Talbot and Jones
and the
N.B.M.A.
Standard Rattler
Tests of Paving Brick

Civil Engineering
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COMPARISON OF THE TALBOT-JONES AND THE N. B. M. A. STANDARD RATTLER TESTS OF PAVING BRICK

BY

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This is to certify that the thesis prepared under the direction of Professor Talbot by

CHARLES WESLEY MALCOLM

entitled COMPARISON OF THE TALBOT-JONES AND THE H. B. M. A.

STANDARD RATTLE TEST OF PAVING BRICK

is approved by me as fulfilling this part of the requirements for the Degree of Bachelor of Science in Civil Engineering.

[Signature]

Head of Department of Civil Engineering
Comparison of the Talbot-Jones and the N. B. M. A. Standard Railer Tests of Paving Brick.

Brick pavements rank high in durability and popularity. They give good satisfaction, not only under light travel, but under moderately heavy traffic. With the extended use of brick as a paving material has arisen the necessity of finding methods of determining the quality of paving brick which may be used as standards. The methods of testing that have been in use are the following: (a) Specific Gravity Test; (b) Crushing Test; (c) Cross-Breaking Test; (d) Absorption Test and (e) Abrasion and Impact or Railer Test. The list now generally accepted and used as the standard is the Abrasion and Impact or Railer Test. The standard railer used for making this test is that adopted by the National Brick Manufacturers Association. Since the adoption of the standard railer, another machine has been brought
out by the Talbot-Jones rattle. It will be
the purpose of this thesis to make a comparison
of the Talbot-Jones and the N.B.M. C. Stan-
dard rattle tests and to determine which
better determines the quality of brick for paving
purposes.

The purpose of the rattle test is to deter-
mine the quality of different makes of brick
and of different burnings of the same make.
To make a good pavement, the brick, taken
as a whole, should not only be tough, hard
and durable but each brick should possess
the same degree of toughness, hardness and dur-
ability. The principal cause of the poor re-
sults obtained with many pavements is not
due to the fact that, taken as a whole, the
brick are hard or too soft but that some are
hard and others soft. This difference in quali-
ity gives rise to unequal wear and rapid
disintegration of the pavement.

**History of Rattle Tests.**

Before the year 1897, there was no at-
tempts at uniformity in the rattle lists of
paving brick. Almost every manufacturer
and experimenters used a different form of rauler. Any foundry rauller, used for cleaning castings, was rejected and any lot of foundry scrap was used as shot. There was no uniformity in speed, size of rauller or charge. On account of the great differences in the conditions of the tests, the results obtained by different experimenters were in no wise comparable and were of little use. In February 1895, a commission was appointed by the National Brick Manufacturers Association to investigate the subject of tests for having brick, and to recommend some form of rauller that could be used as a standard. Prof. Edward Ation, Jr. made a series of tests and in behalf of the commission reported upon a rauller which he recommended for use as a standard. Mr. T. H. Harrington also made numerous tests along this line. The results of these two experimenters upon different makes of brick agreed very closely although the tests were made separately. In February 1897, at a meeting of the National Brick Manufacturers Association, the report of the Commission appointed in 1895 was received and the rauller
test, a description of which follows, was adopted. The machine recommended was to be 28 inches in diameter and 20 inches long, measured inside the rattle chamber. The barrel was to be supported on trunnions and in no case was there to be a shaft passing through the rattle chamber. The cross-section of the rattle was a regular polygon having fourteen sides. There was a space of one-fourth inch between the slates for the escape of dust and small pieces of brick. The charge was measured by bulk, it being 15 per cent of the cubic contents of the rattle. The number of whole brick coming nearest this amount was considered a charge. The speed of rotation was 30 revolutions per minute for 1800 revolutions. All brick must be thoroughly dry before rattering. In this form of test it is to be noticed that nothing was put into the rattle except the brick themselves. This form of rattle did not give good satisfaction and its use occasioned much unfavorable comment. It was said and with good cause, that the test did not distinguish between good and poor paving brick.
About this time numerous tests were being made by different experimenters, among the most important of whom was Prof. E. W. Talbot, using a charge of cast iron block. At the Detroit convention in February 1900, the National Brick Manufacturers Association received a report from a body of engineers recommending that the standard test be amended to require a charge of cast iron shot. This recommendation was adopted and is the method called the standardsierrer test in this class.

