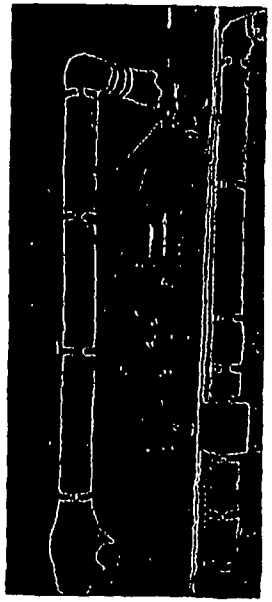
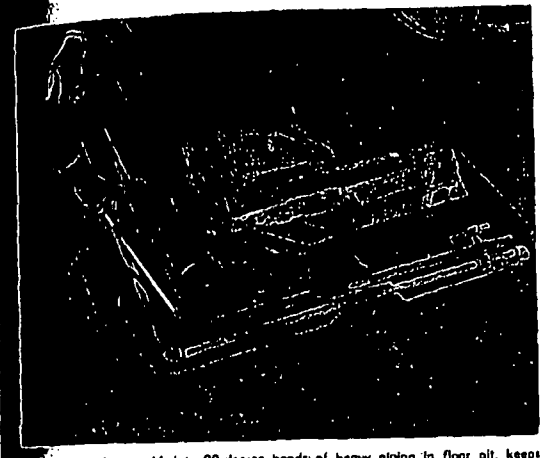
TWO-INCH extra-heavy piping is welded at bends to stop vibration in hp lines



SMALLER piping-braces are welded here to hydraulic lines to stop any "shimmy"

SHEET IRON is welded to inside of slight bends on pipe's opposite

# High-Pressure Hydraulic Piping Gave Trouble at 3300 psi Until These Changes Were Made



HEAVY strap iron, welded to 90-degree bends of heavy piping in floor pit, keeps pressure from straining piping at elbows. This also solved vibration problem

► It's ALWAYS a pleasure to run into a chief engineer of the old school. Driving through Palmyra, N. Y. recently, I was attracted by the one big smokestack in town. It turned out to be The Garlock Packing Co's power plant.

Inside, I found Howard Spanganberg, who has been chief engineer in the same plant since 1928. He was glad to see a POWER editor because he's been reading POWER religiously all these years. A trip through his plant soon showed me that Howard has a man-sized job. With the firm growing steadily through the years, the manufacturing plants have always demanded more and still more power. About the time one new unit is *installed, another is overworked,* and Spanganberg's headaches start all over.

At present, a new 100,000-lb-per-hour *boiler* and a *3000-kw* steam-turbine electric generator, complete with condenser, are being installed. A few months ago, two new triplex, variable-stroke, pumps for hydraulic service were installed:

Back in his office I asked Howard to tell me about some problems he's had to solve. That's when he pulled a large, well-filled photo album out of his desk drawer. Album is filled with photos of his associates, interesting repair jobs, and many other things that have taken place in his plant. It was easy to see that his plant and his associates are as important to him as his home and his family.

**Flood.** "Here's one headache that had us all sweating," said Howard, showing me photos of water around his plant. "We had our first flood in 1942. Then it paid us a return visit in 1950. There was 36-in. of water against our plant wall here when 'Garlock Lake' got rambunctious.

"In '42, we placed large 2-in. planks *against all openings around the power-*house, then dumped truck loads of clay against the planks to seal them. Water came up so fast we had only four hours before it got to our building wall. Then, just as we got to feeling smug about the whole thing, we found water flowing into our cistern inside the plant. Trouble was a faulty sluice gate that we couldn't close. The gate hadn't been closed for some time, and now it didn't work.

"But we had to keep the plant [illegible] So we hooked three pumps to the ci[stern] and ran their discharge outside (photo). Three pumps running at full capac[ity] shoved water outside at the rate of 5[000] gpm. That just *did* keep water down [in] the cistern.

"That flood taught us a lesson [all] plants might profit from," said How[ard] good-naturedly. "Now we are *prepar[ed]* if the water pays us a return *engage*ment. Our answer is large sheet-[iron] partitions that fit against the pow[er] plant doors (photo). If a flood shou[ld] threaten, we can bolt these pla[tes] against angle-irons fastened into [the] brick work at all openings. With *a gasket at each joint, there's no dan[ger]* of water getting in. That's quicker [and] easier than building wooden walls a[nd] hauling clay.

