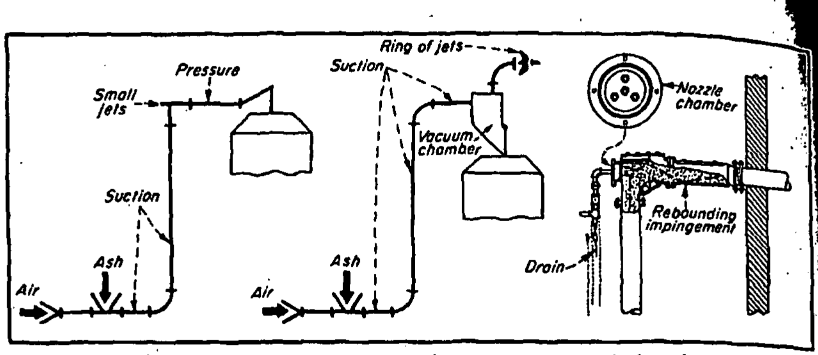


Use suction and pressure . . .

1 Parallel jets of steam at riser top expand freely toward tank, propelling ash; section lifts only to riser top

. . . not suction alone

2 Necessarily larger jets of steam must create more suction not only to lift ash but to bring it around elbow to tank

Watch the rebound

3 Remember that rebounding wear occurs beyond elbow so ample protection is needed there as well as in elbow

Tips for Pneumatic Ash Conveying

As told to Managing Editor L N Rowley
By Eugene Hahn, Hahn Equipment Co.

▶ To THE BASIC PROBLEM of handling ash, changes in firing methods have added the job of handling flyash in many plants. Presence of precipitators, *dust collectors, cinder traps and* other points of flyash deposit considerably complicates layout of ash conveyors, making good design more essential than ever.

Fortunately, the flexibility of pneumatic or "pipeline" construction favors the proper solution of the frequently tortuous and difficult layouts encountered, provided it is kept in mind that even flyash, let alone clinkery ash, con*sists of highly abrasive solids moving* at high velocities in the pipeline. This means that resistance through unnecessary elbows and turns should be avoided. Resulting free-flowing design also prevents clogging and reduces steam consumption and maintenance to a minimum. When designers forget this, they produce layouts that would be more proper for water or gas lines, where velocities are much lower and *abrasion is no problem.*

Once the best layout for given conditions has been established, it is important to arrange outlets for ash and flyash to the intake orifices of the conveyor so charging into the latter will be most convenient. This keeps down steam consumption. It also reduces volume and velocity of exhaust steam, which is responsible for carrying flyash into the atmosphere. If not eliminated entirely, this must be held to a nonobjectionable minimum.

The next problem is the convenient and so-called "dustless" unloading of ash and *flyash from the storage tank.* This is never perfect, as the disintegrated mass—fines and lumps of dusty ash and clinkers—is more difficult to handle dustlessly than uniformly fine or granular material. The first requirement is that the tank be of discharge-efficient and self-clearing design. This facilitates gradual and uniform flow instead of dropping out irregularly with a cloud of dust and without possi*bility of effective spraying to allay dust.*

Although most steam-operated equipment now boasts higher efficiencies, pipeline conveyors still tend to be the "steam hogs" of yore, when steam cost was immaterial as long as the ash was removed. In contrast to skillful exploitation of thermo dynamics in other fields, engineers often ignore the simple fact that the jet of steam should be properly expanded and propel the ma*terial in the line by pressure as well* as suction, reducing exhaust velocity to a minimum. Exhausting the steam, without first expanding it sufficiently, carries off more flyash than necessary.

In Fig. 1, parallel jets of steam at riser top expand freely toward the tank, propelling the material for this distance. Suction created by the jets needs to lift material to the riser top only. In contrast, necessarily larger jets of steam in Fig. 2 must create more suction. They must not only lift ash within the riser but must also bring it around the elbow and then to the tank, *which may be quite distant.* High-velocity exhaust is wasted to atmosphere, carrying flyash with it as an objectionable byproduct.

