T. MATSUMURA.

REPEATED IMPACT TESTING MACHINE.

APPLICATION FILED DEC. 28, 1915.

1,201,326.

Patented Oct. 17, 1916.

3 SHEETS—SHEET 1.

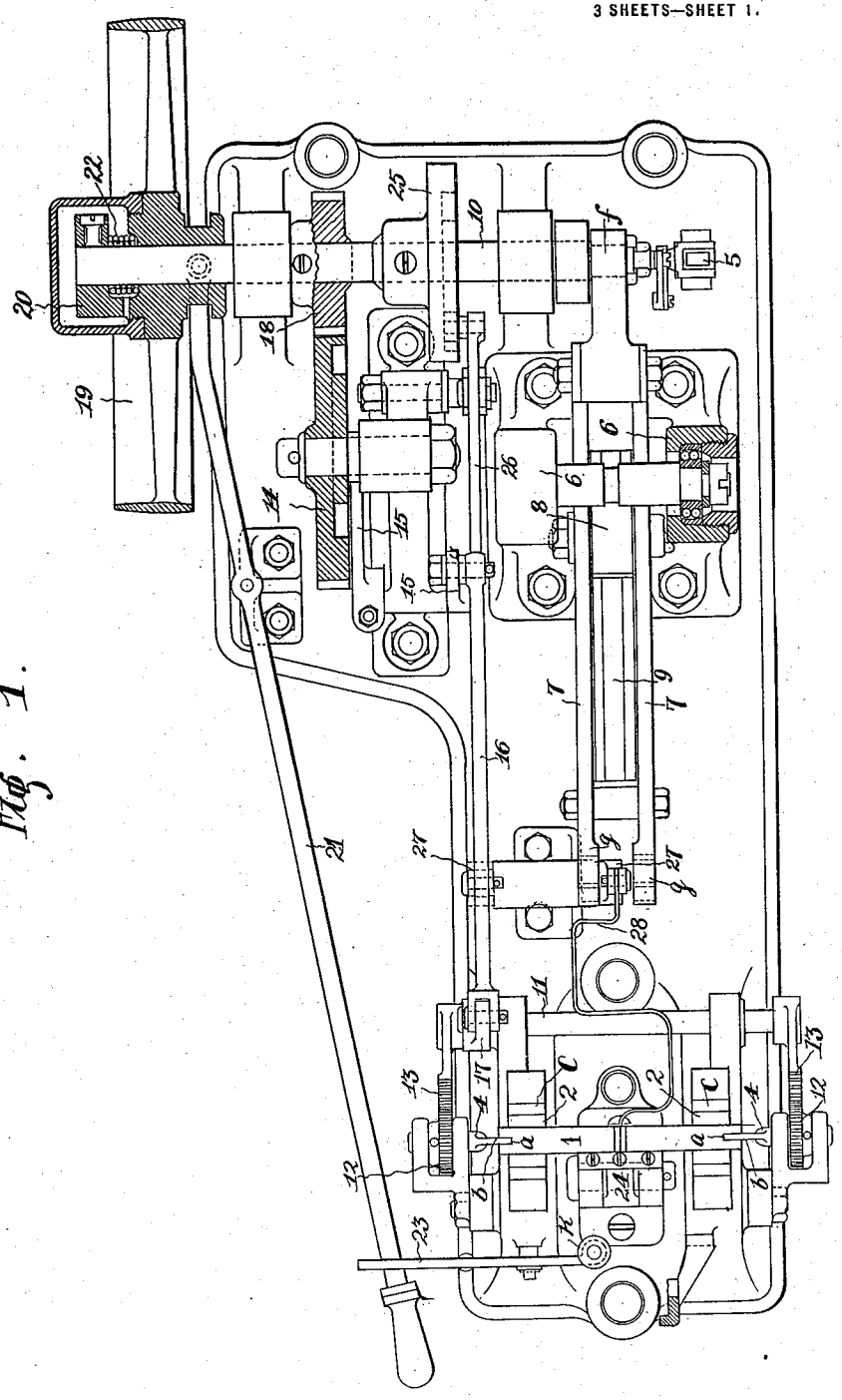


Fig. 1.

Inventor-
Iwanzo Matsumura,
By- R. Singer Atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

T. MATSUMURA.

REPEATED IMPACT TESTING MACHINE.

APPLICATION FILED DEC. 28, 1915.

1,201,326.

Patented Oct. 17, 1916.

