sition half a pint of reducing liquid; this liquid is also used to thin down the pitch when long exposure to heat has evaporated a proportion of the vegetable tar and oil. The reducing liquid is composed of vegetable tar 12 lbs., and oil of naphtha (in which $\frac{1}{2}$ oz. india-rubber has been dissolved) 3 lbs. For the oil of naphtha, 3 lbs. rough creosote or 5 lbs. oil of turpentine may be substituted, but the first mixture is preferred. The pitch and tar are heated separately, and well mixed; the oil is then added, and the composition is ready for use.

On Superheating Steam. By L. E. FLETCHER, Chief Eng.

From the Lond. Mechanics' Magazine, November, 1861.

At the last ordinary monthly meeting of the executive committee of this association, held on Tuesday, October 29th, 1861, Mr. L. E. Fletcher, chief engineer, presented his monthly report, from which we have been furnished with the following extracts:—

During the past month, 438 engines have been examined, and 595 boilers; 22 of the latter being examined specially, 14 internally, 43 thoroughly, and 516 externally. The following defects have been found:—Fracture, 8 (2 dangerous); corrosion, 36 (7 dangerous); safety-valves out of order, 9; water-gauges ditto, 14; pressure-gauges ditto, 8; blow-off cocks ditto, 54 (1 dangerous); furnaces out of shape, 2; deficiency of water, 2; over pressure, 14—total, 147 (10 dangerous); boilers without glass water-gauges, 13; ditto without pressure-gauges, 10; ditto without blow-off cocks, 59; ditto without feed back press valves, 93. In my last report, I called attention to the application of steam jackets to cylinders, pointing out their importance as an agent “for effecting economy in the use of steam.”

I now wish to allude to a kindred and equally important subject—viz: that of *Superheating*, the economy derived from which has now become established by general experience, and in marine engines has, in many cases, effected as high a saving as 30 per cent. I scarcely anticipate such a result as this from its application to Lancashire mill engines; still I am confident that a very considerable saving would be effected, while, at the same time, the vacuum would be improved, the temperature in the hot-wells reduced, and less injection water required, which, to steam users having cooling ponds of limited area, would be most important. These results are mainly due to the prevention of condensation and re-evaporation on the internal surface of the cylinder, as explained in my last report relative to the action of the steam jacket; so that the effect of superheating the steam, or coating the cylinder with a steam jacket, is very similar. The application of the jacket, however, to cylinders, can only be made at the time of construction, except with considerable difficulty, while the principle of superheating can be applied to old engines as an auxiliary without alteration to the existing arrangements.

The subject of superheating has been sadly bugbeared. It has been reported that the use of superheated steam would destroy the surface

of the cylinder, piston, and slides, by preventing lubrication; also, that it would corrode the metal; that it was highly explosive, productive of great pressure, and altogether dangerous and difficult to deal with. Actual experience, however, has proved that these objections are entirely visionary, and I have only within the last few days been assured by the superintending engineer of all the engines and boilers in the large fleet of the Peninsular and Oriental Steam Navigation Company, where superheated steam is now and has, for some time past, been extensively employed, that no difficulty is experienced in its use, and no alteration whatever is required in the old engines, beyond the introduction of a slightly better description of packing for the glands, while not a trace of corrosion has been found. It only now remains, therefore, for the manufacturing engineers of this district to bring out a simple and efficient superheating apparatus, adapted to mill engine boilers, by which they will not only benefit themselves, but at the same time render essential service to the steam users of the district. I am glad to say that one of our members is now laying down a superheating apparatus, and, as soon as I have an opportunity of doing so, I shall be happy to state to the members of the association the results of its actual working as applied to the boilers of an ordinary mill engine, and to assist in the general introduction of this system amongst all our members by affording any other information I am able. I would state, however, in the meantime, that it is found most advantageous to superheat the steam to about 100 degrees above the temperature of plain steam, when no difficulty is found in lubricating; also, that the utmost care must be taken in maintaining the temperature of the steam when once it has been superheated, or the virtue will be lost before it gets to the engine. I found in one case, that although the temperature immediately on leaving the superheater was as high as 600 degrees, yet it had fallen nearly to 300 degrees on its arrival at the engine. I understand that some parties entertain the idea that superheating may be advantageously applied where steam is used for heating purposes. I am convinced, however, that such would not be the case, and that disappointment will inevitably ensue wherever superheating is adopted with this view.—*Assoc. Prev. Stm. Boiler Explosions.*

Water Gauge.

The Committee on Mechanics of the "*Société Industrielle*" of Mulhouse (France), report favorably upon a new form of water gauge submitted to them by MM. Varillat and Langlois. This consists of an iron tube passing horizontally through the front of the boiler to which it is firmly screwed, and terminating externally in an oblong case. Through the interior of this tube passes an iron rod, supported at its inner end on a socket, and at its outer extremity passing through a stuffing-box into the case before spoken of. The inner end of this rod is attached to a hollow float by means of an arm, so that the ris-