

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public works.

DEPARTMENT

G.O. No.	1832	Press
B.P. No.		Mis.
308-309		
Dated	17. 4.	1843.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
17th July 1873.*

No. 308. Read the following endorsement of the Chief Engineer for Irrigation, dated Ootacamund, 30th June 1873, No. 396B:—

From Surgeon E. NICHOLSON, R.A., on special duty, Department Public Works, to Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, dated Bangalore, 15th June 1873, No. 40.

WITH reference to G. O., 14th May 1873, I have the honour to forward a sketch of the cement-testing machine which I have constructed.

2. The apparatus includes that necessary for testing

1st.—Tensile strain on the standard brickets of the Board of Works.

2nd.—Resistance to transverse strain on prisms.

3rd.—Adherence of joints between pairs of bricks.

The indications are accurate to 1 lb. The following results were obtained in test experiments with the apparatus as shown in figure 5. A weight of 168 lbs. was balanced with ten different combinations of weight and leverage. The mean force required was 167.4, the extremes being 167 and 168.8 lbs.

3. The following practical results were obtained in six experiments on three prisms of cement (of 1 square inch section), being broken once at each end: A 126 and 132 lbs., B 222 and 223 lbs., C 231 and 240 lbs.

4. The lever has a preponderance of 115 lbs., so that with mortars so weak that they are unable to stand that weight the lever is of itself too heavy. In this case the clamp apparatus is disconnected from the lever, shifted to the middle of the horizontal beam and a scale pan attached for the use of ordinary weights. The lever could be used for weak mortars by a slight modification, the connecting strap being made movable when necessary to double the distance from the fulcrum.

5. The total cost of the machine with fittings was under Rupees 100, and others could be turned out for a sum not exceeding Rupees 80 complete. It can be taken to pieces, and the wood-work being readily made up anywhere the iron-work alone could be sent to any place where the machine was required. The strength is equal to any materials likely to be used in it; I have used 1,000 lbs. force without any symptoms of weakness appearing.

Description of a Cement-testing Machine.

THE machine is held in a wooden framework 6 feet square, which may conveniently be wedged in between two piers of masonry. On the upper beam are iron straps A and G G, to which are suspended the clamps for holding standard brickets of cement, prisms of cement, and pairs of bricks, to either of which the disruptive force is applied by means of a lever having its fulcrum embedded in and bolted to one of the uprights. A weight, suspended to riders E E', is drawn along the lever by means of a winch until the material breaks; the free end of the lever falls between a pair of rack plates F, and is at once caught on a pin which is cushioned with India rubber so as to avoid shock.

2. The force is applied to the lowermost of the clamps holding the material by means of a iron strap B passing under the lever. At this strap, and also at the fulcrum the lever is fitted with a transverse steel knife edge.

3. The lever is divided into unitary divisions, each equal to the distance between the perpendiculars of the two knife edges. At the end of each of these divisions the effect of a weight sliding

No 40

Bangalore 15th June 1873

From

Surgeon C. Nicholson R.A.
on special Duty D. P. W.

From Surgeon C. Nicholson R.A.
on Special Duty D. P. W.

To The Chief Engineer for Irrigation

5. Thus supposing that a bricket supported a 56 lbs. weight (58 lbs. including the rider) at the 10th division and also a second 56 lbs. weight at 3.2, before it broke we should have lbs.

Total breaking weight... 830.6

Sir
With reference to G.O. 14th May 1873
I have the honour to forward a sketch of
the cement testing machine which I have
constructed.

The apparatus includes that necessary for testing

- 1° Tensile strain, on the standard bricks of the Board of Works
- 2° Resistance to transverse strain on prisms
- 3° Adherence of joints between pairs of bricks.

The indications are accurate to 1 lb. The following results were obtained in test experiments with the apparatus as shown in fig 5. A weight of 168 lbs was balanced with ten different combinations of weight & leverage; The mean force required was 167.4 the extremes being 167 and 168.8 lb.

The following practical results were obtained in 6 experiments on 3 prisms of cement (of 1 square inch section); being broken once at each end; A 126 and 132 lbs, B 222 and 223 lbs, C 231 and 240 lbs

that of Surgeon Nicholson's apparatus
£10 or probably less. The working of

(Signed) J. MULLINS, Lieut.-Colonel, R.E.,
Chief Engineer for Irrigation.

ORDER THEREON, 17th July 1873, No. 1,832.

ORDERED to be recorded.

Colonel, R.E.,

To Surgeon E. Nicholson, R.A., on special duty, Public Works Department.
To the Chief Engineer for Irrigation, with a Plan.

Spare Copies.

The lever has a preponderance of 115 lbs; so that with mortars so weak that they are

5-2

unable to stand that weight the lever is
of itself too heavy. In this case the clamp
apparatus is disconnected from the lever,
shifted to the middle of the horizontal beam
and a scale pan attached for the use of ordi-
nary weights. The lever could be used for
weak mortars by a slight modifications
this connecting strap being made movable
when necessary to double the distance
from the fulcrum.

The total cost of the machine with fittings
was under Rs 100 and others could be turned
out for a sum not exceeding Rs 80 complete.
It can be taken to pieces and the woodwork
being readily made up anywhere, the iron
work alone could be sent to any place where
the machine was required. The strength is
equal to any materials likely to be used in it,
I have used 100 lbs force without any symptoms
of weakness appearing.