3 SHEETS—SHEET 2.

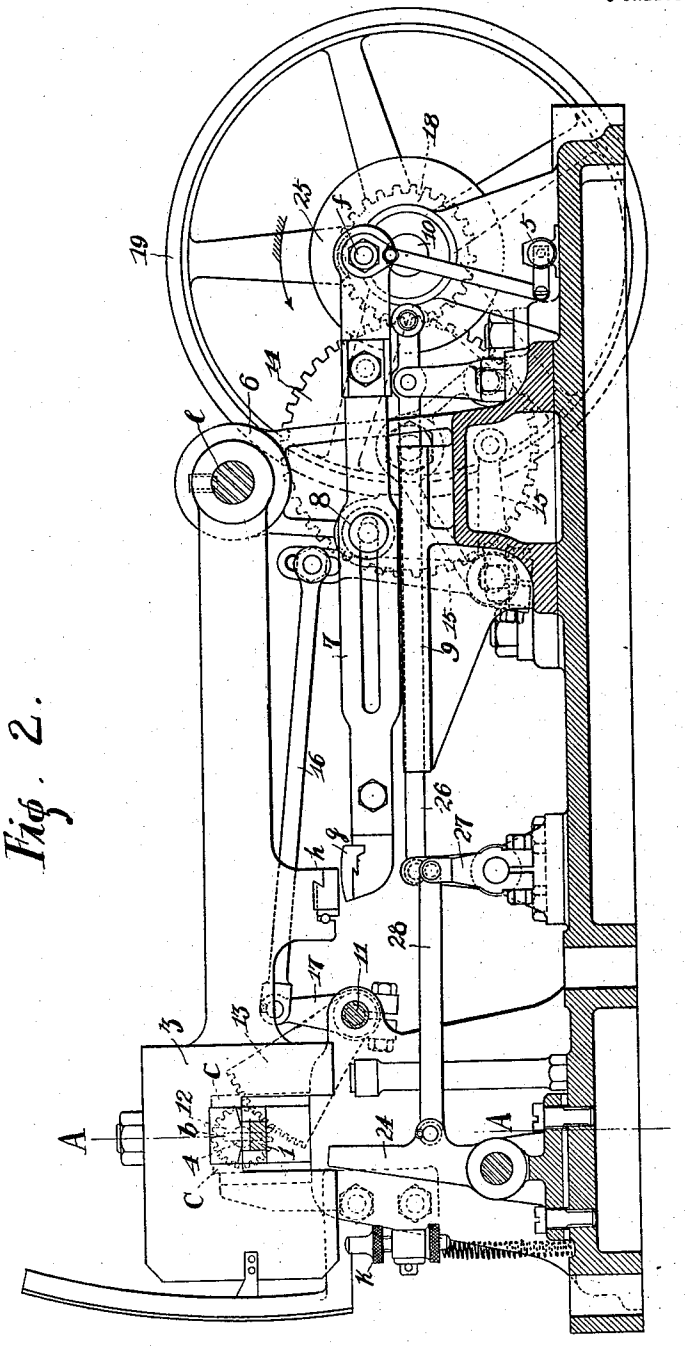


Fig. 2.

Inventor-
Tsuruzo Matsumura
By. B. Singer Atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

T. MATSUMURA.

REPEATED IMPACT TESTING MACHINE

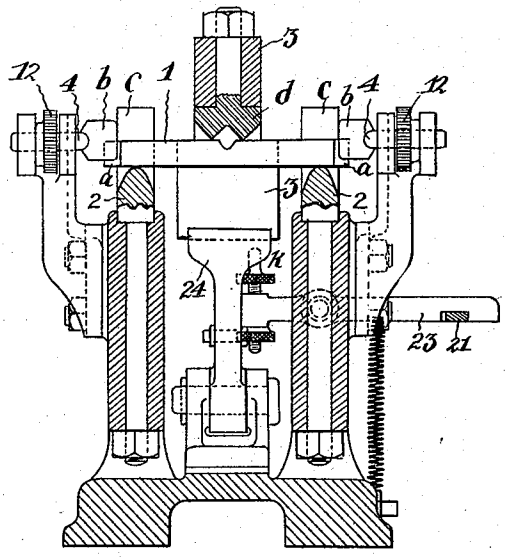
APPLICATION FILED DEC. 28, 1915.

1,201,326.

Patented Oct. 17, 1916.

3 SHEETS—SHEET 3.

Fig. 3.



Inventor-
Tsuruzo Matsumura.
By- D. Swigert Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

TSURUZO MATSUMURA, OF KIOTO, JAPAN.

REPEATED-IMPACT TESTING-MACHINE.

1,201,326. Specification of Letters Patent. Patented Oct. 17, 1916.

Application filed December 28, 1915. Serial No. 69,112.

To all whom it may concern:

Be it known that I, TSURUZO MATSUMURA, Prof., a subject of the Emperor of Japan, residing at No. 429 Yabushita Machi, Futasuji, Nishi-iru, 5 Chome, Imadegawa, Noboru, Tera Machi, Kami-Kyoku, city of Kioto, Empire of Japan, have invented new and useful Improvements in Repeated-Impact Testing-Machines, of which the following is a specification.

This invention relates to a repeated impact testing machine wherein the specimen resting on supports at the ends and receiving blows of a hammer at the central part is provided at the ends with an open slit with which it engages the flattened end of the intermittently reciprocating turning spindles, adapted to rotate through 180 degrees, so as to transmit same intermittent reciprocating semi-circular motion upon the specimen in such a manner that after each blow of the hammer the same is turned upside down, the blows being continued until the specimen breaks and the number of blows applied is counted and is taken as the measure of resistance to shock of the material tested.

