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THE NEW ORLEANS EXPOSITION.

EXHIBIT OF THE RAND DRILL COMPANY.

A noteworthy exhibit in the machinery department of the New Orleans Exposition is made by the Rand Drill Company, of 23 Park Place, New York city. Their display is well deserving of close attention and study, because it is representative or typical of the apparatus they manufacture, and also for the reason that it contains specimens of all the most important tools now in daily use in mining and tunneling, from the mammoth air compressor to the smallest drill. As such it may be considered as showing the present condition of that branch of engineering which is confined to underground problems; or it might be more appropriate to state that it contains those tools which have made possible the grand works of the mining engineer of the present day. It also clearly illustrates the superiority of the means we now have at our command for removing rock, whether in mine, tunnel, or quarry, compared with the few and, from our present standpoint, insignificant appliances of olden times.

The accompanying engraving shows the source of power—the air compressor—and the rock drills which utilize that power. These being the two most prominent features in the plant when fitted for active operation, we may omit a detailed description of all the smaller devices which, although most essential, occupy minor positions.

The engines in the duplex air compressor are provided with adjustable cut-off, and are mounted on extra heavy frames, so disposed as to take the strains in direct lines. The machine is easily accessible in every part, and is so designed as to be readily available as an engine as well as a compressor. The cut-off can be adjusted by a hand wheel while the machine is in motion, the point of cut-off being shown upon a graduated scale. In case of sudden loss of pressure from any cause—the breakage of air pipes or the like—an ordinary ball governor prevents the engine from running away. Attached to this governor is a pressure governor, the duty of which is to slacken the speed whenever the air pressure reaches the maximum desired. The air and steam cylinders are in line, and are tied together by a heavy cast iron sole plate and tie rod. The flywheel is made very heavy, to insure smooth motion when it is necessary to run one side at a time.

It will be seen that the compressor really consists of two perfect single engines, and it is the practice of the Rand Company to furnish, when desired, one side only, and when greater capacity is needed, to add the other side. Poppet valves are used in the air cylinders. The inlet valves are of steel, and consist of two pieces—the valve proper and the stem—put together on a taper and then riveted; they are protected by a steel guard plate, rendering it impossible for them to fall into the cylinder. A simple device protects the valve from violent slamming. The outlet valves are of brass.

The method of absorbing the heat of compression is most perfect. The air cylinder is made of hard brass, owing to the better conductivity of that metal, and as thin as is consistent with safety. The cylinder heads are hollow, and have water circulating through them; the piston and piston rod are also hollow, and by means of a telescopic arrangement of tubing at the back end of the cylinder are kept supplied with cold water. The piston packing consists of four composition rings arranged in pairs at each end of the piston.

Before escaping, the water of the piston circulation is made to pass between these rings completely around the piston in contact with the inside cylinder walls. The practical value of this method of cooling was shown in a recent experiment with one of these compressers and with one having the ordinary thick iron jacket around the cylinder only. With this compressor the temperature of the escaping air was 215 degrees less than the theoretical temperature due to pressure, had no heat been absorbed; while with

(*Continued on page* 245.)

