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SUDDEN RUPTURE OF A 1500 HORSE POWER ENGINE.

On April 30, at 9:58, the shaft of the new 1,500 horse power Corliss engine of the Willimantic Linen Co. Mill No. 4, Willimantic, Conn., broke, causing a complete wreck of the engine and engine house. The engine, when complete, was to be of the triple expansion type, with four cylinders in pairs, one side only being completed when the accident occurred. The part erected consisted of a 30 inch and a 55 inch cylinder arranged tandem on one side, the other side, when completed, to be 26 and 44 inches, 60 inch stroke. The belt fly wheel was 28 feet diameter, 9 feet 2 inches face, bolted together in 12 segments, with 12 arms terminating in a double-flanged hub, occupying a space of about 4 feet on the swelled part of the shaft. Weight of the belt fly wheel complete was 125,000 pounds. The shaft was 21 feet 4 inches in length—15 feet between bearings, which were 28 inches each in length. The swell of the shaft carrying the wheel was 18 inches diameter, 8 feet long, occupying the central portion of the shaft the balance, 6 feet 8 inches from the curved shoulders to each end, was 15 inches in diameter.

When the shaft, crank disks, and hub, weighing 27 tons, were put in place the leveling showed a slight sagging in the center, and when the wheel was completed the sag amounted to 0·135 of an inch. Soon after the engine was started in January last a noise or slight squeaking was heard at the hub of the fly wheel, which, upon examination, was found to arise from the hub working upon the shaft, caused by the spring of the shaft. This had slightly bell-mouthed the outer ends of the hub, so that a thin piece of steel could be inserted between the shaft and hub on the under side, while on top there was contact between the hub and shaft.

To remedy this the engine was stopped and a pair of supplementary or re-enforcing hubs were made and applied on each side of the main hub. Each re-enforcement was made in three sections and bolted together so as to tightly hug the shaft and hub as if one piece. Six 2½ inch bolts were put through from side to side, passing through one of the bolt holes in six of the arms, the original bolts being removed and the holes bored larger, the hub having been turned off and faced to exactly fit the recess in the re-enforcing pieces. When the whole was screwed together it made the hub apparently a solid one, 8 feet in length, and covering the entire length of the 18 inch swell in the shaft. This tended to relieve the spring in the central portion of the shaft.

By this arrangement nine tons was added to the weight of the fly wheel, making the total weight upon the central portion of the shaft 143,000 pounds, or over 70 tons.

The engine was again started early in April with two 24 inch belts making a temporary connection with the mill shafting, and furnishing about 400 horse power, or about one-third of the power required by the mill, the balance being made from the three old duplex high speed engines within the mill. For two or three weeks the engine was apparently running well, when a slight creaking noise was heard coming from the vicinity of the hub.

Upon examination no visible signs of disturbance could be found; but, suspecting that a slight movement of the arms in the hub sockets might be the cause, melted sulphur was poured into the hub around the arms. On trial, this gave no indication of the cause of the noise, and it was decided to shut down at noon on Saturday, April 30, and make a thorough examination, but the engine could not wait, for at 9:58 on that morning the impending crash came.

The speed being 65 revolutions per minute, the rim of the fly wheel was running at over a mile per minute. The shaft parted at the junction of the curve with the straight part on the driving crank end. The immense momentum of the ponderous rim, which alone weighed 42 tons, acting like a gyroscope, seemed to prolong the canting fall of the wheel, as related by Mr. T. R. Schenck, for a second, when the roar of the crash made him seek safety by a dash through a window. He was standing in the corner of the engine room at the rear of the cylinders.

Dwight E. Potter, superintendent of the company, was in the corner near the fly wheel, and, comprehending the urgency of the case, dove through a glass door into the main body of the mill, only to see the wall of the mill and pieces of the wheel flying past him. The third person in the engine room, Andrew Darcey, was at the moment in the wheel pit, and only sheltered by the condenser and air pump, had a most miraculous escape, being covered with the falling debris. He crawled from under with only a few bruises.