In 1899, Mr. Homer Jones of Geneva, N.Y., devised a testing machine in which the brick to be tested were clamped in pockets but tests made by Prof. C. H. Kroun showed that the machine had many defects. In 1900, Prof. Talbot devised a machine in which the brick were clamped around the circumference forming a brick cylinder, which received the blows and worn of the shot. At a meeting of the National Brick Manufacturers Association, a committee was appointed to investigate the merits of this method of testing brick. This committee recognized the advantages of the new machine but recommend
PLATE I.

DETAILS OF THE TALBOT-JONES RATTLER

Scale 1" = 10"
ed that the standard is not changed.

The Machines.

Plates I and II. show drawings of the Talbot-Jones and the University of Illinois Standard Railers.

Talbot-Jones Railer.—The Talbot-Jones railer (shown in Plate I.) consists of a thin drum 37 inches in interior diameter, fastened to a cast-iron head. Between the drum and the head is a space 3/8-inch wide to allow the dust and small pieces of brick to escape. Near the outer circumference of the head, is a groove 5/8-inch wide running entirely around the railer head. Into this groove are placed the bolts used for fastening the brick in position. This groove is accessible through six holes 1 1/8-inch in diameter. The groove is 1 3/8-inch from the inside of the drum, thus allowing room for the wooden spacers, which are used to separate the brick. The inside edges of the brick, when placed in position on the railer, fit against the head for a distance of 3 3/8 inches, the upper portion of them being left free to allow for
PLATE II.

DETAILS
OF THE
N.B.M.A. STANDARD
RATTLER
Scale 1" = 10"

Rattler made of one piece of cast iron.
Interior Dimensions - Dia. = 28", Length 20"
SHOWING ARRANGEMENT of POSTON BLOCK IN TALBOT-JONES RATTLER BEFORE RATTLING

PLATE I. (a)
SHOWING ARRANGEMENT of POSTON BLOCK

IN

TALBOT-JONES RATTLER

AFTER RATTLING

PLATE II (a)
wear. This is accomplished by setting the head back about 3/4 inch at this point. In spaces, and a bolt are placed between adjacent bricks, and the outer end of the brick held in position by rectangular washers (see the two photographs of the brick in position in the machine). A wooden end or head was used in the tests, 3 3 inches in diameter, and 1 3/4 inches thick. There is a hole in this head about 11 inches square to allow the charge of cast iron shot to be put in after the brick are in position and the cover on the table. This hole is then closed by a wooden cover. A wooden head was used in preference to a steel or iron head to lessen the noise made by the table. This head is held some distance from the ends of the bricks by the washers and nails on the bolts, thus making the ends of the bricks about the same distance from the two ends of the table. The table is overhung.

"Standard Rattle." Details of this rattler are given in Plate II. The principal point of difference between the University of Illinois Standard
Rainier (the one used in the test) and other standard Rainiers, is that the U. of I. Rainier is overhung, and is accessible through an opening in the end. This makes the charging of the rainier an easy matter. The rainier barrel is of cast iron and is made from a single casting. The interior dimensions are 28 inches in diameter by 20 inches long. One end of the rainier is solid and contains the shaft, the other end having a hole 12 inches in diameter in it. The rainier barrel is made of fourteen slats, there being a narrow slot between each slat to allow the brick dust and chippings to escape (see Plate II.). These slats are \( \frac{3}{4} \) inch wide on the inside and \( \frac{3}{8} \) inch wide on the outside. The thickness of the outside head is \( \frac{1}{2} \) inch and of the slats at the sides \( \frac{3}{8} \) inch. Four bolts are set into the outside head and provided with thumb screws for fastening the cover. This rainier was made too light and erected as the slats requiring patching and repairs.

