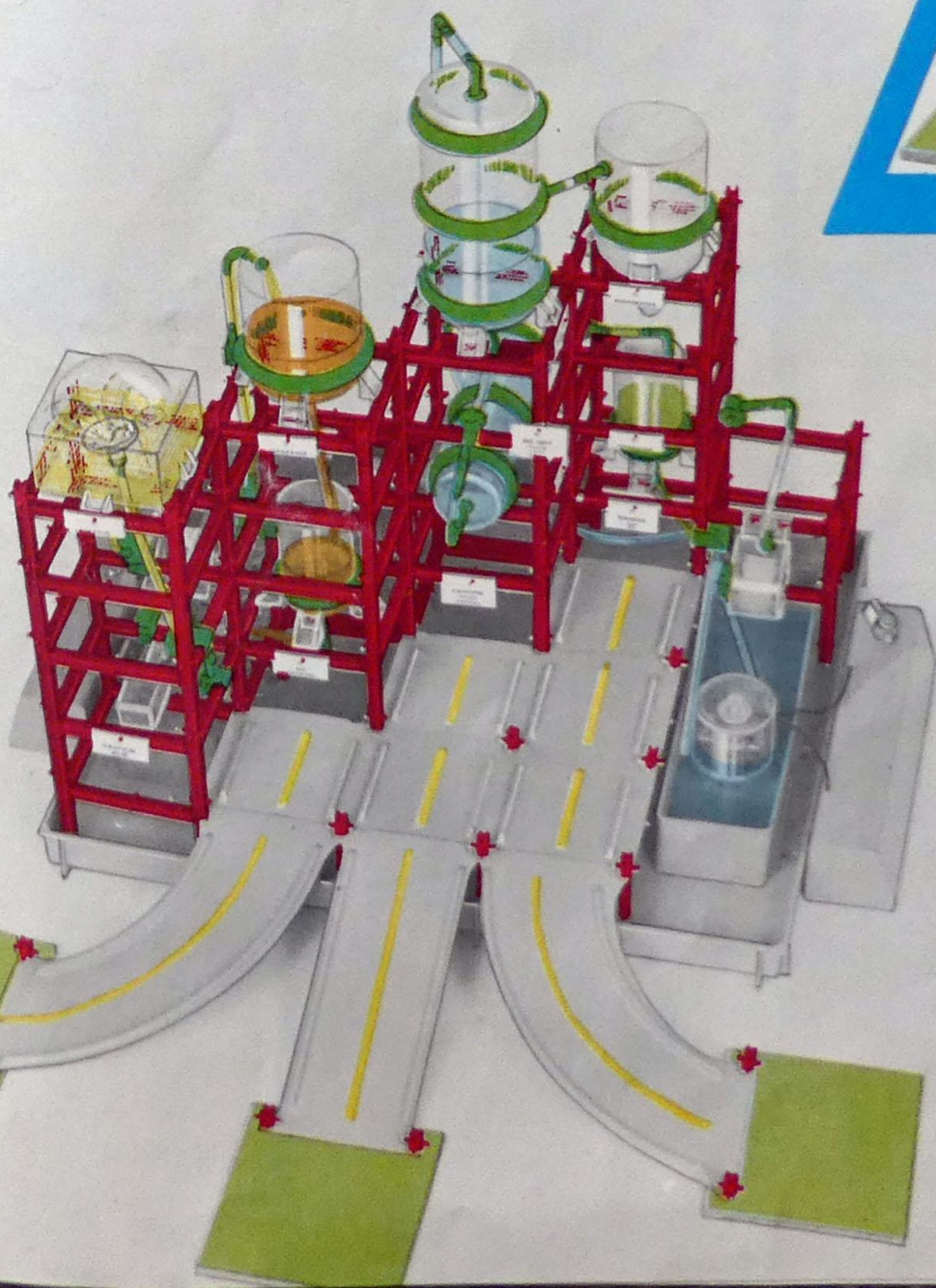
Here is another view of the big No. 12 structure pictured on the cover of this book. Each of the three tower systems can be operated individually, or they can all be operated at the same time. If 3 color tablets are used, they can all be blended together in the small tank (D) in the middle. Here is an example of one way to operate this system:

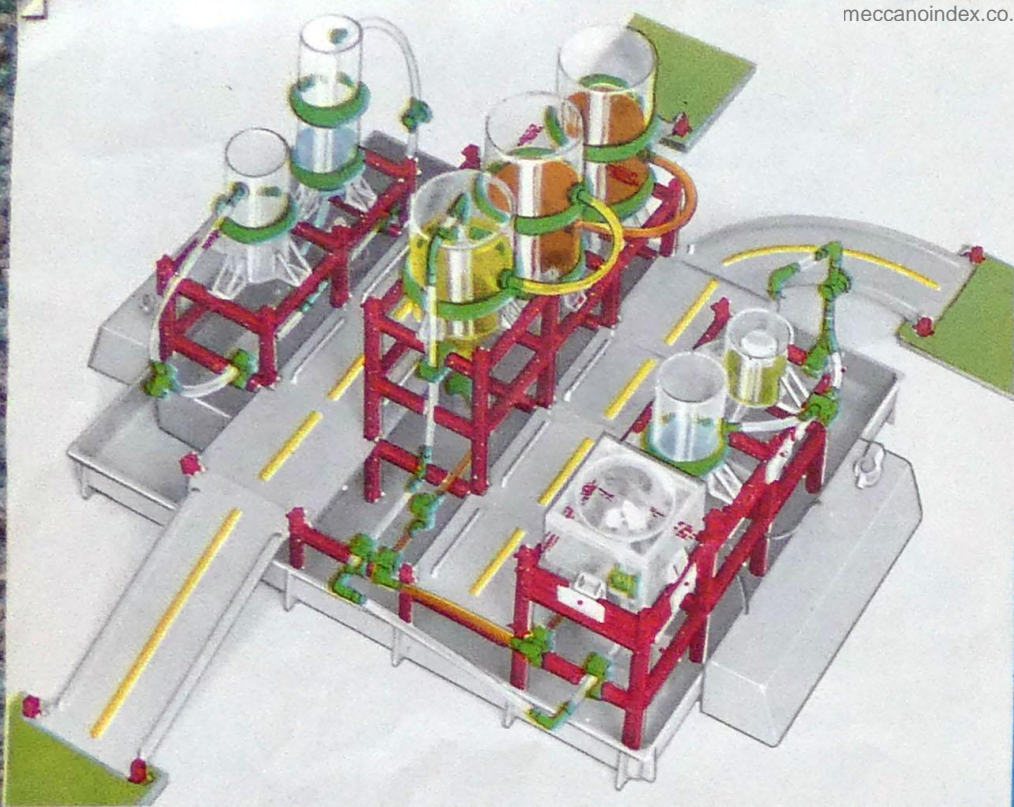
The pump in the right-hand reservoir fills the tall distillation column (A) which contains a Yellow tablet. Then it will fill tank (B) which contains a Blue tablet. Meanwhile the pump in the other reservoir has filled tank (C) which contains an Orange tablet. Now, tank (A) can be drained directly into its reservoir (through the pipe beneath it) and tank (B) can empty through the turbine velocity meter, mixing Yellow and Blue in the reservoir; or Yellow from tank (A) can be pumped into tank (B) to mix Green there. Tanks (B) and (C) both feed into the small tank (D) from where the mixture is drawn off through the bottom valve into drums. Tank (D) is equipped with an "overflow" connection with a "T" joint so that it can drain into either reservoir.



