tool self-sharpening. This method of applying hard-facing material to but one face is said[3] to have worked very well with other digging parts, such as power shovel teeth and plowshares.

We decided upon simulated rather than actual field experiments in order that we might perform as nearly as possible exactly the same routine with the two picks, since it can readily be appreciated that manual digging might easily have resulted in serious errors in a comparative study of the wearing qualities of a modified and an unmodified Brown pick.

A hole was bored through an extension of each pick handle 36 inches from the pick end and a round iron rod of slightly smaller diameter passed through the holes and securely fastened to supports in such manner that the picks could only move up and down. The picks could then be lifted and allowed to fall freely through equal and controlled distances upon selected objects. The lifting and release of the picks was secured by the revolution of two eccentrics of the same size fastened to an axle which was geared to a one-fourth horsepower motor. The end of the pick handle farthest removed from the head was depressed as the eccentric was revolved by the motor and the pick elevated, then suddenly released as the eccentric continued its revolution, and as soon as one pick was released for its downward stroke the other was quickly elevated. Speed-reducing gears were introduced between the motor and the revolving shaft, thereby regulating the number of strokes delivered by each pick to twenty-six per minute. The length of arc through which the pick points rose and fell was approximately seven inches. A counter was attached to the shaft and each complete revolution of the shaft, and therefore the number of strokes delivered by each pick was automatically recorded.[4]

A total of eight thousand strokes were delivered by each end of each pick, distributed as follows: Alberene (a soft stone)—1,000 strokes; old brick—1,000; sandstone—1,000; concrete I (interior of a broken block)—1,000; concrete II (surface of U. S. Highway I)—3,000; polished, fine-grained white marble—1,000. The digging operation was interrupted after each five hundred strokes and the specimen turned so that each pick now dug where the other had been digging.

Neither pick showed much sign of wear after impact upon alberene and old brick, but beginning with sandstone a decided difference in the two picks was observed. The pointed end of the original Brown pick quickly became blunted and rounded off so that its effectiveness was materially lost and could only be restored by resharpening. At the same time and under the same working conditions the hard-faced pick became self-sharpening, the alloy showed no evidence of wearing and only the steel undercoat wore away. The results were even more noticeable at the spatula end. Since this is relatively thin for some distance, the alloy applied to the outer face composed a relatively larger cross-section than at the pointed end. Even very slight wearing away of the steel left a wear-resisting knife edge which was effective in digging very hard materials, such as marble and concrete, although a slight loss of alloy by chipping resulted. The unmodified steel spatula was badly bruised and roughened by sandstone, concrete and marble. Practically no effective digging was done on the two latter materials by the original steel pick.

It is the conclusion of the writer that the usefulness and effective life of this valuable tool can be materially increased by the application of Haynes Stellite[2] or some similar hard-facing alloy. These improved picks are not on the market. Perhaps it should be noted that the application of this alloy requires the services of a good welding operator. In addition, the alloy is too hard for machining and must be finished by grinding.

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[3] *Oxy-Acetylene Tips*, 6: 58, 1928.

[4] The general idea of the testing machine was described to Mr. J. M. Holeman and Mr. J. B. Weems, Jr., students at Randolph-Macon College. The writer expresses his appreciation of the time and efforts expended by them in designing and constructing it.

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