Charge and Speed

Tulbot-Jones Rainier - in the Tulbot-
Jones rattrler, enough brick or block to fill
the entire circumference were used. This num-
ber is about 25 or 26 blocks of the Clinton size
or about 33 of the brick size. The number depends
somewhat upon the spacing used. In the spea-
ing used in the article, the distance between bricks
at the inner face was about 1½ inch, the size of
the spacers being as follows \( \frac{5}{18} \). The charge of
east iron shot consisted of sixty (60) pounds of
2½-inch cubes and ninety (90) pounds of 1½-inch
east iron cubes, the individual cubes being re-
placed by new ones after they had lost one-tenth
of their original weight. The corners of the
cubes were slightly rounded before using in
a list. The speed was about 42½ revolutions
per minute, the rattrler being run 3000 revol-
utions at this speed.

**Standard Rattrler** — The charge used in
the standard rattrler consisted of twelve (12)
brick or min (9) block together with three
hundred (300) pounds of east iron shot. The
charge of shot was made up of 225 pounds
of 1½-inch cubes and 75 pounds of rectan-
gular east iron blocks 2½ inches square by 1½
the long with slightly rounded corners, the block weighing about 7½ pounds each. The individual pieces were replaced by new ones after they had lost one-twelfth of their original weight. The speed used in the tests was about 30½ revolutions per minute, the roller being run for 1800 revolutions.

**Conditions of Tests.**

The number of revolutions of the roller during each test was recorded by a counter and this number in turn checked by taking the time of the test. All brick were dried before using. The sharp edges of the cast iron cubes were worn off before the cubes were used in a test. The Terre Haute brick were graded by the manufacturer and again graded by the writer before they were tested. The Clinton block were selected from piles on the street ready to be used in the pavement. The Boston block were taken from the pavement on Taylor and Walnut streets, Champaign, Illinois, while they had been under direct and moderately heavy traffic for a city of 10000 inhabitants.
The two streets were paved at the same time, about November 1st, 1898, and the brick were taken from the pavement in November, 1901. It is almost impossible to determine the relative amount of traffic upon the two streets.

**Preliminary Tests**

Several tests were made to determine the spacing to be used in the Talbot-Jones railer. The brick used in these preliminary tests were a soft grade of Clinton block. Two tests were made using a spacing of about 1/2-inch. With this spacing, the brick were found to chip badly. Greater difficulty was also found in obtaining a uniform spacing than when the 1/4-inch spacing was used. A spacing of about 3/8-inch was tried but when Clinton block were used, 26 blocks could not be placed in the railler and 25 block did not completely fill the circumference. A test was also made without space, the brick being placed as closely together as the bands would allow. This spacing was found to be impracticable as it was impossible to keep the brick from becoming loosened during the progress of the test. An advantage found
with the 1/4-inch spacing was, that for the various makes and sizes used, the circle was more readily finished with an even spacing. Another advantage of this spacing was that it was better adapted to brick sizes, as the chipping effect was less. It is known from the tests made by Prof. Edward Clinton, Jr., that the wear with narrow spacing varies little up to a spacing of 1/2-inch, so that slight changes in the distance apart of the brick will not materially affect the results. The standard spacing finally chosen for these tests was that which was given by using one block (Clinton) less than the number necessary to approximately fill the railecr circumference. This spacing averaged about 1/4-inch measured on the inside of the brick cylinder. This spacing was chosen because it gave more opportunity for uniform and convenient spacing, held the brick firmly, avoided excessive chipping and gave sufficient roughness to the brick cylinder to carry the shot up the side of the railecr as the given speed.
Results of Tests (Page 32 and 33)

Table I, II, and III. give the results of tests made upon different makes of brick, and different grades of the same make, by the Standard and the Talbot-Jones rattle. Plates III, IV, V, etc. show diagrams made by plotting the individual losses of brick in the Talbot-Jones rattle. The results on the different makes of brick will now be given.

Tests on Clinton Block.