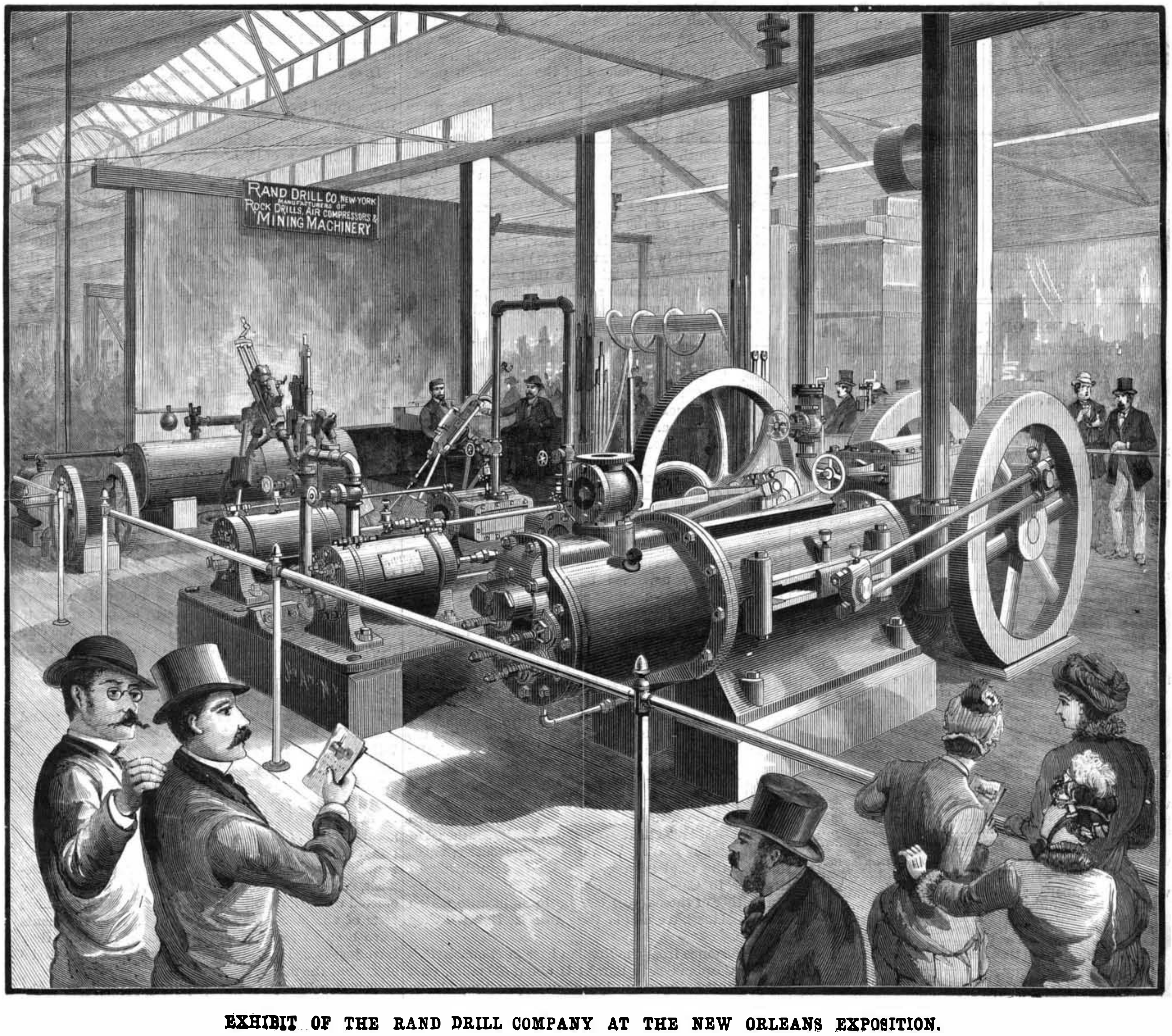


EXHIBIT OF THE RAND DRILL COMPANY AT THE NEW ORLEANS EXPOSITION.

THE NEW ORLEANS EXPOSITION.

(Continued from first page).

the other machine the difference was only about 25 degrees. One of the ingredients of the piston packing rings is graphite, the effect of which, in combination with the circulation of the water in contact with the cylinder walls, is a very perfect automatic lubrication.

The large bearing surfaces, the heavy and well distributed framing, and the efficient method of cooling allow these compressors to be driven at more than ordinary speed and at the same time secure economical results.

The "pony pattern" air compressor requires but a slight foundation, since it is self-contained in the manner of direct-acting steam pumps. The upper crosshead guide is cast solid with the frame, thus placing a liberal proportion of metal above the center line of the cylinders, and taking the working strains in direct pull and thrust. This obviates the necessity for the deep box which has been customary with this style of machine, and makes it practicable to support it at each end only, and also prevents any springing or bending due to bolting a long bed to an irregular surface. The piston rods and crosshead are of steel, the crank pins, pins and links of valve connections are of mild steel, casehardened, and all the brasses are of phosphor-bronze. The valves are of the poppet type, giving a minimum of waste room in the ends of the cylinder, which is provided with a water jacket. The inlet valves are similar to those described above. The bearing surfaces are all large, and the machine is well made throughout.

Although we have mentioned but two of the air compressors, we have given enough to acquaint the reader with the principal characteristics regarding the construction and operation of the machines manufactured by this firm.

The rock drills shown in the engraving belong to the class known as "striking drills," in which the drill steel is an extension of the piston rod. The cylinder slides in a guide or shell, mounted upon a tripod formed with a universal joint, and is fed toward the rock as fast as the steel penetrates it. A positive motion valve insures certain operation when steam or air is admitted, without depending upon close fits or clean parts; it allows of a variation between the up and down stroke, thereby saving steam and increasing the working capacity of the drill. The valve is moved in the same direction as the piston. The rotating bar is made full size where it enters the ratchet, and it is claimed that it never breaks. The piston rod and chuck are made small and solid outside of the cylinder, whereby greater lifting power is obtained. The throttle is placed on the steam chest, where it cannot be lost or injured in handling. The coupling has no gaskets that can drop out, and provides for instantaneous connection of the hose without the use of a wrench or spanner.

