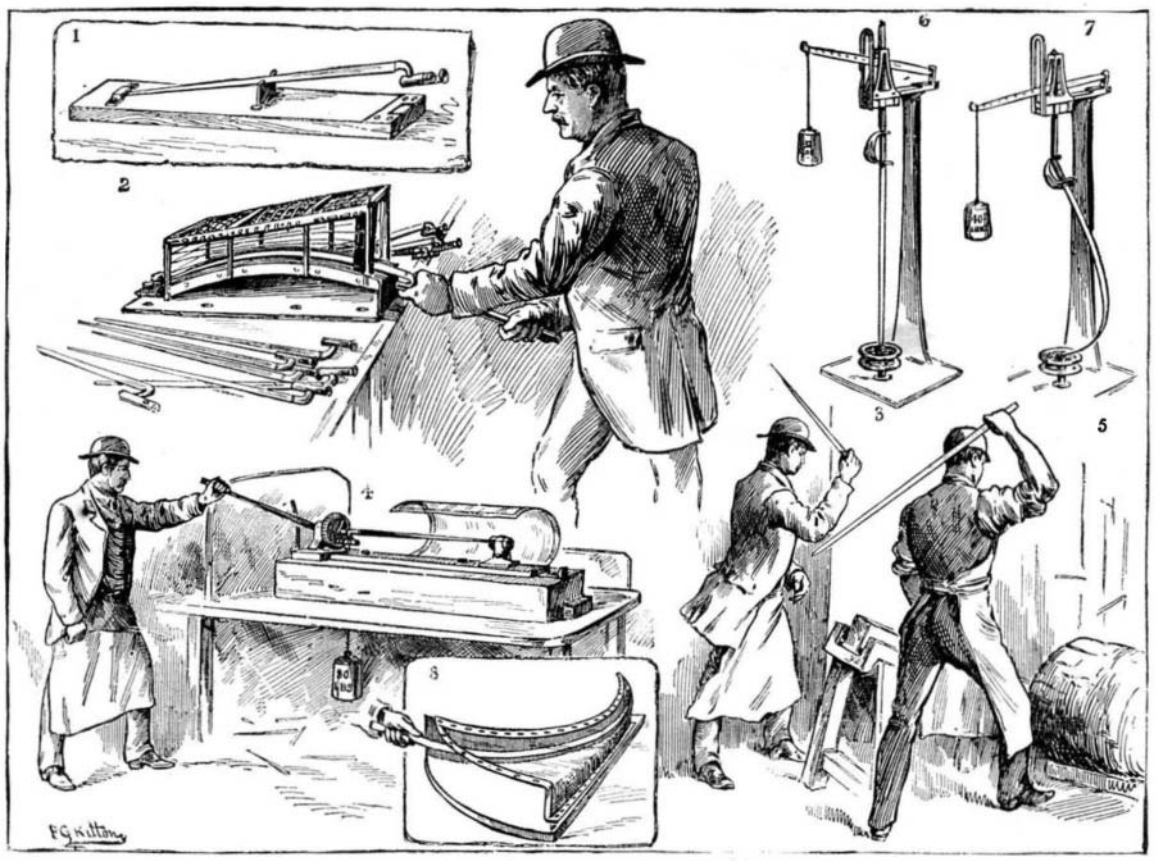
TESTING BAYONETS AND CAVALRY SWORDS.

Previous to the year 1885, the long triangular Martini-Henry bayonet was tested by being sprung over a bridge two inches high, as depicted in our sketch (No. 1). The point of the bayonet was held in a shoe, the center of the blade rested on the bridge; the socket was then pressed down till it was level with the point. The bayonet had to stand this test without receiving a permanent "set." This test was considered sufficient till the campaign in the Soudan showed the necessity for a more severe test. The bayonet now, instead of being sprung over a bridge, is bent down over a curved block of wood (Fig. 2), on all three sides, which tests every part of the blade from point to shoulder; if it stands this without receiving a "set," it is then struck two or three times on each face on a solid wood block (Fig. 3); this is with the object of testing the temper and quality of metal, and for detecting flaws. If the bayonet stands this test, it is finally subjected to the twisting test (Fig. 4). In this the socket is placed in a revolving disk with a weight of 80 pounds attached to it, the point being held stationary; the bayonet is twisted through an arc of a quarter of a circle, and on being released must recover its figure.

