Building the Stanley Steamer

A Water Glass Open at the top on a Boiler Carrying 500 Pounds of Steam. Ball Bearing Crosshead, and Some Other Interesting Details

EDITORIAL CORRESPONDENCE

Here is one case at least where the old saying about the prophet being without honor in his own country seems to have slipped a cog, for of all the 7000 or thereabouts Stanley steam automobiles that have been built nearly every one has been sold within 50 miles of the factory at Newton, Mass. Those who remember the early stages of the automobile will recall the multitude of little steam cars that were made and sold under the name of Locomobile and Mobile, and it is interesting to note that both of these were built under the patents of the Stanley Brothers, who have kept right on along the same line, while both the others have long been ancient history.

Making the Boiler

While many of the details have been improved, the engine placed horizontal so as to gear direct on the axle without the use of a chain, the boiler placed in front, etc., and the general principles remain the same. Beginning with the boiler, which is of the fire-tube type, very similar to those used in steam fire engines, we find a steel drawn shell, without a seam and with one head drawn in place. The other head is slipped in and the shell beaded over. Both heads are drilled and tapped so that when the tubes are expanded into them it forces the metal into the threads in the tube sheet and adds to the resistance against bulging. This is especially desirable when it is remembered that these little boilers carry 500 pounds steam pressure. The tubes are expanded as usual and each end of the boiler has a steel ring shrunk onto it as can be seen in Fig. 1, where the final touch is being given in the shape of the outer winding of the best quality of piano wire. Four separate windings are made and each wire fastened independently so as to secure the maximum strength and enough to be controlled by the brake at the other end of this same shaft, and then to the boiler. In this way a very nice job is made in a minimum of time.

An excellent example of gang slitting is shown in Fig. 2 where the burner that

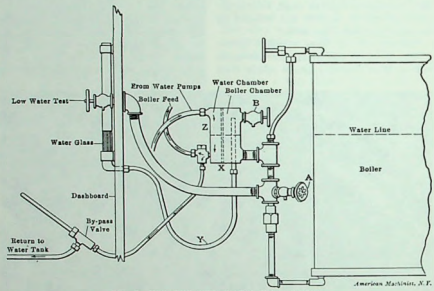

FIG. 3. HOW THE OPEN WATER GLASS WORKS

prevent any possibility of accident from explosion. This view shows how the boiler is mounted in a large lathe and how the wire is fed on to lay evenly by using the carriage feed. The wire goes from the reel to the small guide wheel, then over the larger pulley above, making several turns around this to secure tension goes under the boiler is being cut. The vaporized gasolene comes in under this after passing over the top of the boiler, as shown in Fig. 4, through the coil of pipe, then down to three pipes running directly through the fire and out through jets under the burner plate shown. This makes a fire like a young blast furnace

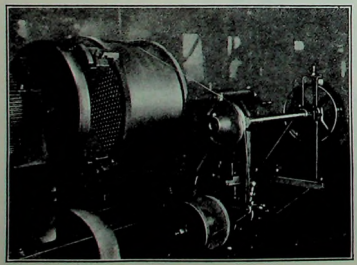

FIG. 1. WINDING BOILER WITH PIANO WIRE

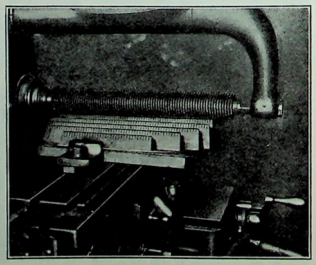

FIG. 2. SLITTING THE BURNER

and the way it gets up steam is a surprise to those who are not familiar with gasoline as a fuel.

An Open-top Water Glass

One of the most original features about this car is the water glass shown in detail in Fig. 3, which is in front of the dashboard in front of the driver. The annoyance and possible danger of having a water glass break with 500 pounds of steam in the boiler led to the designing of an indicator in which the water glass is open at the top, which means that it has no direct connection with the boiler, yet indicates perfectly the hight of water in it. There is a connection top and bottom of the boiler with the try cock *A* and connecting to the boiler chamber *X*, so that the water stands the same hight in this chamber that it does in the boiler, just as though this were a gage glass instead of being made of steel. A portion of this is partitioned off at *Z* and through this the water from the feed pump goes on its way to the boiler to help cool this chamber and make the indicating tube *Y* more sensitive. This tube is filled with water to the top of its inner end and closed tightly at that end, the water then standing at a corresponding level in the glass on the other side of the dashboard. The steam in the boiler chamber above the water line vaporizes the water in the indicating tube *Y* and drives the water up in the glass to the hight shown. If the water in the boiler lowers, there is more steam in the boiler chamber and the water is forced higher in the glass, which it will be seen, indicates in a reverse manner but indicates very accurately according to those who have used it. This is also shown in Fig. 4, which also shows the location of the boiler and the water and gasolene piping in connection with it.