The length of stroke of a rock drill is uncertain, since, as the hole progresses in depth, the cylinder must be correspondingly fed forward, but to effect this feed with perfect regularity is impossible. In these drills provision has been made for this irregular feed and length of stroke, but nevertheless, when full strokes are made, the valve does not move nor is steam admitted below the piston until the actual delivery of the blow. The result is that while in cushioned drills the blow struck is that due to the difference between the action of the driving steam and of the cushioned steam, in this drill the blow is that due to the full, unobstructed action of the driving steam.

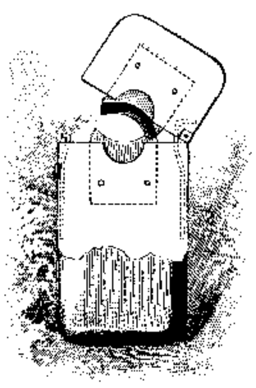
In the adjustable tripod both front legs are so arranged that they can be set at any angle or placed in any desired position. The movement of the legs is not limited to a small area, but they can be pointed toward the side, front, or rear, raised at right angle to the drill rod, or pointed straight upward in an opposite direction to that in which the rock is to be bored. This arrangement is particularly useful in drilling "lifting holes," and where it is desirable to drill a hole close to the side of a cut, or in bench work in mines. In the iron mines of Lake Superior, where many of these drills are at work, the miners are often called upon to commence drill work 40 feet or more from the floor of the chamber. A ladder is set up against the side of the mine, the miner climbs to the place to be drilled, lowers a rope, and with the help of his mate pulls the drill up after him. He chips out of the rock a spot large enough for the rear leg and one for one of the front legs of the tripod, the other front leg being tied to the ladder. The hose being connected, four or five holes are drilled in the solid ore, iron bars are placed in the holes, and across the projecting ends of these bars planks are laid and a stage constructed from which drilling and blasting in the regular way are soon carried on.

Two or more of these drills (without the tripod) may be mounted upon arms projecting from shifting sleeves placed upon a swivel jointed bar which may be held between the walls of a shaft or the floor and ceiling of a gallery. The bar is firmly held, and is not loosened by the jar of the drills while running. The drills can be moved along the bar to any position, and can be worked at any angle. A quarry bar is used to carry drills for channeling, gadding, etc. It can be set at any angle, and with it holes can be drilled true and in line.

It has always been the aim of the Rand Drill Company, in all of the appliances made by them, to design the machines in accordance with both the theory and practice, to employ the best material and so distribute it as to obtain ample strength without unnecessary weight, and to insure economy and effectiveness in operation and great durability.

COMBINED CIGAR-CUTTER AND MATCH BOX.

The convenient little device herewith illustrated was recently patented by Mr. H. B. Eggert, of Bethlehem, Pa. The body of the box, made of sheet metal, is provided with a spring hinged lid, which is thrown open when released by pressing on a front button catch. Secured within the box on the one side of the body, and corresponding side of the lid, are two concave steel cutters, which project beyond the meeting edges of the body and lid, so that in closing the lid one cutter slides, as the blade of a shears, over the other. An opening is formed by notching the meeting edges of the lid and body of the box at the point where the cutters are located, the object of this being to prevent the end of the cigar from being crushed, as it would be if the meeting edges were straight. The arrangement of the cutters within the box prevents the cutting blades from catching on the lining of the pocket in which the box is carried.



Curing Herring.

In Mr. Perley's Report of the Fisheries in the Bay of Fundy, the manner of curing herring is thus described:

The fish are scaled by being washed in bushel baskets with a square bottom, open like a coarse sieve, the men standing in the water up to their knees. The best fish have very few scales, and only half a bushel of them are taken in the basket at once; they are then salted in large tubs, the salt being stirred through them by hand; the quantity used is half a bushel of salt to two and a half barrels of fish, which are a tub full. They lie in salt twenty-four hours, and are then washed in fresh water to prevent their becoming "salt burnt," after which they are strung on rods, with their heads all one way, and then hung up in the smoke house. In Clements the smoke houses are usually 30 feet square, with 14 foot posts and a high roof; no fish hang nearer the fire than 7 feet, but the most careful curers do not hang them nearer than 8 feet. Rock maple is used in smoking; when it cannot be procured ash is used, being considered next best. The process of smoking usually occupies eight weeks; and it requires the whole time of one person to watch the fire and to attend to the smoking, in which much judgment and great care are required. The smoke is usually made up at nightfall, unless the weather is warm and wet, during which time no fires are made. In fine weather the smoke houses are thrown open during the day to cool; and the greatest care is taken at all times to keep down heat, and to render the smoke house as cool as possible by numerous windows and openings. After being smoked, the fish are packed in boxes 18 inches long, 10 inches wide, and 8 inches deep, measured on the inside; and there should be 24 dozen fish in a box of prime herring. If the fish are large and of the best quality, it requires some pressure to get this number into a box. The Digby herring are in some instances cured in pickle, unsmoked, and packed in half barrels.

The Air and the Telescope.

