APPLICATION OF SHAPER AS A MULTI BALL MILL MACHINE*

By

Dr. Abdel-Aziz E. Abdel-Naiem** , Dr. Soad M. Serag***

ABSTRACT

The object of this research work is now to utilize the free zone at which the tool connected with the shaper not under cutting condition . Also to increase the utilization factor for such machine especially it characterized with low efficiency (some times less than 30%).

The main idea of this work is to use this sudden change or the large difference between the two velocities of the ram in the forward and backward direction to produce a crushing force for a very fine particle less than 400 micron. It presents a law producivity multi-ball mill which can be used for special purposes in the field of medical, chemical industries and in the technological processes for producing the rare metals.

The practical results indicates that it is possible to fix more than one vessel of the proposed ball mill on the ram of the shaper to increase the productivity and efficiency of this machine when used as a multi ball mill machine.

* This work was carried out in the maintenance workshop of production Eng. & Machine Design Dept., Faculty of Eng.and Techn. Menoufia University.

** Abdel-Aziz El-Sayed Abdel-Naiem: B.Sc. Elect. Eng. M.Sc. Ph.D. of Automation of Technological processes, Lecturer of Automatic control in Production Eng. & Machine Design Department.

***Soad Mohamed Serag, B.Sc. Ph.D., Lecturer Production Eng. & Machine Design Department, Faculty of Eng. & Technology, Menoufia University.

work the investigation was carried out by construsting a special experimental stations and measuring the variation in output torque affecting the driving shaft, and checking the vibration of the, rotating parts according to our construstion.

II. EXPERIMENTAL STATION AND EQUIPMENTS USED DURING THE INVESTIGATION:

Fig. 1a illustrates a picture of the experimental station constructed and the equipment used during the investigation Fig. 1b indicates a simple block diagram for measuring the torque at the driven shaft. Generally this station consists from the following parts:

1. 3phase I.M. motor. HP= 2,380 Volt, 1440 r.p.m.,
2. Torque transeducer,
3. Amplifier,
4. Recording device with off-set,
5. Special steel base,
6. Triangle base,
7. Drive pulley,
8. Driven pulley,
9. V-belt,
10. Braking mechanism ,
11. Spring,
12. Ball bearing of driven wheel,
13. Pin.

Fig. 2 indicates the construction of the triangle base attached with a controlling spring 11. (1) and (2). This base can be rotates freely arround the pin 13. This base includes a special steel interlock 16. Fig. 3 illustrates a simple braking mechanism depending completely on the gravity force. Simply it constructed from a special flat belt 14 taking a rest position on the driven pully 8. from one end is fixed and from the other one is free Fig. 3. A variable weights 15 can be put to increase the