Plate III. shows the results of tests on the Talbot-Jones rattle upon medium, soft, and hard-overburnt Clinton block. The different diagrams are plotted to the same scale and are made by plotting the individual losses in the mass of the loss of each brick. For the medium Clinton block, two lines represent the results obtained by rattling the brick first on one side, and then on the other. The same method was used for the soft grade. Separate charges were used for the two tests of overburnt block. For the Talbot-Jones rattle, readily distinguishes between medium, soft, and hard-block as shown by noting the mean per cent loss viz:
medium, 405; soft, 8.44 and hard overburned, 15.90. Referring to Table I, the results obtained with the Standard rate iver upon the same grade of block are 21.51, 25.12 and 16.73 per cent, respectively, for medium, soft and hard grade. The results given for the medium and soft grades are the averages of two tests but only one test was made for the hard, overburned block. It is quite evident that the Fulbro-Jones rate iver distinguished more markedly between the different grades. The Standard list gave little difference between the soft and hard Clinton block. The ratio of the losses for the Fulbro-Jones list is as 1:2.1:3.9 for the medium, soft and hard grades respectively and for the Standard list, 1:1.17:1.21 respectively, for the same grades.

Plate IV shows the results of the same tests as Plate III. The losses are, however, plotted in the order of the brick in the rattle. The lines show that the order of the brick has nothing to do with the actual losses. Referring again to Plate IV and comparing the curved showing the losses of the brick when ratted
on one side and thin on the other, it is
seen that, although the mean values are about
the same, the individual losses of the two side
differ widely. This may be partly explained by
the fact that the bricks are not uniform through-
out, but some of the difference must be charged
to the imperfections of the test itself. Another
fact shown by these tests is that the ex-
treme losses for the medium block (consider-
ing the individual block) do not vary within
nearly as wide limits as the extreme losses of
the soft and hard (overburned) block. This
fact makes it evident that a requirement,
that the mean losses of the first third of the
charge, taken in the order of the present test,
should not differ more than — per cent
from the mean of the last third, might
make a good specification.

**Perrine-Harvey Brick.**

The results obtained by testing the Perrine-Harvey
brick are shown in Table II. Column V shows
the individual losses obtained from the Talbot-
Jones' ratio test, upon medium and soft brick.
The losses are plotted in the order of the per.
sent lost by the individual brick. The mean value given for the soft brick is the mean of two separate charges, and for the medium grade, the results of raining first on one side and then on the other. No complete list was made upon the hard pressed brick of this maker as they became loose in the railler before the test was completed. This was due to the fact that a very small number of spacers was used, the spacers being left out in many cases to make the spacing more uniform. Plate V gives the results upon the medium grade of brick, shown in Plate IV, plotted in the order in which they were placed in the railler. One line shows the results of raining on one side, and the other, the results when the brick were turned over and the opposite side railed.

The tests upon the brick again show, as in the tests upon Clinton block, that the Talbot-Jones test gives a very good distinction between the medium or best grade and the soft brick, the mean value of the two tests being 9.40 and 18.08 per cent respectively. The results obtained with the Standard railler are given
in Table II. The grains were the same as were used in the Talbot-Jones test. In addition tests were made upon hard, sunburned brick. The following values are means of two tests upon each grade: medium, 24.20 per cent; soft, 31.45 per cent; and hard, 22.93 per cent. Here again the hard, sunburned brick are not readily distinguished by the test. The Talbot-Jones roller again gives a greater difference in losses between the medium and soft grades, there being no tests made upon the hardest grade. The ratio of the losses in the Talbot-Jones roller upon these bricks are as 1:1.93 for the medium and soft grades respectively and for the Standard roller 1:1.30:1.11 respectively for the medium, soft, and hard brick.

Plate VII shows curves of the individual losses of soft brick (Terra Nostra) in the Standard roller. Bricks were selected that weighed the same before rolling and the individual percentages obtained by weighing each brick after testing. In the first test, three bricks were badly broken and in the second, two bricks were so badly broken that the individual losses could not be
obtained. These test show that the variation in loss in the standard rattle, upon this grade of brick, is greater than in the Talbot-Jones rattle. This is partly due to differences in quality of the brick, but must be charged largely to rather accidents of the tests.