I have the honour to be
Sir

Your most Obedt Servant

Edward Nicholas

Surgeon R.A.
on Special Duty S.M.

S P 13

Description of a cement testing machine

The machine is held in a wooden framework 6 feet square which may conveniently be wedged in between 2 pieces of masonry. On the upper beam are iron straps A & G to which are suspended the clamps for holding standard bricks of cement, prisms of cement and pairs of bricks, to either of which the disruptive force is applied by means of a lever having its fulcrum embedded in and bolted to one of the uprights. A weight, suspended to riders E E' is drawn along the lever by means of a winch until the material breaks, the free end of the lever falls between a pair of rack plates F & is at once caught on a pin which is cushioned with india rubber so as to avoid shock.

The force is applied to the lowermost of the clamps holding the material by means of a iron strap passing under the lever.

At this strap, and also at the fulcrum, the lever is fitted with a transverse steel knife edge.

The lever is divided into unitary divisions each equal to the distance between the perpendiculars of the 2 knife edges. At the end of each of these divisions the effect of a weight sliding along the lever from the clamp strap towards the free end will be successively 2, 3, 4 & times its weight (& that of the rider). Each division after the 2nd is graduated into tenths.

The preponderance of the lever being found

C. E. No 9234
Pg

from
Jurgens & Nicholson C. E.
on special duty 2.1.17

of
the Chief Engineer of the
Department

Comptroller 10th June 1895.
P. E. 15
P. E. 25
P. E. 40
P. E. 55
P. E. 70
P. E. 85
P. E. 100
P. E. 115
P. E. 130
P. E. 145
P. E. 160
P. E. 175
P. E. 190
P. E. 205
P. E. 220
P. E. 235
P. E. 250
P. E. 265
P. E. 280
P. E. 295
P. E. 310
P. E. 325
P. E. 340
P. E. 355
P. E. 370
P. E. 385
P. E. 400
P. E. 415
P. E. 430
P. E. 445
P. E. 460
P. E. 475
P. E. 490
P. E. 505
P. E. 520
P. E. 535
P. E. 550
P. E. 565
P. E. 580
P. E. 595
P. E. 610
P. E. 625
P. E. 640
P. E. 655
P. E. 670
P. E. 685
P. E. 700
P. E. 715
P. E. 730
P. E. 745
P. E. 760
P. E. 775
P. E. 790
P. E. 805
P. E. 820
P. E. 835
P. E. 850
P. E. 865
P. E. 880
P. E. 895
P. E. 910
P. E. 925
P. E. 940
P. E. 955
P. E. 970
P. E. 985
P. E. 1000

Machine No 9234
P. E. 15
P. E. 25
P. E. 40
P. E. 55
P. E. 70
P. E. 85
P. E. 100
P. E. 115
P. E. 130
P. E. 145
P. E. 160
P. E. 175
P. E. 190
P. E. 205
P. E. 220
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P. E. 535
P. E. 550
P. E. 565
P. E. 580
P. E. 595
P. E. 610
P. E. 625
P. E. 640
P. E. 655
P. E. 670
P. E. 685
P. E. 700
P. E. 715
P. E. 730
P. E. 745
P. E. 760
P. E. 775
P. E. 790
P. E. 805
P. E. 820
P. E. 835
P. E. 850
P. E. 865
P. E. 880
P. E. 895
P. E. 910
P. E. 925
P. E. 940
P. E. 955
P. E. 970
P. E. 985
P. E. 1000

Description of
 Current-Testing Machine
 C.E. 2/923/22.
 P.M. 3859/73.

N. 39613.

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Submitted to Government with
reference to G.O. 5th March 1873. 12711

2. The cost of Mr. Mache's ce-
 G.O. 7 Jan 73 ment testing machine is, in Eng-
 12-36- land, £24, and that of Surgeon
 Nicholson's apparatus £10 or pro-
 bably less. The working of the
 two machines will soon be com-
 pared and, should the cheaper
 apparatus be found in all respects
 efficient with or without modifica-
 tion, Surgeon Nicholson might be
 asked to transmit a drawing
 with the details shown on a
 somewhat larger scale than in
 the accompanying sketch, & the
 design can then be lithographed
 & circulated to District Engineers.

Detachment of Whulmlins Lt Col M.E.
 30th June 1873
 Chief Engineer for Irrigation
 To The Secretary to Govt P.H.E.

P. W. 1843 Department

No 3859.

From

The Chief of the
The Secretary of the
P. W. D.

No 39613.

Dated 30 June.
Recd 9th July 1873.
Enclos 3

Notes on Surgeon S.
Nicholson's current testing
machine.

No 1832-17th July 1873.

No 1832-17th July 1873

Plan of the machine for
head in following
from the Surgeon S.
Nicholson's current testing
machine.

Refer to the

enclosed.

By. 2/7/73
P. W. D.

Surgeon S. Nicholson
in the machine
for the machine

Surgeon S. Nicholson
in the machine
for the machine

Cp 3859
Govt. of 1873 Madras.
PUBLIC WORKS.

To *Mr. J. G. Nicholson & Co.*

India

Recd

Encl. 2

G. 17th July 1873.

Nos. 508-9-

Cement testing machines

*Made by the Chief Eng
for Bridge in S.
Nicholson's ma-
chine, recorded.*