Cavalry Sword, Pattern 1885.—The tests for this sword are also extremely severe (Fig. 5). The blade is first struck on back and edge on a solid oak block to detect flaws. The rigidity of the blade is then tested by placing it in a machine (Fig. 6), and bringing a weight pressure on it of 32 pounds; it must support this weight without deviating from the straight line. Its elasticity is next tested in the same machine (Fig. 7). A weight pressure of 40 pounds is applied, depressing the hilt six inches, as shown in the sketch. On the weight being released, the blade has to recover itself; the blade is then finally tested round a curved block of wood (Fig. 8), on both sides. After all these tests the blade should remain absolutely straight, without having received a permanent set. If it is set in the smallest degree, it is cast out. From the above brief description, it will be seen that it is almost, if not quite, impossible for either a cavalry sword or a triagular bayonet which is either too soft or too hard to be passed into the service.—*London Graphic.*



1. The "Bridge" Test (old style) for Triangular Bayonets.
2. The "Curve" Test (the method adopted during the past two years).
3. The "Striking" Test for Bayonets.
4. The "Twisting" Test for Bayonets.
5. The "Striking" Test for Cavalry Sword Blades.
6. The "Vertical Pressure" Test for Cavalry Swords. (A weight of 32 lb. must not deflect the blade.)
7. The "Vertical Pressure" Test. (A weight of 40 lb. must shorten the blade by six inches without breaking it.)
8. The "Curve" Test for Sword Blades.

TESTING BAYONETS AND CAVALRY SWORDS AT THE ROYAL SMALL ARMS FACTORY ENFIELD.

SCREW CUTTING AND SELF-ACTING SLIDING GAP LATHE.

We give an illustration from *Engineering* of a screw cutting and self-acting sliding gap lathe, constructed by Messrs. John Lang & Sons, Johnstone, Eng. The fast headstock is 6 ft. long and is in one casting to the ground line, where it is securely bolted to the gap frame. The head is 6 ft. 6 in. wide at the base, and is carefully designed to resist the various strains to which it is subject. The spindle is of steel and has a front journal 10 in. in diameter by 15 in. long.

The cones on the spindle and counter gear are turned inside as well as outside, so as to be properly balanced. The largest step of the cone is 3 ft. 6 in. in diameter, and the smallest step is 22 in. in diameter. The face plate is 9 ft. in diameter, with an internal wheel cast on the back. The gap frame is of massive proportions, and is arranged to swing 15 ft. in diameter and 4 ft. clear of the face plate in front. The bed is 20 ft. long, 4 ft. broad, and 20 in. deep, and is arranged to slide from 12 in. to 6½ ft. from face plate. The leading screw is of steel, and is 4½ in. in diameter; it is accurately cut to Whitworth standard thread. The motion for driving the leading screw for general work up to 10. ft. diameter is communicated through the shaft crossing the gap frame; but when the work is over 10 ft. in diameter, the motion is carried around the end of the gap frame by shafts with bevel gearing, the shaft crossing the gap being then withdrawn.

