(No Model.)

C. A. CASPERSSON.

METHOD OF AND APPARATUS FOR DETERMINING THE TEMPER OF STEEL.

No. 458,784. Patented Sept. 1, 1891.

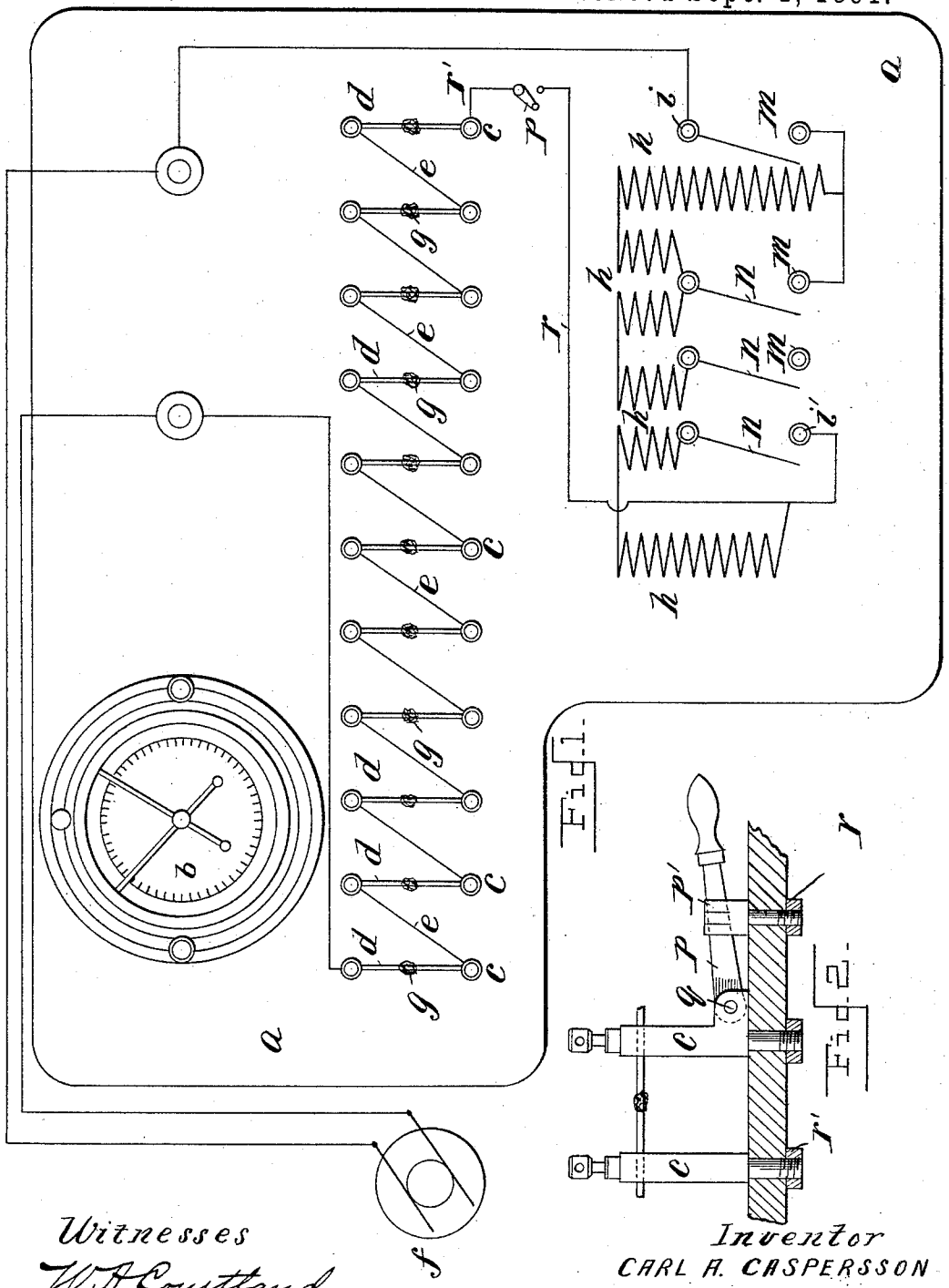


Fig. 1.

Fig. 2.

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CARL AUGUST CASPERSSON, OF FORSBACKA, MARZRETCHILL, SWEDEN.

METHOD OF AND APPARATUS FOR DETERMINING THE TEMPER OF STEEL.

SPECIFICATION forming part of Letters Patent No. 458,784, dated September 1, 1891.

Application filed October 7, 1890. Serial No. 367,337. (No model.)