The air we breathe is, in truth, the worst enemy of the astronomer's observations. It is his enemy in two ways. Part of the light which brings its wonderful, evanescent messages across inconceivable depths of space it stops; and when it does not stop, it shatters. And this even when it is most transparent and seemingly still; when mist veils are withdrawn, and no clouds curtain the sky.

Moreover, the evil grows with the power of the instrument. Atmospheric troubles are magnified neither more nor less than the objects viewed across them. Thus Lord Rosse's giant reflector possesses—nominally—a magnifying power of 6,000; that is to say, it can reduce the apparent distances of the heavenly bodies to one six-thousandth under their actual amount. The moon, for example, which is in reality separated from the earth's surface by an interval of about 234,000 miles, is shown as if removed only 39 miles. Unfortunately, however, in theory only. Professor Newcomb compares the sight obtained under such circumstances to a glimpse through several yards of running water, and doubts whether our satellite has ever been seen to such advantage as it would be if brought—substantially, not merely optically—within 500 miles of the unassisted eye.

Correspondence.

A Grand Chance for Inventors.

To the Editor of the Scientific American:

Will you kindly permit me to give inventors a hint through your valuable paper? In 1877 I traveled through the Red River Valley on the Northern Pacific Railroad in Dakota. I noticed those large level fields of thousands of acres, which were being plowed or sod broken up by the slow process of a fourteen inch plow drawn by four horses. I thought then that the plow was far behind all other farming implements. I then thought of the ordinary hand plane and the revolving planing machine, and could not see why plowing could not be done on the same principle that a planing machine planes a board. If some inventor will get up a plow to run by steam or horse power, that will cut up the sod into chips like a planing machine cuts the top off a board, and plow about three inches deep, he will confer a great blessing on our Western farmers, as he can then put his field in condition to put in any kind of a crop the first year, and not be hampered for two or three years with long, dry strings of tough sod, which is always in his way in harvesting his crop.

MICHAEL LANG.

Mandan, D. T., March 29, 1885.

Lightships on the Ocean Cable Tracks.

To the Editor of the Scientific American:

As to the suggestion regarding ocean stations along the line of a cable for the purpose of communicating with the land, I would say:

At the meeting of the Ancient and Honorable Artillery Company, September 13, 1880, certain persons, supposed to be experts in all sublunary things, were invited to prepare papers *on the past and present.* These papers were to be sealed up in a box, and preserved until 1980. I was requested to write on commerce and navigation, but I wrote only upon the supposed condition of *the future.* I predicted that small craft would be located on the track of ocean steamers at convenient distances; they were to be fitted with electric lights and means to send messages to the shore; in short, my plan was identical with that above alluded to.

In discussing the practicability of anchoring small craft with steel wire cables, it must be kept in mind that they could not be depended on in waters of more than 500 fathoms, owing to the danger of breaking the wires. Having no chart at hand showing the depth of water on the line of a cable, I cannot say where the stations should be placed.

Consulting Col. Edward Wyman, who was an active member of the Ancients, he says: "Your statement recalls to my mind discussing the very point alluded to; your proposition, in brief, was that vessels could be anchored in mid-ocean at various points on the usual track of ships, and could communicate with passing ships, and transmit by cable to the land any desirable information."

Now, Messrs. Editors, as your sons or grandsons may be here in 1980, I beg you will let them know that I was thinking and writing on the said mode of communicating as far back as September, 1880. I regret that I have not preserved the publication of another writer on the same subject.

I am very truly yours,

R. B. FORBES.

March 31, 1885.

[The probable feasibility of establishing some such means of communication between ships at sea and ports on either side of the Atlantic has long been entertained. In 1876 mention was made in our columns of an invention which had "*revived* the discussion" of the practicability of "establishing telegraph stations in mid-ocean, by which messages could be sent along the line of the cable to terminal points on shore, and *vice versa.*" This particular device was for a hollow sectional column, to be anchored, and with a branch cable to be coupled to the main cable. The great difficulty would be, of course, in making and maintaining a permanent connection with the cable on the floor of the ocean, which through a great part of the length of the Atlantic cable is as much as 2,000 fathoms below the surface.—ED.]

Why Contagious Diseases Attack but Once.

Professor Tyndall thus endeavors to explain the immunity obtained against a second attack of a contagious disease: "One of the most extraordinary and unaccountable experiences in medicine was the immunity secured by a single attack of a communicable disease against future attacks of the same malady. Smallpox, typhoid, or scarlatina, for example, was found as a general rule to occur only once in a lifetime of the individual, the successful passage through the disorder apparently rendering the body invulnerable. Reasoning from analogy, I have ventured to express the opinion that the rarity of second attacks of communicable disease was due to the removal from the system, by the first parasitic crop, of some ingredient necessary to the growth and propagation of the parasite."—*Medical World.*