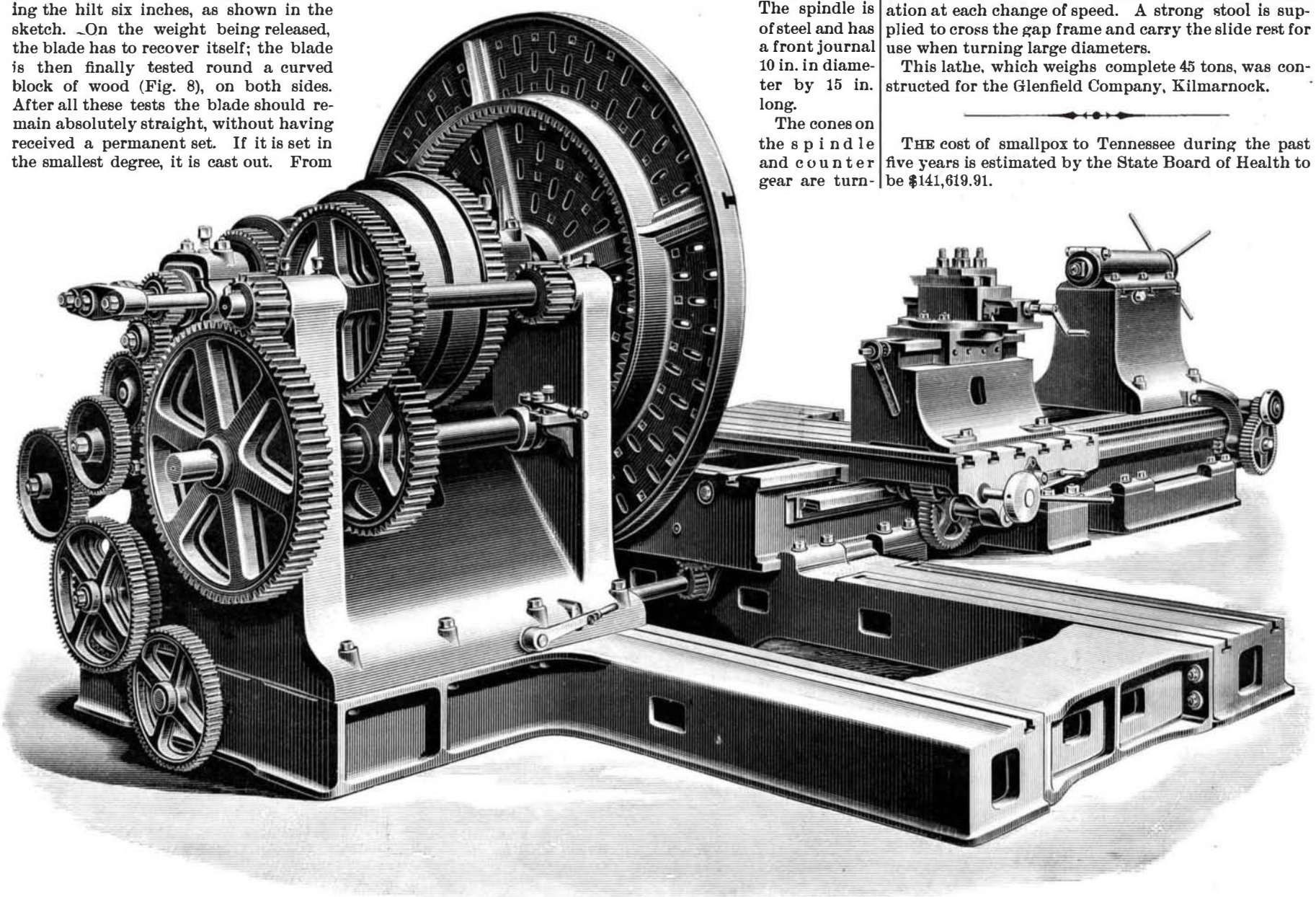
The shifting headstock is fixed in alignment with the running head by sliding in T-slots planed out of the bed, and having V-lips in which the headstock is fitted. Four bolts from these T-slots secure the headstock in position when turning.

All the gearing of the lathe is carefully designed and of ample strength for heavy duty; the arms wheels are all of the box pattern, and all teeth of the wheels, including the change gears, are machine cut from solid lanks, so as to give smoothness and steadiness of cut, with little or no backlash, and the nearest possible approach to noiselessness of action.

The internal wheel on the back of the face plate, and the bevel feed motion, are cast from machine cut patterns, having a correct form of tooth. The gearing is proportioned so as to give an equal percentage of variation at each change of speed. A strong stool is supplied to cross the gap frame and carry the slide rest for use when turning large diameters.

This lathe, which weighs complete 45 tons, was constructed for the Glenfield Company, Kilmarnock.

THE cost of smallpox to Tennessee during the past five years is estimated by the State Board of Health to be $141,619.91.



IMPROVED SCREW CUTTING AND AUTOMATIC SLIDING GAP LATHE.