The object of the invention is to provide a machine wherein the specimen when struck, resting freely on the supports, experiences an unconstrained deformation and that the shock is transmitted to the supports alone and not to other machine parts, thus securing the correctness of the result and preventing the machine parts from damages due to the shock.

A still further object is to provide a machine of the character described that will be strong, durable, simple and efficient, and very easy to produce.

With this object in view, the invention consists of certain novel features of construction and arrangement of parts as will be more fully described, and particularly pointed out in the appended claims.

Referring to the accompanying drawing, Figure 1 shows the plan of a machine constructed on the principle of this invention, the hammer not being shown. Fig. 2 is a side elevation and Fig. 3 the section on the line A—A of Fig. 2.

Same reference characters refer to same parts throughout all the views.

The specimen 1 rests on the supports 2 and receives blows of a hammer 3 at the central part. Upon each end of the said specimen 1 is cut an open slit *a*, with which loosely engages the flattened end *b* of the turning spindle 4, which makes intermittent reciprocating rotations through 180 degrees.

Thus it is possible that after each blow of the hammer 3 the specimen is rotated around the axis of the turning spindles 4, its center line moving parallel to itself. The specimen 1 is checked by the guard *c c*, from disengaging and falls freely on the supports 2 when a semi-revolution is almost ended, it then being ready to receive the next blow.

Blows are continued until the specimen breaks and the number of blows applied given by the counter 5 is taken as the measure of the resistance to shock of the material tested.

The surface of contact of the specimen and the ends of the turning spindles is at the instant of striking of the hammer parallel to the direction of blow and moreover the fit is loose, therefore the specimen when struck, resting freely on the supports, experiences an unconstrained deformation and at the same time the shock is transmitted to the supports only and not to the other machine parts. This is the essential point of the invention.

The specimen may be provided with a notch (a groove for a round specimen) at the middle section to facilitate the breaking. The striking face *d* of the hammer is made to W form to clear the notch.

The hammer is pivoted at its rear end *e* to the bracket 6 and is lifted by the lifting lever 7. The latter carries a slide block 8 at the middle part, which slides on the guide 9. The one end of the lever 7 is connected to the crank pin *f* of a crank shaft 10 driven by belt. The other end *g* forms a tappet, which as the crank rotates, in the direction of the arrow, hits the projection *h* of the hammer arm and thus lifts the hammer and lets it fall freely on the specimen. By changing the position of the slide block on the lifting lever the height of lift is adjusted.

The motion of the turning spindles 4 is transmitted from the reversing shaft 11 by the pinion 12 and the section wheel 13, while that of the reversing shaft in its turn is transmitted from the cam wheel 14 by the bell crank 15, the connecting link 16 and the

arm 17. The cam wheel is provided with teeth on the circumference and is driven by the pinion 18 mounted on the crank shaft 10.

The boss of the pulley 19 and the collar 20 fixed to the crank shaft, form a clutch, which is set in action by pulling the hand lever 21 against the action of the spring 22. The hand lever is held at this position by a hook lever 23, pivoted to one of the supports 2. When the specimen breaks, the hammer strikes on the head *k* of the hook lever and releases the hand lever. The coupling is then disengaged by the spring 22, thus actuating the automatic stop. After each blow of the hammer the supporting link 24 is inserted below the hammer head. This is to protect the specimen from being subject to the repeated blows due to the rebound of the hammer. The motion of the link is taken from the cam wheel 25, mounted on the crank shaft 10 and is transmitted by the link 26, the double arms 27 and the connecting spring 28.

By this invention I am enabled to obtain the correctness of the result and prevent the machine parts from damage due to the shock.

It will be seen that many modifications can be made in the manner of carrying this invention into effect without in any way departing from the spirit of the same.

Having now described my invention what I declare as new and desire to secure by Letters Patent of the United States is:—

1. A testing machine of the character described comprising intermittently reciprocating spindles supporting the slotted specimen adapted to receive the ends of said spindles in its slots, and a hammer for subjecting the specimen while it is rotated to blows delivered upon the central part of the same until it breaks, the number of blows applied to said specimen constituting a measure for its resistance to shock, means for rotating the spindles, and means for operating said hammer, both means adapted to be operated from a common source of motion, substantially as described.

2. A testing machine of the character described, comprising a support for the specimen to be tested, means for rotating said support through 180 degrees, a hammer for subjecting said specimen to a number of blows until it breaks, means for operating said hammer adapted to be operated together with the means for rotating the spindles from a common source of motion, means for adjusting the lift of said hammer, and means for transmitting the motion of the turning supports to the specimen, substantially as described.

3. A testing machine of the character described comprising a support for the specimen to be tested, means for rotating said support through 180 degrees, a hammer for subjecting said specimen to a number of blows until it breaks, a lifting lever and an adjustable slide block on said lever for adjusting the lift of the hammer, means for operating said hammer adapted to be operated together with the means for rotating the supports from a common source of motion, a guard for said specimen and means governed by the condition of the specimen for automatically stopping the motion of the hammer, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

TSURUZO MATSUMURA. [L. S.]

Witnesses:
ISAUM SAKAI,
ICHIRO LUZUKI.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."