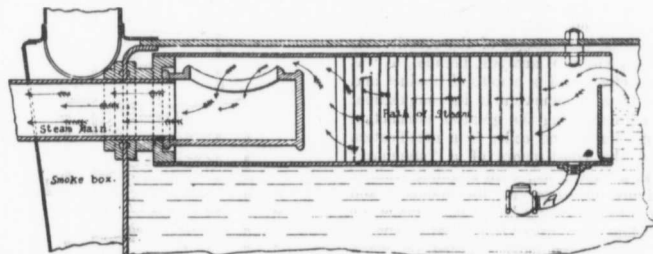


are usually directly connected to induction motors. The power required for cooling is small, being usually one-tenth to one-fourth of one per cent. of the transformer capacity.

In the air-cooled transformer before being admitted to the windings the air is passed through fine screens, which remove the dust and other foreign matter from it, in this way keeping the windings clean and the ventilating ducts open; so some method must be followed in the case of the oil used in cooling. The quality must be up to a certain standard and required specifications must be fulfilled.

Internally Submerged Steam Separator; a Puzzle

The accompanying illustration is of a steam separator installed by the Ideal Steam Separator & Supply Co., 73 Adelaide Street East, in one of the boilers at the Central Prison, Toronto. Owing to the location of the boiler it was impossible to install the steam main on top of the boiler. It had to be located as shown in the sketch. Thus the steam main at the boiler was practically half



Internally Submerged Steam Separator.

full of water, as a glance at the water level as indicated in the illustration will readily show. As a consequence the boiler supplied very wet steam.

Two years ago an electric light plant was installed, and because of the large quantity of water which came with the steam from this boiler it was found necessary to cut off the steam supply from this boiler.

The Ideal Steam Separator & Supply Co. undertook to equip this boiler with a steam separator which would do away with the water in the steam. This special internal separator, shown in the illustration, was designed and installed. It has now been in successful operation for over eighteen months. A letter from the Department of Public Works certifies to that, the letter containing this statement, "the trouble from water being carried over to engine is completely remedied."

The illustration gives a good idea of the installation, except that the character of the passages through which the steam passes is not shown. There are three of these running straight through the separator, two of which are the same size and the third slightly smaller. This separator is about 33 inches long.

The method of draining this trap is through the pipe A, there being a lift valve, opening outwards, at the end of this pipe. It is claimed by the makers that the water which accumulates in this separator automatically drains itself through this pipe and lift valve;

and the proof that it does drain in this way is that upon inserting a pipe through the shell of the boiler and the separator, provision for which has been made, and thrusting the pipe to within 1 inch of the lower side of the separator, no water comes from the pipe—nothing but steam. The boilers are emptied only about once a month.

The report from the Department of Public Works shows conclusively that they are getting dry steam, and it is claimed that it is 99.5 per cent. dry. A very considerable saving in fuel is being effected since the installation of the separator. It is quite evident that the separator is doing its work, and the water from the separator must be automatically drained back into the boiler; but how?

A glance at the water level in the boiler will show the peculiarity of this. If the water is to drain, there must be conditions of steam pressure, temperature and velocity existing inside the separator, which are not so in the boiler. From the construction of the separator there seems to be no reasons why material difference of conditions should exist.

Coal Pile Extravagance*

BY HENRY STANLEY RENAUD.

"The greatest possibilities for saving or wasting about a steam plant are undoubtedly in the coal pile, but as it is a dirty proposition and many of its features not well understood, the subject does not receive the consideration to which it is entitled." So spoke W. L. Abbott, chief operating engineer of the Chicago Edison Co., in a paper read before a meeting of the National Electric Light Association.

Many power plants, and the power departments of numerous manufacturing establishments, buy their supply of coal on the statement of the local coal dealer as to its quality, or on the strength of the name of a special kind of coal. The reputation of a particular mine, or the general integrity of the house handling it, is made the basis of most coal transactions. This state of affairs does not take into consideration the fact that the quality of coal in any given mine varies greatly as the mining goes on. This uneven quality is due to two causes: First, the natural change in the character of the vein; second, the care, or rather lack of care, of the miners in rejecting impurities, and in the further preparation, in picking out slate and other foreign substances. Nor does it allow for the possibility of actual substitution before the coal enters the control of the consumer.

* Abstract of Paper Read Before Meeting of National Electric Light Association.

COAL CAN BE BOUGHT SCIENTIFICALLY.

This antediluvian system of purchasing fuel is absurdly sentimental. Coal can now be bought on as scientific and accurate a basis as that which controls the sale of gold, silver, sugar, alcohol or fertilizer. Our manufacturers can, with advantage to themselves, follow the example of the farmers of this country, who require a chemical analysis of all the fertilizer they buy.

When the subject is broached to the superintendent or manager of a power plant, that the coal consumed under his boilers should be contracted for on specifications and analysis, he immediately "goes up in the air" and emphatically states that he cannot afford to waste money on chemical analysis and scientific tests. Usually he will not even listen to, or read about, an actual demonstration of the saving brought about by expert advice and assistance, but will greedily absorb a pseudo-scientific article in a popular magazine, or Sunday newspaper, on "How to Burn Ashes when Made into Cakes with Glue," or about some wonderful (?) apparatus which will decompose water into its component hydrogen and oxygen, and make these elements available to re-combine to generate heat!

"When we consider," said Mr. Abbott, "that \$100 saved is \$100 added to the surplus which is as good as \$500 increase in the gross receipts, and that to add \$500 monthly to the gross earnings would require an investment of, say, \$25,000—when we consider this, we may realize what a valuable asset is an engineer who is prolific in methods for keeping cost down, or is ready to adopt such methods from others."

RESULTS OF TESTS ON DIFFERENT COALS.

The present advanced methods of testing fuels as to their comparative and relative values as heat producers afford sure means of getting what is paid for, and also of securing the best possible fuel for the particular type of furnace used, etc. By way of example, following are results of tests on three different coals which were tested in our laboratories, for commercial purposes:

Mois- ture.	Vola- tile	Car- bon.	Ash	Sul- phur.	Heating Power B.t.u.
A...3.72	39.27	45.61	11.40	0.49	12,006
B...3.63	41.10	52.14	3.13	0.57	13,205
C...0.58	16.80	77.00	5.62	0.62	14,553

If we take C as a standard, dividing the B.t.u. recorded for each by 14,553, would give the relative heating values thus:

A.....	82.5
B.....	90.7
C.....	100.0

So that if C sells for \$3 a ton, B is worth only \$2.72, and A (on its merits) could bring only \$2.47.

If a contract called for a delivery of 10,000 tons of coal C and one-half of the order were filled with coal A, where would the loss be shown? See the gain to the dealer:

10,000 tons of coal as per contract at \$3.....	\$30,000
5,000 tons of coal C, worth \$3.....	15,000
5,000 tons of coal A, worth \$2.47.....	12,375
	\$27,375
Gain to dealer.....	\$2,625