FUEL BLENDING PLANT

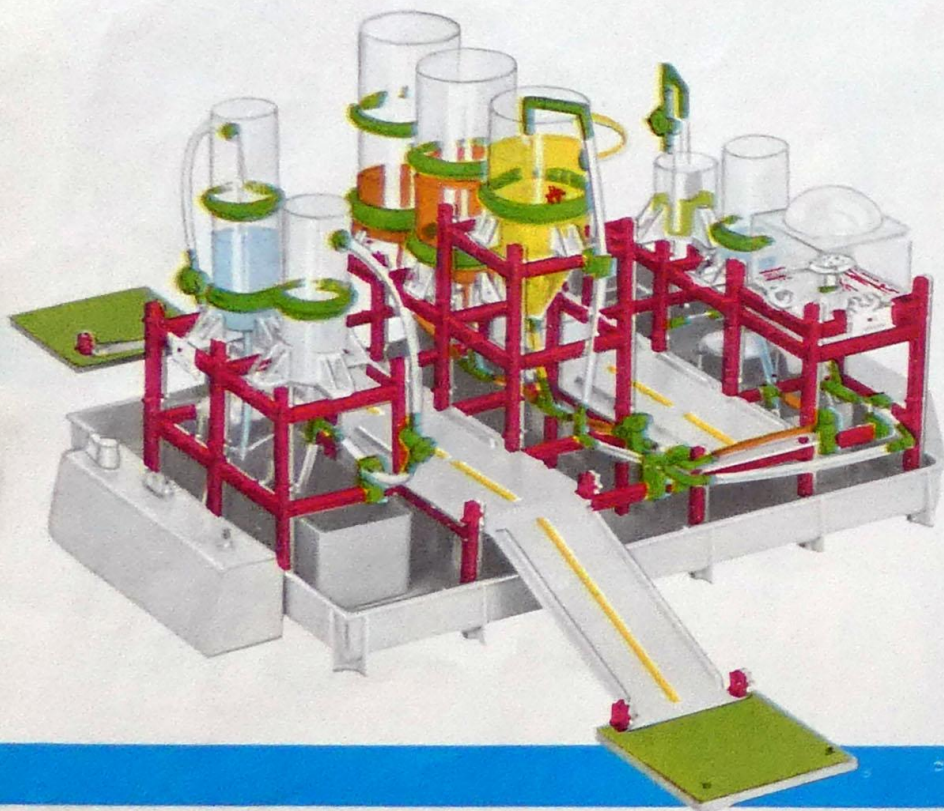
These two views (left and below) show the complete structure and piping system of this imposing factory. By comparing the two pictures you should be able to trace the entire piping system and build this with no further aid. You will see that it now has two separate circulating systems. How many ways can you find to inter-connect them?





WATER PURIFICATION INSTALLATION

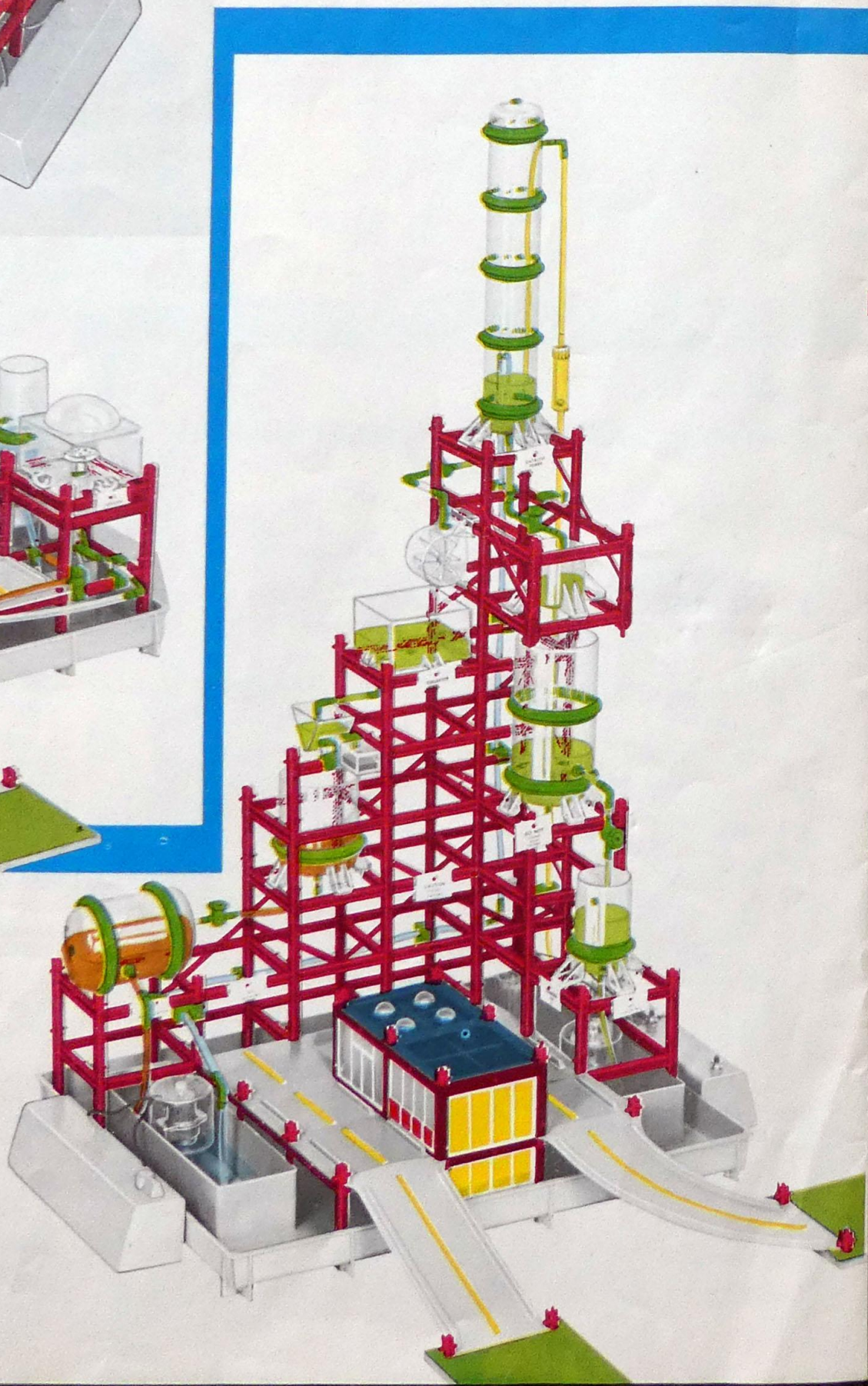
This is a hydraulic engineer's ideal. It contains every tank part, every "T" joint, and every valve in Set No. 12. Tanks can be filled and emptied individually or in combination. From these two views you should be able to construct this with no further explanation. Perhaps you can figure out some cross-over connections so the two pumps can alternate in operating the various tank combinations.