To all whom it may concern:

Be it known that I, CARL AUGUST CASPERSSON, a subject of the King of Sweden, and a resident of Forsbacka, Marzretchill, Sweden, have invented certain new and useful Improvements in Determining the Temper of Iron or Steel, of which the following is a specification.

In a former patent—namely, Patent No. 404,600, dated June 4, 1889—I have set forth a method of determining the temper of iron or steel in a manner therein described.

The present application relates to an improvement upon the invention described in said patent.

My object is to be able to accomplish the same result in less time, with greater accuracy, with more economy of current, and with greater convenience.

The invention is described by reference to the accompanying drawings.

Figure 1 is a diagram containing the elements of the invention. Fig. 2 is a detail.

a is a table for supporting the apparatus and conductors.

b is an accurate chronometer of any make.

c are electric terminals or posts arranged in two lines.

d are pieces of iron or steel whose temper is to be tested, the one of them being of a known temper and the others of unknown temper. They connect posts in pairs, while electric conductors *e* each connect one member of contiguous pairs of posts, so that the current from the generator *f* may flow through the test-pieces *d* in series.

g are fuses, one being placed upon each test-piece *d*. Resistances *h* serve as a rheostat. One pole of the generator is connected to the rheostat terminal *i* and the other to the terminal *i'*.

m are terminals of the rheostat so arranged with circuit-closers *n* that by closing or opening the same the resistance of the circuit may be varied, according to the amount of current it is desired to pass through the test-pieces *d*. If the right-hand circuit-closer *n* is closed, all the resistances are in circuit. As each one to the left in order is closed in addition to the first, the resistances are successively and gradually cut out.

p is a switch or circuit-closer in circuit between the posts *c* and *i'*. By closing the same the test-pieces are connected in series with the generator *f*. The mechanical construction of the switch is shown in Fig. 2.

p' is a pair of brushes between which the circuit-closer *p* fits when the circuit is closed, the circuit-closer being pivoted at *q*. The wire *r* leads to the post *i'* and the wire *r'* to the first post *c*. The wires *d* having been placed in the posts *c*, &c., so as to connect opposite posts electrically, one of the said wires being a standard wire whose temper is known, the chronometer and current being started simultaneously, and it being known that the electrical resistance varies with its temper, and fuses *g* being placed upon the wires *d*, it will be noticed that if the wires are all substantially of the same temper all the fuses will go off within about the same number of seconds. That wire having a higher temper than the standard wire will set off its fuse before the standard wire. If of lower temper or softer, it will go off or fuse later. As each fuse is melted, a record is made of the number of seconds by the chronometer occupied from the beginning of the operation. Those samples of test-wire setting fuses off most nearly simultaneously with the standard are the best and may be marked accordingly, as test A, test B, test C, &c., in the order of their superiority.

Instead of a fuse there may be employed ordinary gunpowder, phosphorus, wax, or a linen or cotton thread may be blackened or burned into two parts. In the case of the melting of the wires the latter would become wasted and the test could not be repeated on the same wires. In the present invention the tests may be repeated and the average of the results taken as the true result. Again, in order to melt the test-wires so great a current is needed that the carrying on of the test is so expensive as to make its general application objectionable. With the same current by the present invention many more wires may be tested. Again, anything in the nature of a fuse goes off much more rapidly than by melting, so that the test is quicker with a fuse.

As compared with my former invention I can test wires by the present invention by raising their temperature to a little over 100°

Fahrenheit, whereas by the process of melting the wire it was necessary to raise the temperature to several thousand degrees Fahrenheit. Further, the former invention had the objection that if the pieces for testing were arranged in series the breaking of any one by melting would interrupt the circuit and stop the process. If arranged in parallel, the current would vary by the successive breaking of the pieces, and therefore the results would not be sufficiently accurate for most purposes.

It is evident that my invention may be modified. For instance, the posts *c* may be so connected that the test-wires *d* shall be in parallel instead of in series.

I claim as my invention—

1. The hereinbefore-described process of determining the temper of iron or steel, consisting in conducting an electric current through pieces of the iron or steel all of the same cross-section, one of the pieces being of a known temper, conducting the heat developed in the said pieces by the said current to fuses, such as gunpowder or phosphorus, until the fuses ignite, and comparing the lengths of time between the ignitions of the piece of known temper and that of the remaining pieces.

2. The combination of electrical terminals or posts, pieces of iron or steel connecting said posts, one of the pieces being of a known temper and the others of unknown temper, an electric generator in circuit with said posts, and fuses in contact with said iron or steel.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 1st day of August, 1890.

CARL AUG. CASPERSSON.

Witnesses:
G. A. FROSSBERG,
ALFR. CARLBORN.