Planing the Valve Seat

The two cylinders are cast together with a common steam chest between them and plain slide valves for each cylinder. This makes rather an awkward place to machine, but the fixture shown in Fig. 5 makes it easy to do on a shaper. The cylinders are held on the fixture, being located by the bore and the extension planer tool enables the valve seat to be planed without difficulty.

It will be noted that the steam-chest cover is round and it is interesting to note that both this and cylinder heads are all screwed into place instead of being bolted in the conventional way. The threads make a fairly good fit, but the real joint is made by a gasket in a bevel next to the thread. A liberal application of oil and graphite on the thread is said to prevent any tendency toward rusting fast or making it difficult to remove the heads after being in use.

Fig. 6 gives a fair idea of the engine itself as well as the way in which it is connected up to the carriage. It lies nearly horizontal and gears direct with the differential or jack-in-the-box on the rear axle. Drop forgings are used throughout, the connecting rod being of a forked construction so as to reach around the crosshead and make the wrist bearing. The ends are spread apart and coned with a hollow mill to fit the cone bearing in the cross-head, and with this exception all the other bearings on the engines are of balls, even the crosshead, as can be seen. The main bearings have ¾-inch balls while the rest use ½-inch balls, and there seems to be a lack of trouble in the bearings that is not always found in other styles, in spite of the fact that balls are not in general favor in such places.

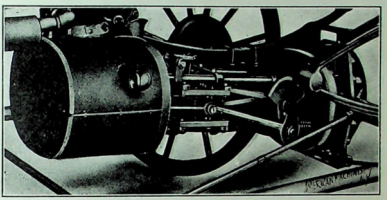

FIG. 6. THE ENGINE AND ITS CONNECTIONS

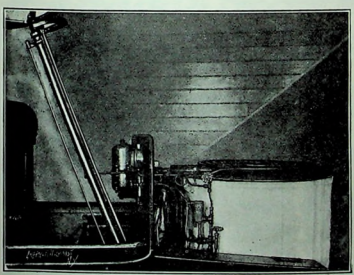

FIG. 4. THE BOILER AND ITS CONNECTION

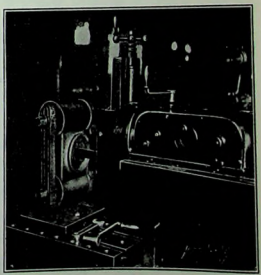

FIG. 5. PLANING THE VALVE SEATS

A Ball-bearing Crosshead

The crosshead bearing consists of two ½-inch balls, one on each side, as can be seen by a careful examination of the engine. This strikes one as peculiar until we stop to think that they must always be opposite, and that the pressure is never on both sides at once, but always alternating from one guide to the other. There is

a stop pin at each end of the guides to prevent the balls getting out of place and these also keep the two balls exactly opposite each other at all times. As a test of this Mr. Stanley had an engine on the test rack stopped and one ball pushed to one end of its travel and the other to the opposite end. On starting the engine again it took only a half revolution to bring them both into their proper relation and there they stay as they run back and forth at any speed up to 300 or more turns a minute.

The valve gear is the plain link which has withstood the shock of so many improvements, and is still the acknowledged leader for simplicity and effective steam distribution under the conditions which present themselves to a locomotive or a road carriage. But one cutoff is provided, that at one-quarter stroke, which is plenty good enough for almost any running and avoids complication and confusion to the average operator. The quadrant, or what serves for one, is shown right over the front cylinder head in Fig. 6.

Two Grinding Fixtures

The links are ground on a very ingenious fixture, as shown in Fig. 7, rigged up with a head from a Rivett grinder. The links are held on the plate shown which is hinged from a point at the back so as to secure a correct radius for the links and the movement past the grinding wheel is secured by the heart cam behind the holding plate. A roller on the back of the plate runs on the edge of the cam and the motion of the work past the grinding wheel is easily accomplished, the spring keeping the roll in contact with the cam.

Another grinding job is shown in Fig. 8, where ball races for the eccentrics are being ground on a regular machine of the same make. The swinging chuck gives the desired shape to the ball race and the size is measured by the gage shown on the bench. This is a special pair of inside calipers with ½-inch balls on the measuring point and the other ends forming a positive stop by being brought together. They open like any calipers and are introduced into the ball race and the outer ends closed. If they just meet and there is no shake in the race, the size is right, and variation is easily detected and the use of balls of the size that are to run in the bearing makes it a practical test in every way.