CATALYTIC CRACKING PLANT

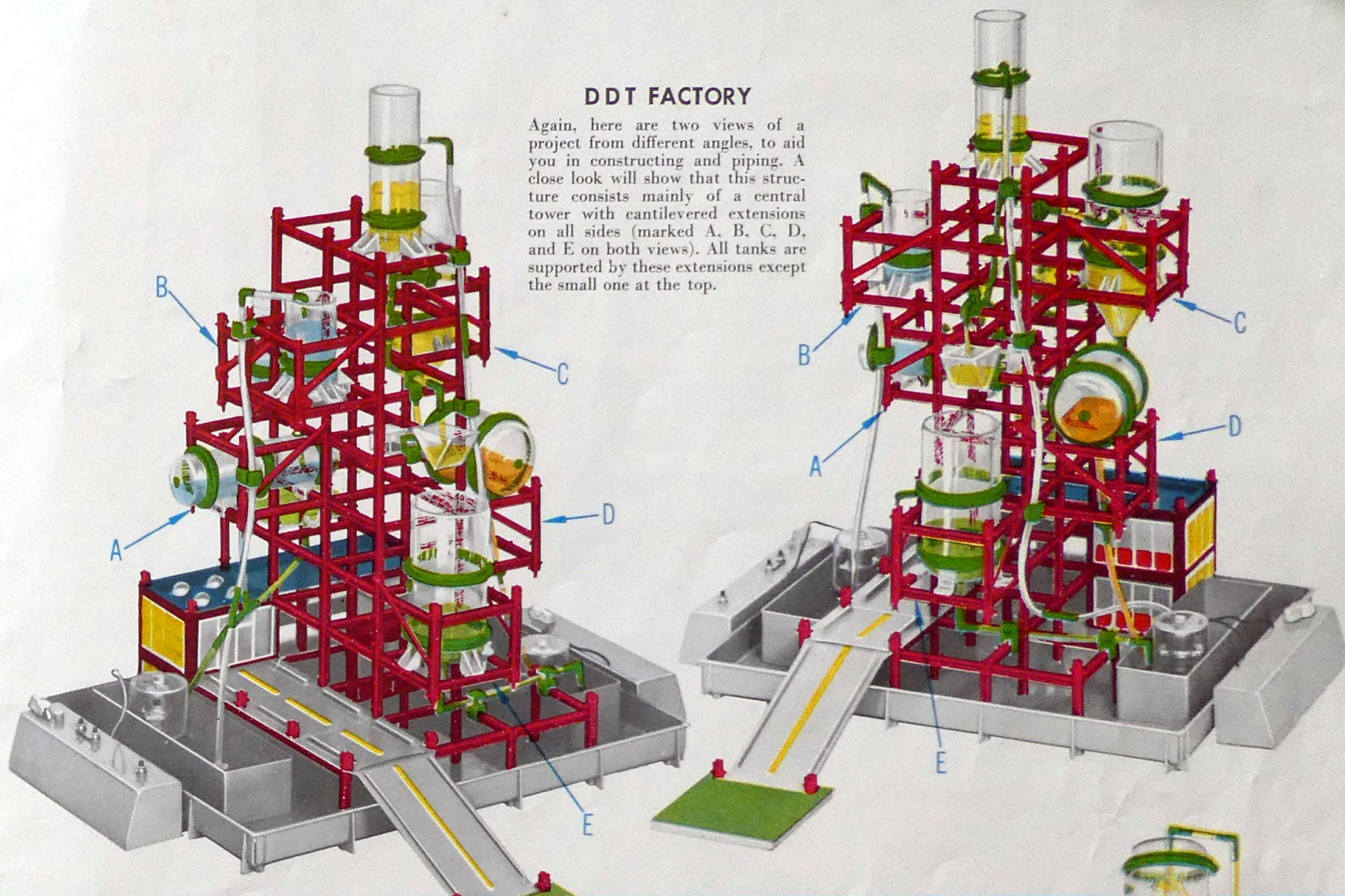
This impressive structure is a double intermixing system. Both pumps are connected directly, by long pipes, to the tall tank on top of the tower. From this tank the water will return to either of the reservoirs, depending on which valves you open. A similar structure is shown on the lid of your No. 12 Set.