New Boston Block

Table III gives a summary of the results of testing new Boston block i.e. not from pavement, in each rattle. Plate VIII shows the individual losses obtained from the Talbot-Jones test, plotted in the order of their losses. The lower lines, marked last grade, show the results of first rattle, the brick on one side and then turning them over and rattle on the other side. The mean value (4.69 per cent), is the mean of two tests. The upper line represents the results of one test of soft Boston block and the value (16.11 per cent) is a mean of the individual losses in the test. The corresponding results obtained for the same grade of brick in the Standard rattle are, 22.95 per cent for the last grade and 27.66 per cent for the soft brick. The latter is the result of a single test, while the former is the mean of two tests. The
difference in loss between the poor and good grades in the Falbo-B Jones rattle is very marked while in the Standard rattle, as in the cases of the tiles of the Clinton and more Recent bricks, the difference in loss is not great. The ratio of the loss upon these brick in the Falbo-B Jones test is as 1:3.44 for the medium or best and the soft grade respectively and as 1:1.21 for the Standard test upon the same grade.

Plate IX shows the results of testing the best grade of Poston block, first on one side and then on the other. The individual losses in the two tests agree very closely as shown by the two lines. In almost all the individual brick, the direction of the lines is approximately the same. The mean losses for the first and second time tested were 4.56 and 4.82 per cent respectively, the mean value of the two tests being 4.69 per cent.

Poston Block from Cameroon

Table III gives a summary of the results of the tests made, in both the Falbo-B Jones and the Standard rattles, upon Poston block from Taylor and Walnut Streets and Plate X shows the tiles plotted in the order of individual losses.
The block had been on the pavement and in
traffic from November, 1898 until November,
1901, when they were taken out for testing. Block
were selected from both Taylor and Walnut streets
that had worn well and also some that had not
worn well, it being the object of the writer to
-determine which railie better graded the brick.
The brick were tested upon the unworn side
-i.e. upon the side that was not exposed to
traffic in the street

**Block from Taylor Street.**
The loss of the block from Taylor street in
the Talbot-Jones railies was 3.28 per cent for
those that had worn well and 4.79 per cent
for those that had not worn well. In the
Standard railies, the losses were 15.09 per cent
for those that had worn well and 23.36 per
cent for those that had not worn well. It is
thus seen that both railies graded the brick
as they were graded by the writer according to
actual wear. The ratios of the losses of those
that had worn well to those that had not was
as 1:1.48 for the Talbot-Jones railies and as 1:1.55
for the Standard railies. These results show that
There was little difference in the graining by the two rails. The results of the tests in the standard and roller were probably a little lower than they would be for new brick as the edges of the block were somewhat worn. Both tests show that the block were exceptionally good, as the tests upon those that had not worn well in the pavement, showed about the same loss as the best new brick rail.

**Block from Walnut Street**

The conditions of the tests were practically the same as those upon block from Taylor Street. The loss of the block from Walnut Street in the Talbot Jones test was 6.89 per cent for those that had worn well and 8.71 per cent for those that had not worn well. In the standard test, the losses were 16.60 per cent and 25.41 per cent, respectively, for those that had and those that had not worn well. Both rails again distinctly distinguished between the good and poor brick from the same street and graded them as did the writer. The block from Walnut Street were evidently not as good as those from Taylor Street as is shown by the tests. The traffic may
have been somewhat different upon the two streets, which would have influenced the grading somewhat. Then, again, the quality of the brick was probably not exactly the same as the block was from different shipments. There is, however, some uncertainty as to the correctness of the results obtained in the standard test upon brick that had worn well from Walnut Street. This block did not stand as good a test in the Talbot-Jones test (see results in Table III) and upon inspection and testing for absorption was evidently poorer brick, yet the value 16.60 per cent is very low and would rank the block as very good. The results of this test is questionable, yet a diligent search failed to give any adequate explanation for it.

That the wear in the Talbot-Jones test is much like that in the street is evident from an inspection of the two sides of the block after railsling. The wear, upon the side railed and also upon the side exposed to traffic in the circus, was very much the same. In most cases, when the block had chipped badly in the pavement, the lose in the railed was also mostly
due to chipping and when the block had worn
by abrasion in the pavement, the same was
true in the rattle.

Conclusions.

