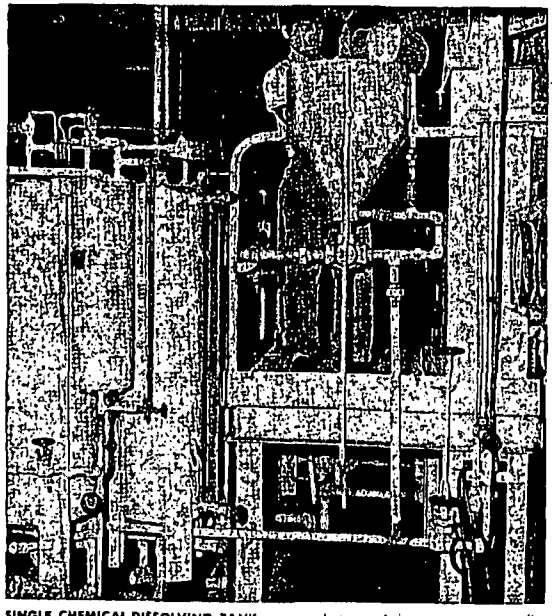
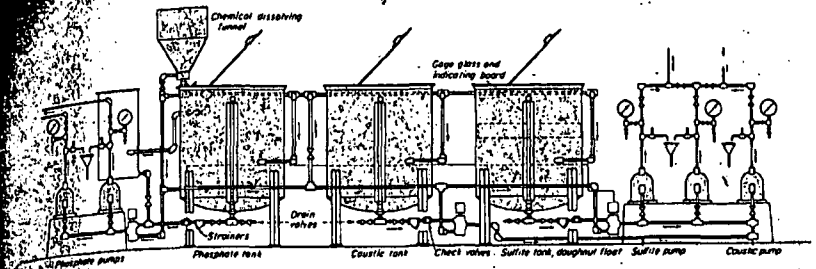


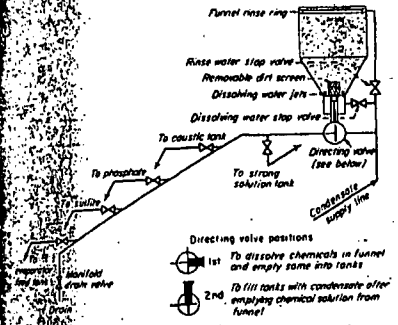
SINGLE CHEMICAL-DISSOLVING TANK serves a battery of separate storage tanks, Fig. 1 and 2. It gives a relatively small design, lets you use stainless metals

CHEMICAL FEED TANK CHARGING INSTRUCTION

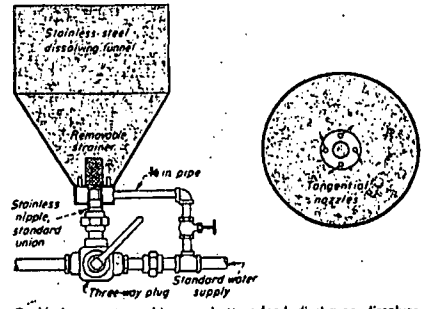
- Weigh out the required chemical in bucket provided
- Open necessary vent valves to
- Open drain valve on bottom of tank charged. Flush same by opening manifold valve to that tank, placing directing in second position (handle vertical)
- After flushing, close manifold valve, directing valve to first position (handle horizontal). Fill funnel to 6-in. depth with "rinse-ring" valve. Then close this valve
- Open the dissolving-water stop valve water rotates in funnel gradually stir chemical into funnel in such a way as to it all in just before water reaches the flow pipe
- Close dissolving-water stop valve, open manifold valve to tank to be charged, solution to drain into tank. When funnel empty, flush by briefly opening "rinse-ring" stop valve to clean funnel of chemical
- Complete filling the tank by placing directing valve in second position (handle vertical). When tank is full, close manifold
- Open manifold drain valve a few seconds flush line, then close. Restore directing to first position (handle horizontal)
- Reset vent valves when necessary (except feed, sulfite tanks) to draw from bottom
- When not in use, all chemical charging shall be in the closed position



1 The complete piping and physical layout of a working chemical-feeding design indicates how the low-head bottom-discharge dissolver in the photo on facing page fits smoothly into the simplified flow procedure pictured below in Fig. 2



2 Schematic arrangement of dissolver and storage-tank portions, the role of manifold in simplifying design layout



3 Various parts making up bottom-feed discharge dissolver have standard dimensions, use stainless steel where needed

Troublefree Chemical Feed System Results From an Integrated Design

Seemingly simple job of dissolving and feeding chemicals into a boiler-water cycle raises problems all its own. Here's a sure method that's proved fully reliable over a 5-year period in a large-scale central station plant out in California

By R C ALEXANDER
Mechanical Engineer
Department of Water & Power
Los Angeles, Calif.