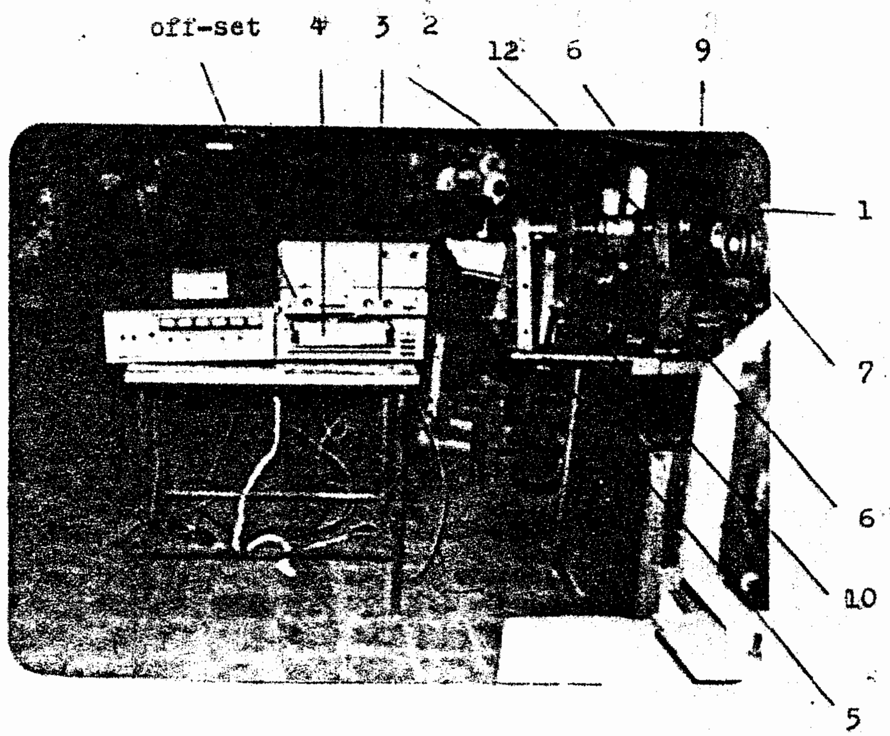

Fig. 1a. Picture of experimental station.

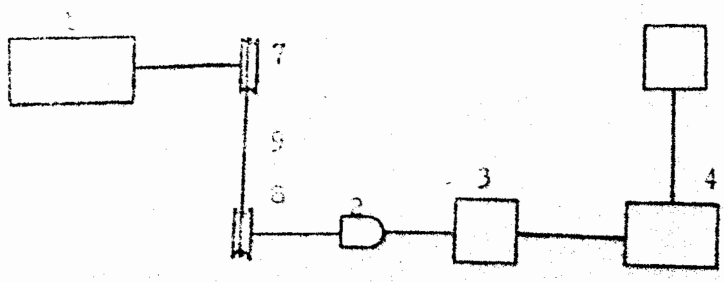

Fig.1b.Block Diagram of torque measurement

Fig.1. Construction of experimental station
and its block diagram.

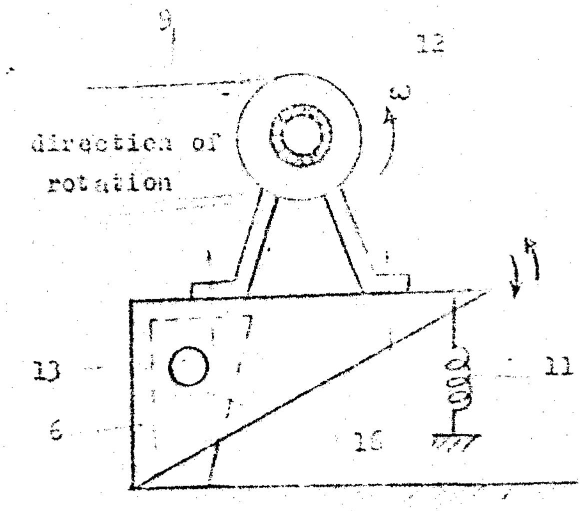

Fig.2 Construction of traingle base.

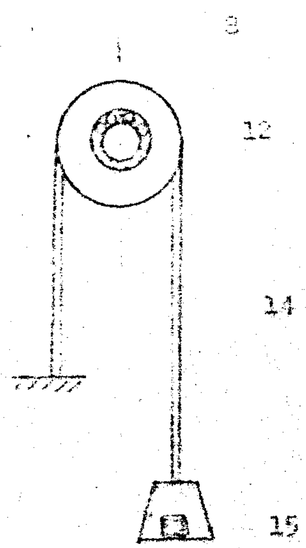

Fig.3 braking
mechanizm

friction forces between the driven pulley and the flat belt and hence the load increases (1) and (3).