To sum up the conclusions drawn from
the tests made by the two rauliers and from other
considerations, the following discussion is given.

Cost - In comparing the costs of the Falbot-
Jones and Standard rauliers and tests, the latter
has the advantage in its cost somewhat less to
construct the machine, less for operation, and less
for repair.

Simplicity - The standard raulier test is
much the simpler of the two tests. The Falbot-
Jones raulier is more complicated than the stand-
ard, and the bolts will require frequent renewal.

Convenience - In convenience, the stand-
ard raulier test has a marked advantage. The
work and charge of shot are easily put into
the raulier chamber, requiring little work, while
the labor attended with the clamping of the stock
in Falbot-Jones raulier is considerable.

Time of Test - A very great advantage which
the standard test has over the Falbot-Jones test.
is in the matter of time required for the test. The standard test requires about 60 minutes for
raiding and say, 10 minutes for charging and
removing the charge from the raider, making
the total time required about 1 hour 10 minutes. The
time for weighing the brick will not be considered in
either test. The time required for the Talbot-Jones
test is about as follows: time to place brick in
position in the raider, about 60 minutes; time
of raiding about 70 minutes; time to put on
and remove the cover, to put in and remove the
charge of shot and to remove the brick about 30
minutes. This makes a total of 2 hours 40
minutes for the Talbot-Jones test as compared
with 1 hour and 10 minutes required to make
the standard test.

Uniformity of Results - Referring to Tables I,
II, and III, it is seen that the advantage is
slightly in favor of the Talbot-Jones test for brick
of the same grade.

Uniformity of the Brick - That the brick,
even those used in the same test and care-
fully selected, are not uniform in quality
is evident from both raider tests although more
clearly brought out by the Talbot-Jones test. This latter test has the advantage of determining the loss in individual brick and hence the uniformity of the product.

**Ratios of the Loss of Cool Brick to Good -** As noted in the discussion, the Talbot-Jones test gives a greater difference between good and poor brick than does the Standard test. For Clinton brick the ratio of the losses of medium, soft and hard (overburned) brick is as 1:2.1:3.9 respectively and for the Standard sample as 1:1.17:1.21 respectively for the grades, in the order named. For Terre Haute brick, the losses are as 1:1.93 for the Talbot-Jones test and as 1:1.36 for the Standard test. The comparison is not so easily shown when brick from the pavement are considered as the side that had been worn by traffic in the pavement was not worn in the Talbot-Jones sample, while the Standard test, from its very nature, wore all sides of the brick. The ability to show higher ratios of loss adds to the grading power and is an important advantage.

**Similarity to Wear in the Street -** The Standard test does not give a wear that is at all
comparable with the wear in the street. This is evident from the very nature of the test. On the other hand, the wear given by the Talbot-Jones test corresponds closely to that caused by traffic in the street. This is at once evident from an inspection of the two sides of the same brick, i.e., the side that was worn in the street and the side that was exposed to the rainfall test.

**Testing and Ranking of the Brick**

The results of the tests shown in Tables I, II, and III, in the opinion of the writer, justify the statement that the Talbot-Jones test better grades the brick as to their actual qualities than does the Standard test. The Standard test did not give a very great difference between the different grades, especially between the soft and very hard brick.

In conclusion, it is the opinion of the writer that the Standard rainfall test is better adapted to the testing of brick than the Talbot-Jones test, when cost, simplicity, convenience, and uniformity of the test are governing factors, but that the reverse is true when uniformity of results, ratio
of the loss of poor and good brick, similarity in wear in the street, and grading and ranking of the brick are considered.
TABLE I.
RESULTS OF RATTLER TESTS
Make: Clinton Block
Size: 3\(\frac{3}{4}\)" x 4" x 3\(\frac{3}{8}\)" x 9\(\frac{1}{4}\"

<table>
<thead>
<tr>
<th>GRADE</th>
<th>TALBOT-JONES RATTLER</th>
<th>STANDARD RATTLER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st.Test</td>
<td>2nd.Test</td>
</tr>
<tr>
<td>Best Medium</td>
<td>4.46</td>
<td>3.57</td>
</tr>
<tr>
<td>Soft</td>
<td>11.09</td>
<td>5.78</td>
</tr>
<tr>
<td>Hard-Cinder</td>
<td>15.60</td>
<td>16.20</td>
</tr>
</tbody>
</table>

