

(Exercise your engineering wit by submitting answers to this question, fresh from the plant. Suitable material will be sold for answers accompanied by sketches or photographs command additional pay.)

WE HAVE a 150-hp 440-v 3-phase slipring conveyor motor that has caused us to change hookup twice. It is apparent that the wrong secondary grid resistors have been shipped with this installation. We have about doubled the size of the bank, but still don't get proper speed regulation. We operate it from a 12-step drum-type controller on the secondary. It is started and stopped with start-stop pushbuttons through a magnetic contactor in the motor circuit. The primary current is 176 amp and the secondary current 190. The speed is 1150 rpm.

On the first test, under no load the rotor started at about 1000 rpm. The grids were then rearranged and some added, to give about double resistance. On the second test under full load the starting speed was still high as it was over 800 rpm.

Readers' Answers

(THIS question is from Oct issue with best answers from readers.)

We have trouble with slippage of a belt that drives an ac generator from a steam engine. The unit, an 18x42-in. 400-hp corliss with a 15-ft. flywheel, has a 28-in. face. The engine runs about 102 rpm and drives a 275-kw 60-cps ac generator through a 34-in. pulley. Generator speed is 514 rpm. Belt is 28 in. wide, of 3-ply leather. Center-to-center distance from generator pulley to engine flywheel is 20 ft. 8 in. A heavily weighted idler at the generator gives a good belt wrap on its paper pulley. Usually the generator runs synchronized with an outside power source.

Trouble is that when we carry a

heavy load of about 250 kw on the generator the belt slips on the engine flywheel, as the polished condition of the metal flywheel face shows. Slippage heats the belt noticeably and is shortening its life considerably.

I have heard that a rider belt, about half the width of the main belt and riding on top of it, greatly helps this condition. Do POWER readers agree or have they a better solution?—IM

ASSUMING AVERAGE ALTERNATOR and belt efficiencies I find that about 380 hp is transmitted for 250 kw. A 24-in. triple-ply heavy-leather belt should transmit 400 hp continuously without undue wear. Excessive load does not cause excessive slip.

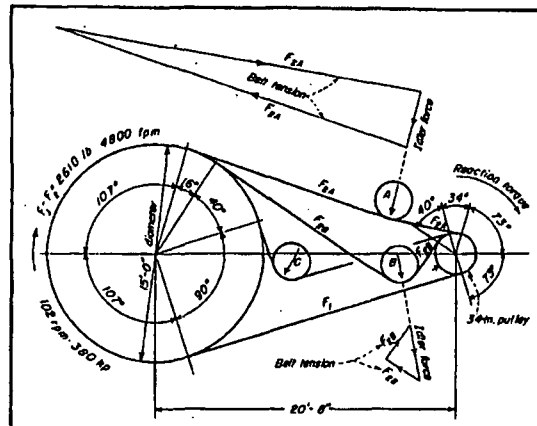
I will pass over expensive solutions, such as facing the flywheel or mounting the alternator on a pivoted base so reaction torque increases belt tension with load. We can still make improvements by relocating the idler or in-

creasing belt tension, or by doing both.

At present the idler is in position *B*, see sketch below. This gives good belt wrap on the small pulley! Actually, the coefficient of friction μ affects the angle of wrap need be only the same for each pulley. Since μ for paper is $1\frac{1}{2}$ times μ for iron, the angle of wrap on the flywheel should be $1\frac{1}{2}$ times that on the paper pulley. It is about this without any idler at all. The ratio is now $214:146$ deg. Hence, if the idler is used to increase angle of wrap, it would be far better mounted at *C* where it gives 270 deg on the flywheel and 180 deg on the generator pulley.

The given speeds indicate 4.8% slip. A trial check shows that belt tension must be low. This can be increased by increasing the load on the idler, whether in position *B* or *C*, or by shortening the belt and forcing idler to position *A*. The vector diagrams on the sketch below indicate how much this increases belt tension without increasing idler bearing loads.

It is unusual to operate a belt wider than 26 in. on a 28-in. pulley face. Working along the edges of a 28-in.



A high-contrast, black and white photograph of a multi-story brick building, likely a factory or warehouse. The building features numerous windows and a prominent sign on the right side that reads "HEAVY WORK". The image is grainy and has a high level of contrast, with deep shadows and bright highlights.

Hecht Brothers Department Store, Baltimore, Md.
Heated by Webster Steam Heating System since 1927.

This is the 20th year of Webster heating service at Hecht Brothers Department Store in Baltimore, where management has long recognized that heating comfort is an important factor in successful department store operation.

In 1927, when the present home of Hecht Brothers Department Store was built, a Webster Vacuum System of Steam Heating was specified by Abbott, Merkt & Co., Inc., New

York, Architects and Engineers. The installation included Webster Radiator Traps and Supply Valves, Webster Float and Thermostatic Traps and Dirt Strainers and a Nash Vacuum Pump. Riggs, Distler & Co., Inc., Baltimore, were the heating contractors.

In 1941, Hecht Brothers decided to discontinue their coal-burning boiler plant and purchase street steam from the Consolidated Gas Electric

Light & Power Co. On the recommendation of the Gas & Electric Company, they decided to convert the installation to a Webster Moderator System, then as now recognized for comfort at low cost.

Installation of a 3-Valve E-4 Webster Moderator System, controlling 15,824 square feet of installed direct radiation, was completed during the heating season without interruption in store operations. Webster Radiator Valves were fitted with expertly sized Webster Metering Orifices so that all radiators would heat evenly. The existing piping was retained.

Hecht Brothers Store faces north. The heating installation is zoned to compensate for the sun effect by delivering proportionately more steam to the north side of the building. Radiators in sections of the store warmed by solar heat receive less steam. Steam savings are appreciable.

Since the introduction of district steam service, there has been a noticeable improvement in cleanliness, an important factor in department store operation. The dust, dirt and smoke which go with many private plants are avoided.

Sam Hecht, President of Hecht Stores, and William P. Calhoun, Store Manager, look upon their Webster Heating System as an investment in customer satisfaction. Webster Service is provided by Baltimore Representative H. M. Harris, with Webster for 18 years.

If you are interested in heating comfort at low cost backed by the experience of long-service Webster Representatives, give us a few facts about your heating requirements.

WARREN WEBSTER & CO., Camden, N. J.
Representatives in principal U. S. Cities: Est. 1888
In Canada, Darling Brothers, Limited, Montreal

Webster
HEATING SYSTEMS

Webster Heating Equipment for Today's New Buildings



Webster Metering Offices, expertly fitted, a vital feature of the Moderator System, balance distribution and make possible central control with continuous hearing.



Wetstat Outdoor Thermostat Control automatically provides the lowest pressure for comfortable inside temperature.



Webster Float and Thermostatic Drip Traps are used on heating coils of air conditioners and drip points of the piping system.



Prefabricated Unit—Webb
System Radiation convectors
with copper tubing, alum-
inum fins, integral Webb
Traps and Valves.



New! Webster Type W1 Radiation for installation where floor or wall space is limited