II. ANALYSIS OF EXPERIMENTAL DATA

Fig. 4 illustrates the relation between the output torque produced on the driven shaft at avariable loads. This charts was recorded with loads W.Kg. started from one Kg. up to six Kgs. It is clear to notice from this sharts that the output torque decreased by increasing the friction forces. Also the vibration or changing in torque is decreased by increasing the loads Fig. 4a - Fig. 4g. To avoid the oscillation of the output torque at small loads we proposed to connect controlling spring 11 between the triangle base and the main base figure 2 we must notice at Fig. 4F the rotation of the driven shaft equals zero i.e. there is no rotation and the belt rotate without no effect on the driven pulley but the torque execisting on the shaft was recorded and its value indicated on the chart. If we consider the average torque Kg.m. which recorded on the chart against the loads. W.Kg., the following table which indicates the numerical values, between torque produced Kg.m and weight W.Kg. affecting on the actuating braking mechanizm can be obtained.

T	1.6	1.6	1.6	1.48	0.88	0.65	0.65
W	-	1	2	3	4	5	6

This relation can be illustrated in Fig. 5. This figure indicates that at small loads i.e. small friction forces the output torque equals constant approximately starting zone a-b of increasing the loads, after that a sudden decreasing in the torque by increasing the loads, we can consider it as a operating zone b-c, at point c. the shaft of driven pulley is in a stand still condition w=o rev./min and the torque execisting on the shaft equals constant value.