* Rattled on one side, then turned over and rattled on other side.
# Separate charges

TABLE II.
RESULTS OF RATTLER TESTS.
Make: Terre Haute Brick
Size: 4" x 4\(\frac{5}{8}\)" x 2\(\frac{1}{2}\)" x 8\(\frac{3}{4}\)" x 0.875"

<table>
<thead>
<tr>
<th>GRADE</th>
<th>TALBOT-JONES RATTLER</th>
<th>STANDARD RATTLER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st.Test</td>
<td>2nd.Test</td>
</tr>
<tr>
<td>Best Grade Medium</td>
<td>9.58</td>
<td>9.21</td>
</tr>
<tr>
<td>Soft</td>
<td>20.14</td>
<td>16.03</td>
</tr>
<tr>
<td>Hard-Pressed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Rattled on one side then turned over and rattled on other side
** Separate charges
TABLE III.

RESULTS OF RATTLER TESTS.

Make: Poston Block

Size: 3\(\frac{3}{8}\)" to 3\(\frac{1}{2}\)" x 3\(\frac{3}{4}\)" to 4" x 9" to 9\(\frac{1}{4}\"

NEW BLOCK

<table>
<thead>
<tr>
<th>GRADE</th>
<th>LOSS IN PERCENT OF ORIGINAL WEIGHT</th>
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<tbody>
<tr>
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<td>TALBOT-JONES RATTLER</td>
</tr>
<tr>
<td></td>
<td>1st Test</td>
</tr>
<tr>
<td>Soft</td>
<td>16.11</td>
</tr>
<tr>
<td>Best Grade</td>
<td>4.56</td>
</tr>
</tbody>
</table>

BLOCK FROM PAVEMENT

<table>
<thead>
<tr>
<th>STREET TAKEN FROM</th>
<th>LOSS IN PERCENT OF ORIGINAL WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TALBOT-JONES RATTLER</td>
</tr>
<tr>
<td></td>
<td>Had worn well</td>
</tr>
<tr>
<td>TAYLOR ST.</td>
<td>* 3.28</td>
</tr>
<tr>
<td>WALNUT ST.</td>
<td>* 6.89</td>
</tr>
</tbody>
</table>

* Tested on unworn side i.e. side that was down in pavement.

### Questionable


Loss in Percent

Mean = 5.90%  Hard Clinton

Mean = 8.44%  Soft Clinton

Mean = 4.02%  Medium Clinton

Clinton Block
T. J. Rattler

Medium Clinton were rattled on both sides
Soft Clinton were rattled on both sides
Hard Clinton were separate charges

PLATE IV  Ref. No. of the Brick
Plate V

Reflect No. of the Brick

Loss in Percent

Terre Haute Soft

Mean of tests = 18.08%

Terre Haute Medium

Mean of tests = 9.40%

Terre Haute Brick T.J. Rattler

The two tests are separate charges of brick

Brick 1st. rattled on one side then on the other.
PLATE VI.

Terre Haute Brick
Medium Grade

Rattled on one side  Loss = 9.21 %
Same brick turned over and rattled on other side  Loss = 9.58 %

Terre Haute Brick  T.J. Rattler

Ref. No. of the Brick
New Poston Block - T.J. Rattler

Mean loss = 16.11 %

Mean of 2 tests = 4.69 %

New Poston Block - Soft

Rattled on both sides

PLATE VIII

Ref. No. of the Brick
New Poston Block  T.J. Rattler

Rattled on one side  \( L = 4.82\% \)

Same brick turned over and rattled on other side. Loss = 4.56\%
Loss in Percent

PLATE X

Ref. No. of the Brick

Rotten Block from Taylor & Walnuts Streets

Tu Ratter

Mean = 3.269%

Mean = 4.79%

Mean = 6.89%

Mean = 8.71%

Had not worn well

Had worn well

Walnut St

Had worn well

Had not worn well