Remember, that if ALL the water from BOTH reservoirs returns to ONE reservoir, it will overflow into the tray. To be sure that this does not happen, adjust the flow with the control valves.



DDT FACTORY

Again, here are two views of a project from different angles, to aid you in constructing and piping. A close look will show that this structure consists mainly of a central tower with cantilevered extensions on all sides (marked A, B, C, D, and E on both views). All tanks are supported by these extensions except the small one at the top.

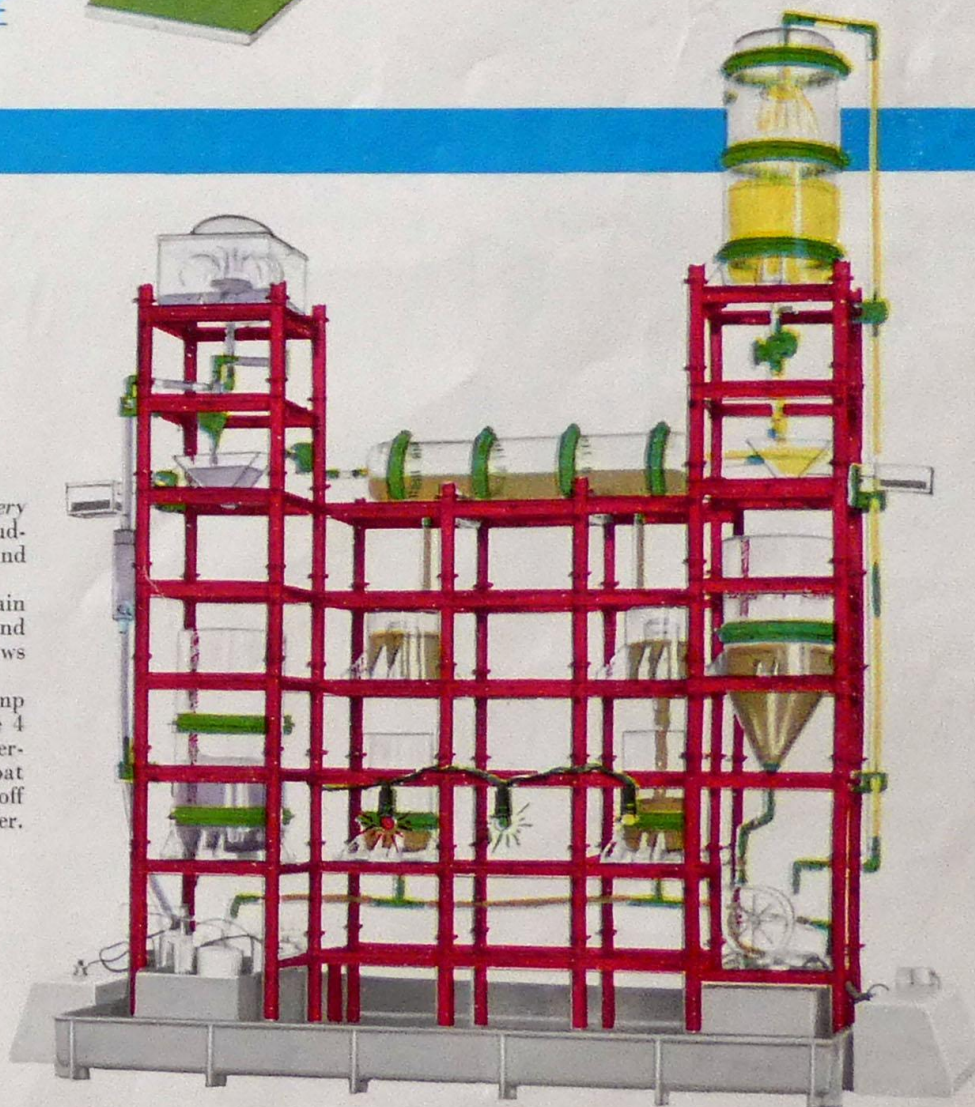


ALCOHOL DISTILLATION PLANT

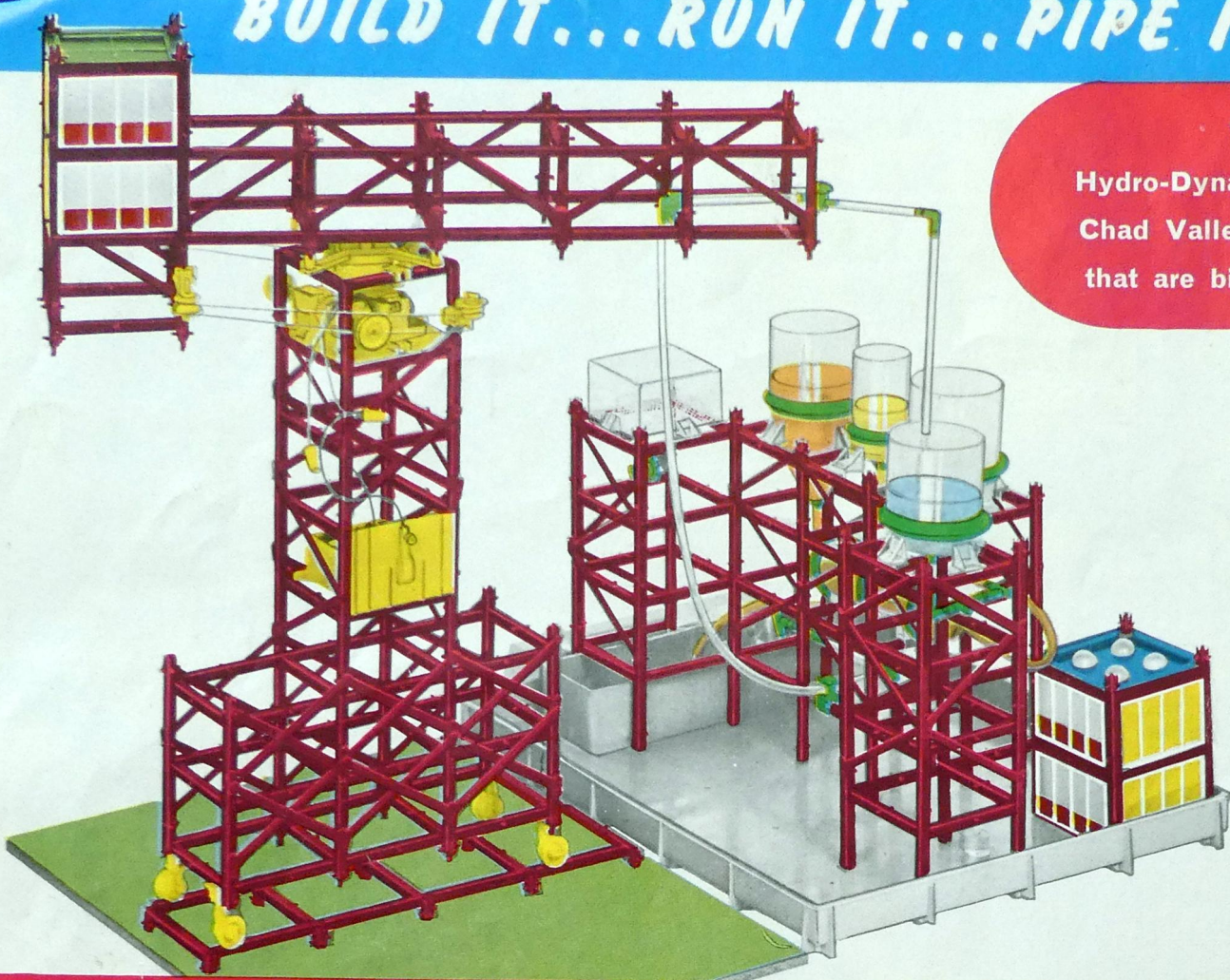
This easy-to-build structure, shown on your Set No. 12 lid, utilizes *every* tank and *every* hydro-mechanical feature contained in Set No. 12, including *automatic control* of the lights by the Float Switch in the left hand reservoir.