► So MANY POWER PLANTS across the country use roughly the same chemicals for water treatment that you'd expect some general agreement on what's good equipment for feeding these chemicals into the boiler cycle. But actually you'll find anything but agreement. In many instances this seemingly simple process proves a source of operating troubles.

The more important phases of the chemical-feeding problem fall into three divisions: (1) pickup of unwanted outside air (2) handling of sticky, intermediary pastes (3) removal of undesirable insolubles in commercial grades of chemicals as supplied.

Outside Air. In dissolving a solid salt like sodium sulfite it is essential to complete the solution as quickly as possible with as little air pickup as possible. The longer the time, the more outside air reaction takes place. Then the chemical has less working capacity to deliver where you want it most—in the feed-water. The newly developed catalyzed sulfites have greatly accelerated oxidation rates so time and aeration factors are of even greater consequence.

Sticky Pastes. Certain other chemicals, like finely powdered anhydrous disodium phosphate, form sticky, hard-to-dissolve pastes that require vigorous mechanical agitation.

Undesirable Insolubles. Industrial commercial-grade chemicals ordinarily contain a small percentage of insolubles that should be screened out to protect chemical feed pumps, check valves, lines, control valves.

Each and every one of these difficulties can be solved by proper design. What's more, the overriding headache of corrosion to chemical feeder parts can also be reduced or controlled entirely in the design stage. It's always an interesting point for the average operator to realize sodium sulfite, commonly used to prevent oxidation corrosion in [illegible] causes severe corrosion of the steel storage tanks.

Ideal approach to meeting all these problems is to design for separate storage tanks for the different chemicals you'll use. Then put in a piping manifold, Fig. 2, to a single dissolver. This allows you to hold the dissolver design relatively small, and hence use stainless metals in corrosive areas.

Such an interconnecting system, though, requires adequate flushing facilities. This alone insures freedom from any contamination of later solutions by traces of previously mixed chemicals.

Screening. In the order of 60 mesh or finer can be installed on the dissolver tank, Fig. 3, to prevent undesirable insolubles. It should be removable and easily seen by the operator so he can clean it as often as needed. Experience shows stainless-steel screening, silver-soldered in place, gives best results. Ultimate aim of the dissolver is to supply a solution carrying the correct weight of chemicals, completely mixed throughout, with no stratification and as free of contaminants as possible.

Working System. Illustrations on these pages show a chemical storage and dissolving system in service at the Harbor Steam Plant, Unit No. 2, that has hung up a completely satisfactory 5-yr record. It involves chemical mixing and feedings, and handles sodium hydroxide, sodium sulfite, disodium phosphate, strong solutions for boiler and feed-water treatment and mixed chemicals for evaporator liquor treatment. Fig. 2 shows the essentials of the system, its special dissolving funnel and the various storage-tank manifold piping.

The funnel, Fig. 2, 3, is built above an annular chamber, which houses four tangent nozzles, right, Fig. 3. Water enters this chamber from the nozzles and gives a vigorous swirling motion to the liquid as the funnel fills. When this swirling liquid reaches a suitable height in the funnel, the dry chemical is added at a high rate. There is little tendency for the chemical to agglomerate into a paste since the hydraulic shear forces break up the chemical. In fact, we've run tests where we've fed as high as 5 lb of fine powdered anhydrous sodium sulfite, in mass, and found it completely dissolved by the time the funnel was full.

Once the dissolving is complete we open the proper tank valve and let the solution drain by gravity from the dissolver into that tank. Then we bring water through the funnel rinse-ring to thoroughly clean all parts of any adherent solution. This rinse water flows out through the gravity feed line into the storage tank so the manifold is also thoroughly flushed. In addition a drain, fitting to the sewer, ties in at the end of the manifold so the flushing can be carried out for the full manifold length when so desired.