A close examination of the broken shaft reveals the probable cause of the creaking noise during the last few days that the engine was running. A zone of laminated surface extended around the outer edge of the broken surface, showing by its smoothness evidence of the progressive extension of the crack during a number of days until it had reached a depth of about 1½ inches, leaving about twelve inches of the diameter of the shaft to support the load, when by the great weight the final break occurred. The surface within the laminated zone showed a nearly uniform crystalline grain usual with iron of large size suddenly broken.

PRESERVATION OF FLOWERS IN THEIR NATURAL FORM AND COLOR.

A "Constant Reader" asks how flowers can be preserved in their natural form and color. The following are some of the processes that have been recommended:

1. Take a wooden box of any convenient length and width, but at least five inches in height, and provide it with a sliding bottom. About a quarter of an inch above the latter fasten to the interior sides of the box a piece of wire gauze having wide meshes.

Now procure some fine white sand, pass it through a hair sieve and wash it thoroughly in water, in order to remove every particle of foreign matter. Place the washed sand in an iron pot and raise it to a temperature of about 200° in a stove or oven. Add to the sand, while hot, a melted mixture of stearic acid and spermaceti in the proportions of six grains of each to one pound of sand. Stir thoroughly, and when the sand is cool enough rub it between the hands, in order that every grain may be coated with the fatty matter.

Place a layer of the prepared sand in the bottom of the box and carefully arrange thereon the plant to be dried. Then, with great care, cover the plant with a thin layer of sand, and, having placed a sheet of paper on the top of the box, place the latter in a stove or oven heated to a temperature of about 120°. The desiccation takes place very rapidly. When it is supposed that it is finished, remove the bottom of the box, when the sand will pass through the wire gauze, and the plant will remain upon the latter. Brush the plant with a badger and preserve it as will be directed below. The prepared sand adheres but slightly to the plants and is always easily removed. It suffices in most cases to give the stem a few fillips to get rid of all of the sand, provided the plants have not been moist.

It must be added that sand, prepared or otherwise, cannot be used for preserving plants that have a clammy or viscous coating. In this case, it is absolutely necessary to use grains of millet or rice.

As the dried plant, when left in contact with the air, absorbs a little moisture, and fades, it must be arranged in a jar or wide-mouthed bottle on the bottom of which has been placed a piece of quicklime wrapped in tissue paper and covered with moss. The jar must be sealed hermetically with a cement of gum lac or rubber.

2. Mr. James L. English's method consists in embedding the plants in a mixture of equal quantities of plaster of Paris and lime, and gradually heating them up to a temperature of 100°.

On removing a flower from the absorbent it presents a very dusty appearance, and is also somewhat brittle if it has been left in the plaster too long. It is best to lay the plant aside for an hour, during which time it will absorb sufficient moisture to prevent it from breaking when subjected to the necessary dusting to rid it of the superfluous plaster. After being dusted, the plants still have somewhat of a hoary appearance, and, for this reason, they should be coated with a varnish made as follows:

Powdered gum dammar	5 oz.
Turpentine	16 "

Dissolve the gum in the turpentine and add 16 ounces of benzoline. Strain through fine muslin.

The plants may receive a second coat of varnish, if need be.

3. The *Revue de Chimie Industrielle* recommends the following varnish for the preservation of flowers:

Ether	500 parts.
Transparent copal	20 "
Sand	20 "

The flowers are to be immersed in this varnish for a couple of minutes, then allowed to dry for ten minutes, and be submitted to this treatment five or six times.

4. Mr. Jules Poissan, of the Paris Museum of Natural History, recommends a solution of 30 grains of salicylic acid in one quart of water for the preservation of plants in their natural form and color.

Dried Bananas.

According to a report made by Vice-Consul Robinson, of Colon, on the Isthmus of Panama, the business of preparing banana meal for the New York market will soon be carried on in that region. He states that a company has been organized with a capital of $75,000, under the name of the Banana Food Company, for the purpose of drying and otherwise preparing bananas and plantains for food. He says it has been ascertained that while apples yield only 12 per cent, bananas with the skins removed yield 25 per cent of thoroughly desiccated fruit. The supply of bananas is practically unlimited. The fruit grows to maturity all the year round, and may be obtained every day throughout the year, so that the manufacture of the new food can be made continuous.