This is a "double" factory. The right and left hand towers contain similar distillation facilities so that two types of alcohol can be made and blended in the horizontal tank in the center. From here, the blend flows through both systems and back into either reservoir.

To incorporate the lights into this distillery, disconnect the pump jumper and connect the float switch and lights as described on page 4 of the "Basic Instructions". In this way, the lights will act as an "overflow" warning. As the water level in the left hand reservoir rises, the Float Switch will turn on the lights. This is a signal for the operator to shut off the flow to this reservoir, connect the pump, and re-circulate the water.



BUILD IT...RUN IT...PIPE IT...PUMP IT



You can combine your Hydro-Dynamic Building Set with any other Chad Valley Building Set to make structures that are bigger, more interesting, more fun!

PETROLEUM STORAGE DEPOT

HYDRO-DYNAMIC
BUILDING SET No. 11
combined with
MOTORIZED GIRDER & PANEL
BUILDING SET No. 8

Here is a motorized crane, built with Chad Valley MOTORIZED Building Set, to which is attached the filler pipe. By controlling the crane arm, the operator can fill any of the five petroleum storage tanks.

Chad Valley BUILDING SETS

GIRDER & PANEL BUILDING SETS

Build Modern Buildings with Girders and Prefab Panels

SET No. G300R—62 pieces.....	12/11
SET No. G301R—106 pieces.....	19/6
SET No. G302R—189 pieces.....	32/6
SET No. G303R—287 pieces.....	45/-

BRIDGE & ROADWAYS BUILDING SETS

Build Realistic Bridges, Roadways and Flyovers

SET No. G299R—121 pieces.....	15/6
SET No. G304R—214 pieces.....	22/11
SET No. G305R—330 pieces.....	42/6
SET No. G316R—543 pieces.....	67/6

COMBINED GIRDER & PANEL and BRIDGE & ROADWAYS BUILDING SET

Build Wonderful Buildings, Bridges and Roadways

SET No. G317R—605 pieces.....	82/6
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MOTORIZED GIRDER & PANEL and BRIDGE & ROADWAYS BUILDING SETS

Build Buildings with Elevators, Draw Bridges, Cranes, Conveyors and many more battery-powered structures

SET No. G318R—640 pieces.....	118/6
SET No. G319R—860 pieces.....	180/-
SET No. G320R—MOTORIZING KIT for any Chad Valley Building Set.....	42/6