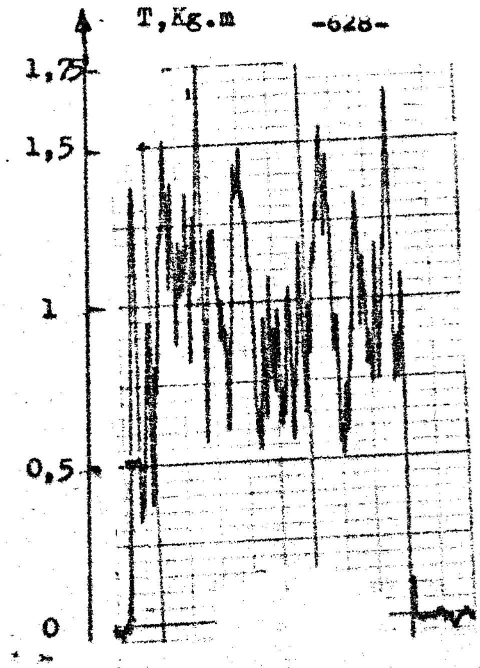

Fig.4.a Output torque characteristic at no Load

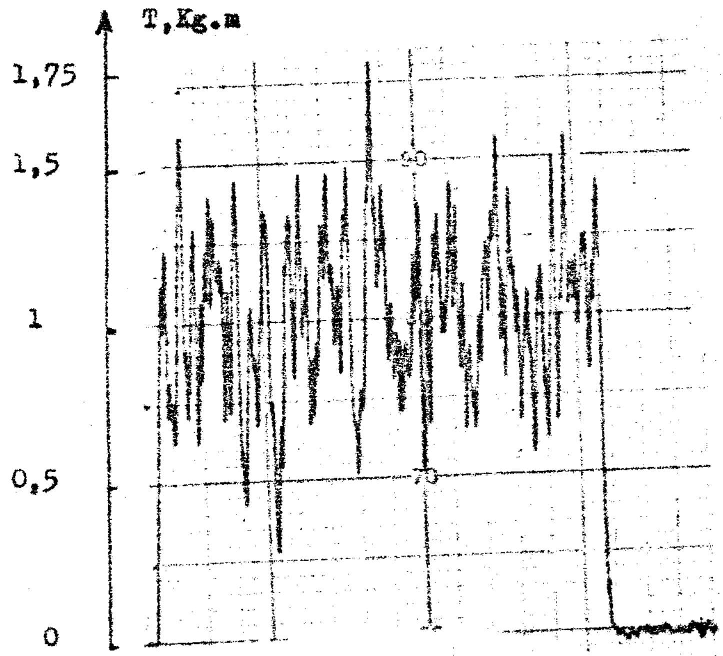

Fig.4.b. Output torque characteristic at Weight 1 kg

Fig 4 Output torque characteristic at variable Loads

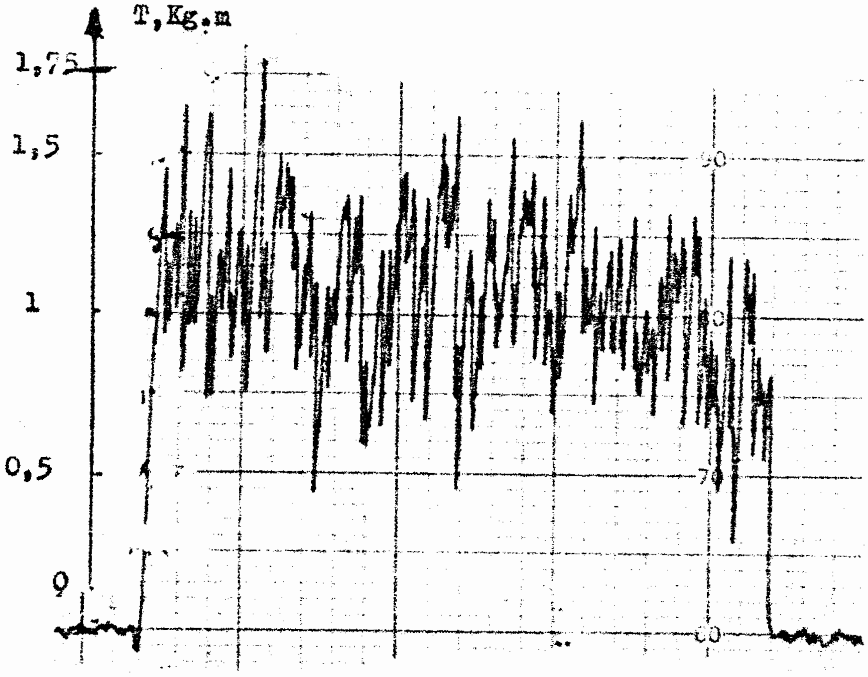

Fig.4.C. Output torque characteristic at Weight 2 Kg

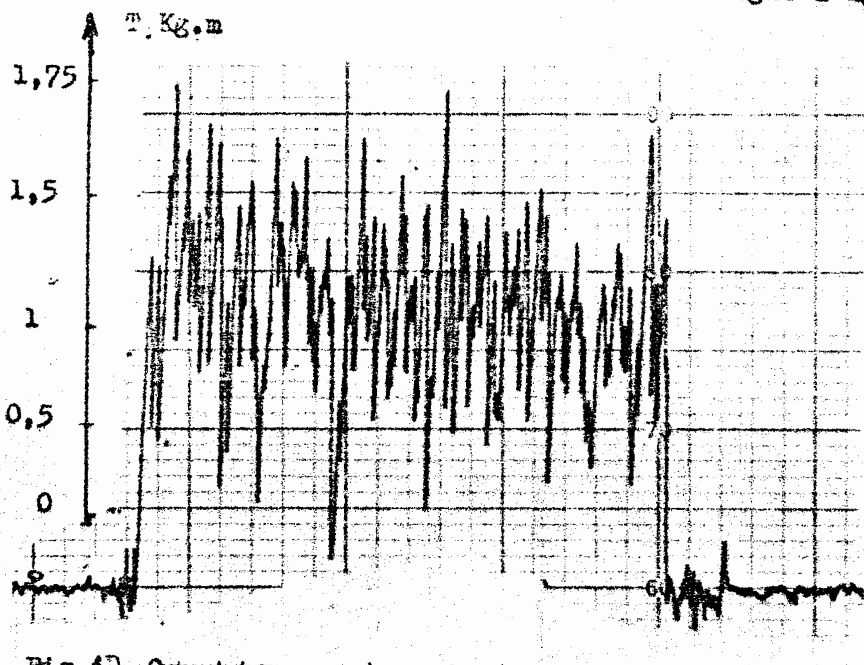