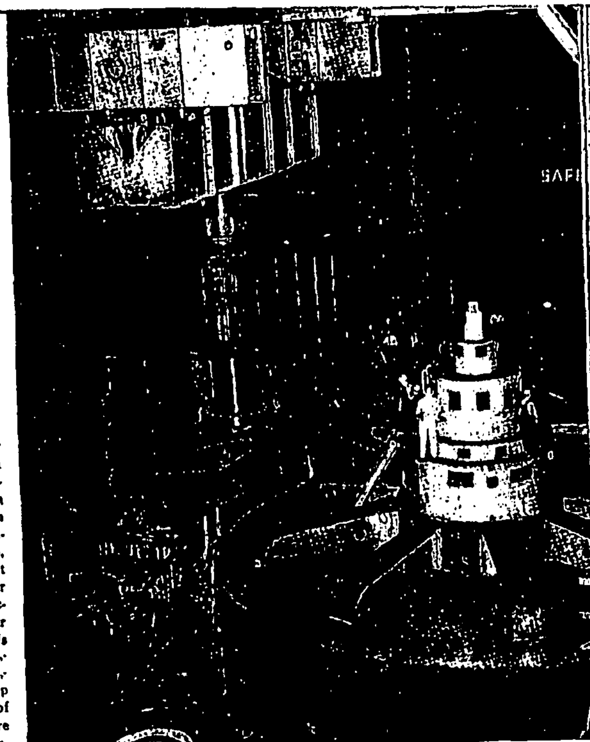
The objection may be raised that contact of steam and ash past the steam jets of Fig. 1 may cause the ash to become moist and hence less easy to clear from the tank. As this contact is a matter of a split second, moisture absorbed by the ash is hardly perceptible. *There should be no problem* with a properly designed tank. In fact, the small amount of absorbed moisture will help reduce the dust nuisance when emptying the tank.

From the maintenance angle, remember that, unlike low-velocity liquids and gases, solids at high velocity acquire momentum and thus cause rebound-wear beyond the elbow as well as impingement in it, Fig. 3. Thus ample *protection should be provided* beyond every elbow or turn in the line with readily accessible and inexpensive liners. Also, since conveyors for difficult materials such as ash and flyash should logically be rugged and simple, complicated "gadgets" should be avoided if low-cost maintenance is desired.

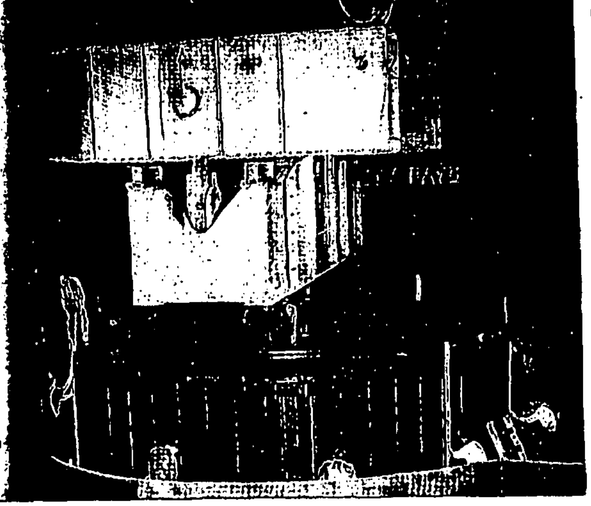
Grand Coulee Hits 1,000,000 Kw

▶ To RELIEVE the Northwest's serious power shortage, *Bureau of Reclamation* engineers rush an addition to Grand Coulee Dam's west powerhouse. Photos show generator L-8 assembly nearing completion. Plant's continuous capacity will then be over 1,000,000 kw.

Each generator is rated 108,000 kw at unity pf, but 1-L to 6-L, in operation during the war, have been loaded continuously to 130,000 kw. When a POWER editor visited the plant last July, each of the six *machines* was loaded to 125,000 kw, or 750,000 kw total. Thus, when L-8 goes into service, the plant will have a continuous rating of over 1,000,000 kw with some overload capacity to spare. L-9 is being erected for operation the early part of 1948. This will complete the plant, except one 10,000-kw service unit, and give it 1,145,000-kw capacity, largest of any group of generators in the world. Six of nine units for the east powerhouse are on order for 1949 and 1950 installation.



CRANES CARRY HUGE ROTOR. Supported by two 350-ton cranes this giant rotor (above) is moved toward its stator on right for newest generating unit in west powerhouse, now nearing completion at Grand Coulee Dam on Columbia River in Northeast Washington. Here rotor passes over unit L-7, rated 108,000 kw but good for over 125,000, which went into service last October to alleviate Pacific Northwest's power shortage



ROTOR IS LOWERED INTO STATOR. Rotor (left) of unit L-8 has dia of about 31 ft, weighs 587 tons. Workmen hold thin pieces of wood in air gap between rotor polepieces and stator core while two cranes slowly lower rotor. Clearance between its polepieces and stator core is less than one inch. This unit, which engineers of the U. S. Bureau of Reclamation put into operation recently, brings the continuous capacity of the station to over 1,000,000 kw