HYDRO-DYNAMIC BUILDING SETS

Build and Operate Industrial Structures with powered HYDRO-MECHANICAL ACTION

SET No. G331R—398 pieces.....	125/-
SET No. G332R—592 pieces.....	200/-

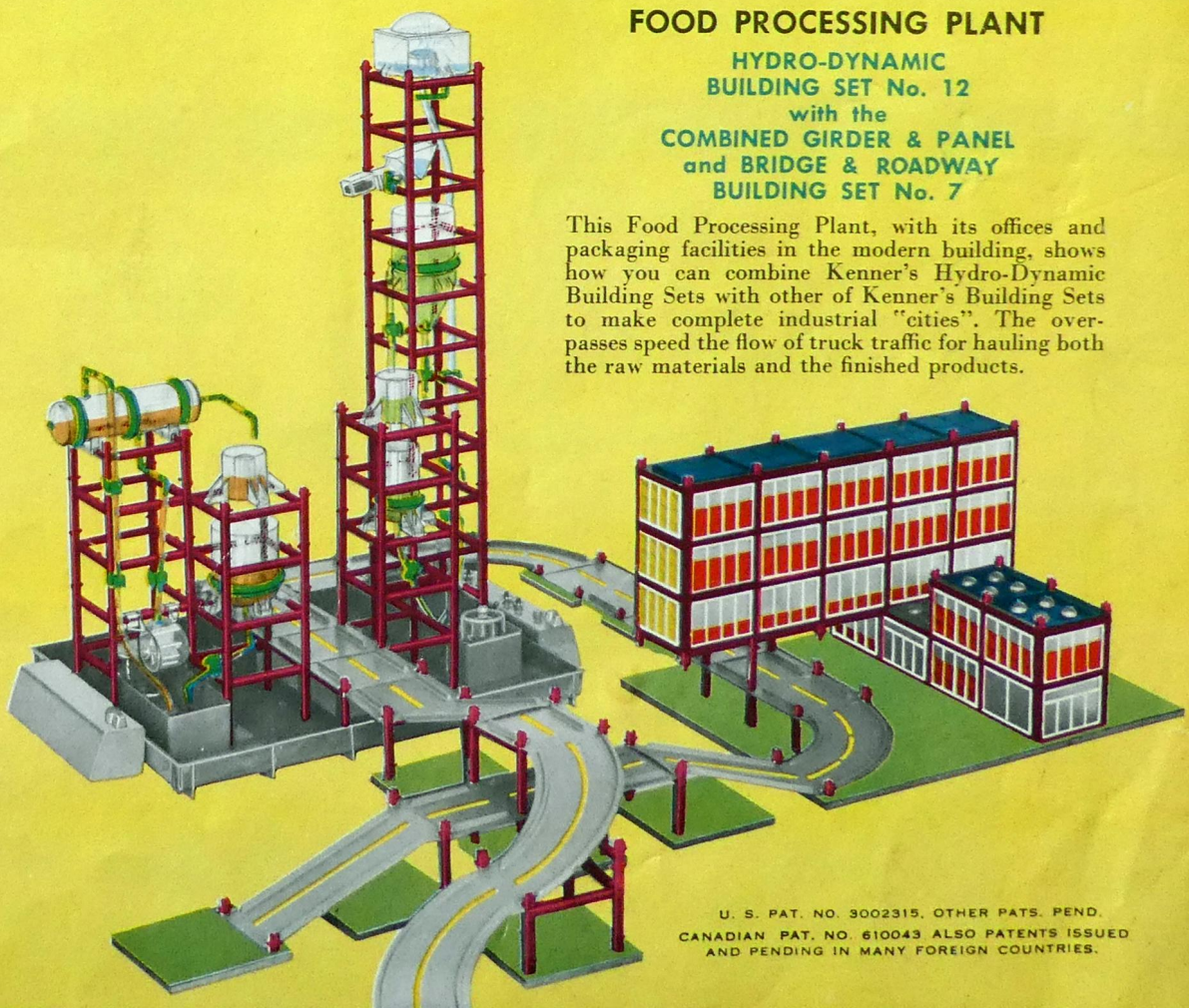
BUILD-A-HOME & SUBDIVISION SETS

SET No. G333R—108 pieces.....	22/6
SET No. G334R—194 pieces.....	45/-
SET No. G335R—398 pieces.....	87/6

FOOD PROCESSING PLANT

HYDRO-DYNAMIC
BUILDING SET No. 12
with the
COMBINED GIRDER & PANEL
and BRIDGE & ROADWAY
BUILDING SET No. 7

This Food Processing Plant, with its offices and packaging facilities in the modern building, shows how you can combine Kenner's Hydro-Dynamic Building Sets with other of Kenner's Building Sets to make complete industrial "cities". The over-passes speed the flow of truck traffic for hauling both the raw materials and the finished products.



U. S. PAT. NO. 3002315, OTHER PATS. PEND.
CANADIAN PAT. NO. 610043 ALSO PATENTS ISSUED
AND PENDING IN MANY FOREIGN COUNTRIES.

CHAD VALLEY CO LTD
HARBORNE
ENGLAND