Fig.4D. Output torque characteristic at Weight 3 Kg

Fig 4 Output terque characteristic at variable Loads

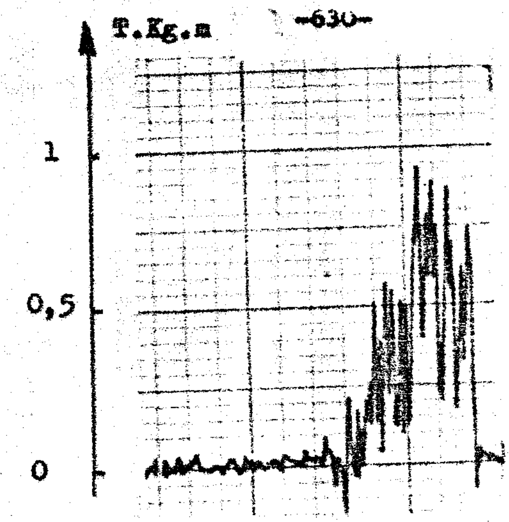

Fig.4.e. Output torque characteristic at Weight 4 Kg.

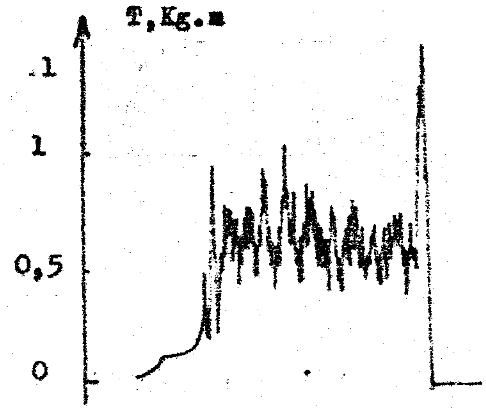

Fig.4f. Output torque characteristic at Weight 5 Kg.

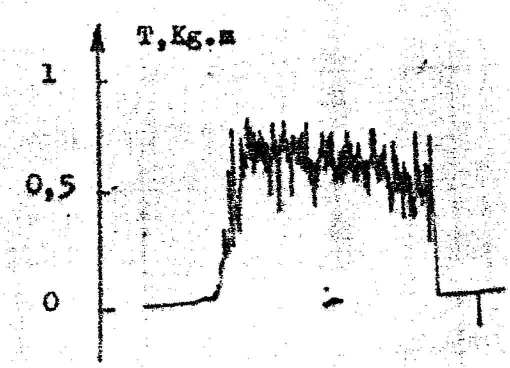

Fig.4g. Output torque characteristic at Weight 6 Kg.