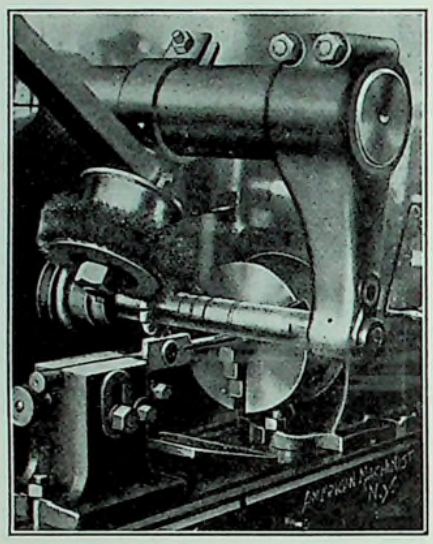

FIG. 9. KEEPING THE MILLING CUTTER CLEAN

In such milling work as the crossheads where it is very desirable to have a smooth job, it has been found advantageous to keep the milling cutter clear from chips, and to do this without taking the operator's time the device shown in Fig. 9 was rigged up by an ingenious mechanic. The pulley carrying the brush is mounted on a spindle which is held to the overarm of the milling machine by a band going around the arm and allowing it to be held at any angle to accommodate different sizes of cutters.

We are indebted to the courtesy of both the Stanley brothers for the assistance in securing these illustrations and the information concerning their product.

F. H. C.

"Peter the Great of Russia, Mechanic"

By C. J. Smith

We think of this great man as the regenerator of Russia; the mighty and solitary lever which in 36 years raised Russia from a semi-civilized kingdom to the level of other European governments. With him we associate the building of St. Petersburg; the sweeping away of barbaric Asiatic customs in favor of the modern manners of Europe; mighty wars with Sweden, and with other States which are now part and parcel of the great Russian empire, but we hardly remember him as the humble workman passionately fond of making horseshoes and boots, constructing boats and working at the forge

Had Peter not been a ruler he would have made a very good workman; in fact, he probably would have excelled at anything—except learning—knowing, as we do, that his was a character possessing many phases. With him the greatest and most ludicrous were mingled together; benevolence and humanity were as conspicuous in him as his total disregard of human life; he was at once kind-hearted and severe to ferocity. Without education himself, he promoted the arts and sciences. As Voltaire says: ". . . he gave a polish to his people, and was himself a savage; he taught them the arts of war, of which he himself was ignorant; from the sight of a small boat on the river Moskwa, he

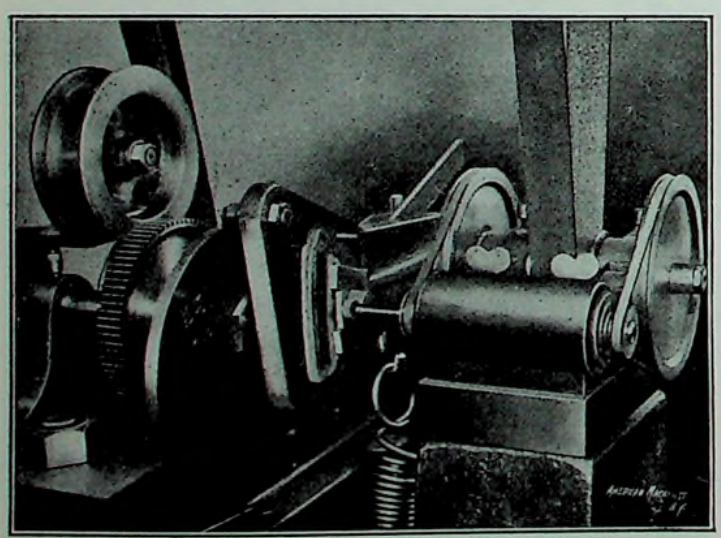

FIG. 7. GRINDING THE LINKS

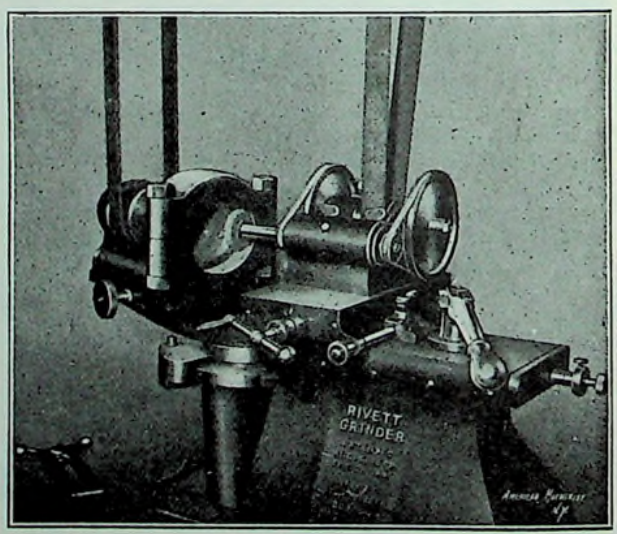

FIG. 8. BALL RACE GRINDER AND GAGE