"Take a look at these photos," [said] Howard, thumbing through his pho[to] album. And there I saw every detail [of] that event, recorded faithfully.

"Too bad more power engineers do[n't] keep a picture history of their plants," I commented. "That's a mighty val[uable] reference for young engineers [who] coming in here to learn this game."

**Vibration Solved.** "A few months ago we installed two new variable-stroke, motor-driven, triplex pumps," continued Howard. Each delivers from 0- to 55-gpm water against discharge pressures up to 3300 psi. These pumps are vertical and have built-in, double reduction-geared drive, *with motor* mounted above the pump frame. Each pump is driven at constant crankshaft speed of 236 rpm. Motors are 125 hp, 1800 rpm, synchronous, having 80% leading power factor. They are excited from external, 125-volt dc power," said Howard.

"Pumps discharge into air-loaded, hydraulic accumulator of 250-gallon capacity. An accumulator shutoff valve automatically isolates accumulator from *hydraulic system if any high-pressure* piping ruptures. That avoids losing the compressed-air charge that loads accumulator.

"These triplex units are in the power plant and supply the many hydraulic presses in the manufacturing buildings. Rams of hydraulic presses are first operated by 180-psi water from centrifugal pumps. Then these triplex pumps take over by driving the rams home at over 3000 psi and holding presses closed while they cure products under high temperature. So only a small amount of water need be delivered by triplex pumps at high pressures.

"These pumps work like a charm," said Spanganberg, "but the piping between pumps and accumulating bottle vibrated so badly we hated to use the *pumps.* Of course, the manufacturer had told us we might have vibration. On some installations there is no trouble, then on an identical *job* the *vibration* may be pretty bad.

"We took the manufacturer's suggestion," said Howard, "and braced the piping." (see photos) "Extra-heavy pipe was welded to each bend from two angles. This keeps the bends from straining when at 3300 psi. It also braces piping against *vibration.* On unlagged piping, where bends are slight, we welded sheet iron on inside of bends. On larger lines in the floor pit, we welded heavy strap iron, to hold all 90-degree bends together. That not only stopped vibration, but also took most strain off elbows.

"This new high-pressure, hydraulic system replaced old horizontal, direct-acting steam pumps," continued Howard. "The old pumps couldn't maintain needed uniform supply pressure that presses called for. Now pressures are held steady *and press operation* has greatly improved. Also, maintenance on entire hydraulic *system* is *much* less. This is because we don't have excessive pressure pulsations now."

"You know," I said, "this method of bracing may be good insurance where there is the least indication of vibration. It not only prevents pipe fatigue, but also cuts down damage to gages, thermometers and other instruments caused by vibration. And it prevents insulation being shaken off the lines."

**Packing.** "Out in the plant, I noticed that your pumps and other equipment don't leak around the glands," I said, after looking through the album. "How do you account for that?"

"Of course, we manufacture all types of packing and gasket materials," answered Howard. "Some of my shafts are sealed with our *latest mechanical* seals. Others with our asbestos packing, or metal foil packing and other types of the many packings we manufacture."

"I'm especially interested in knowing more about mechanical seals," I said. "What's your experience with them?"

"I've found that if the right seal is used for the job," answered Howard, "it does save on maintenance. For example, there is no shaft wear because the seal *does not rub* the shaft. Instead, a carbon ring seals against a metal ring that's attached to the seals. Seal is attached to shaft on outer end and sealed against housing inside old stuffing box.

"Another advantage is there's no leakage. But a sealing problem is like any other around a power plant, it's a good *idea to get expert advice. All in all,* I guess that packing problems are about the least of my headaches."

**Boiler.** Howard *told* me about *losing* water-wall tubes in a boiler. He found the ¾-in. holes in the internal feed line in steam drum were turned up instead of down. So phosphate couldn't mix with drum water. But turning feed-line so holes pointed down solved problem.

At this point Chief Spanganberg was *called over to the new boiler,* so I figured it was a good time to shove off *before I wore out my welcome.* There were many other improvements to write about, but I'll have to let them go until after the new plant is finished. Howard likes to keep an eye on everything going in.

In leaving, I couldn't help feeling that here was a man who loved his job.