Fig.4 Output torque characteristic at variable Loads

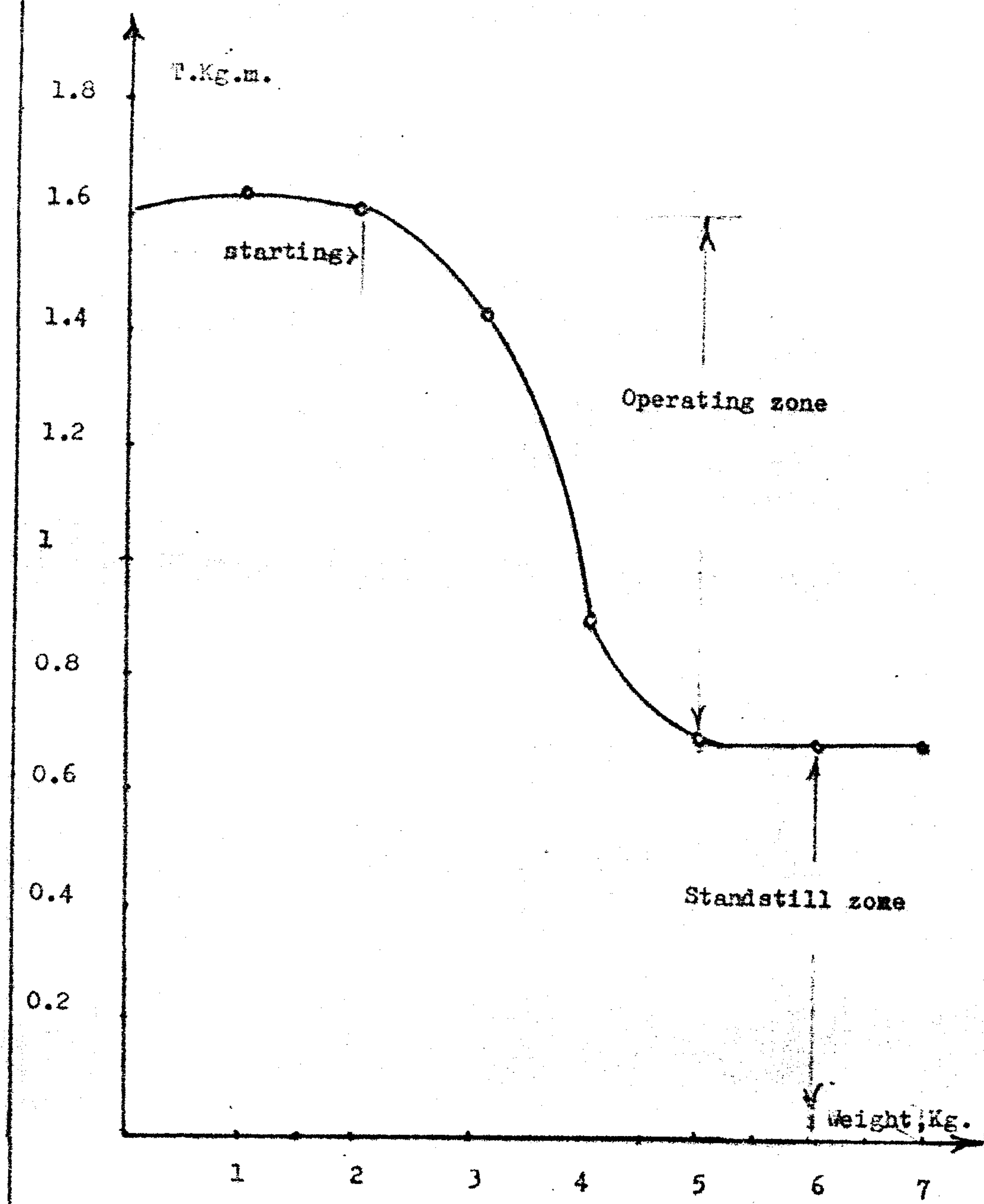

Fig.5. Torsional moment-weight characteristic.

By increasing the loads W.Kg. there is no corresponding increasing in torque. This considers the stand still zone c.d. Fig. 5.

IV. CALIBRATION OF EXPERIMENTAL DATA

The output torque recorded from the recording device Fig.4 calibrated by introducing an artificial torque which was calculated and compared with the actual one. The resultant artificial or static torque was registared with the same equipments as in Fig. 1. This work was carried out in a step manner as in Fig. 6.

The calibrated charts is shown in Fig. 7 which represents the distance on the recorded chart and the equivalent torque. This relation is a linear relation has a slope equal $K = \tan^{-1}$ Kg.m/cm of recording chart.

V. CONCLUSION

Firstly this research work presents a modified idea to increase the life time of the belt and to protect it against sudden shocks or loads.

Secondly the transmitting belts will be operate under self controlling action or simply self tension control.

REFERENCES

1. M. Mornin, A. Izra Yelit, Theoretical Mechanics M., 1970.
2. Joseph E.S., Mechanical Engineering Design Tokyo, 1963.
3. Faronun B.A., Klunoromenia and Fraktsenneu Predacnu and Bareator. Machuguz. M. 1969.
4. Dr. Sabet R. Ghabrial, Assistant Professor, Faculty of Engineering, Ain Shams University, Cairo. Initial tension in Flat leather belts, Key indexing Words: Transmission(Mechanical Power) Belting, Stress Analysis, Engineering Outline 268, UDC 621. 852, Engineering July 1972.

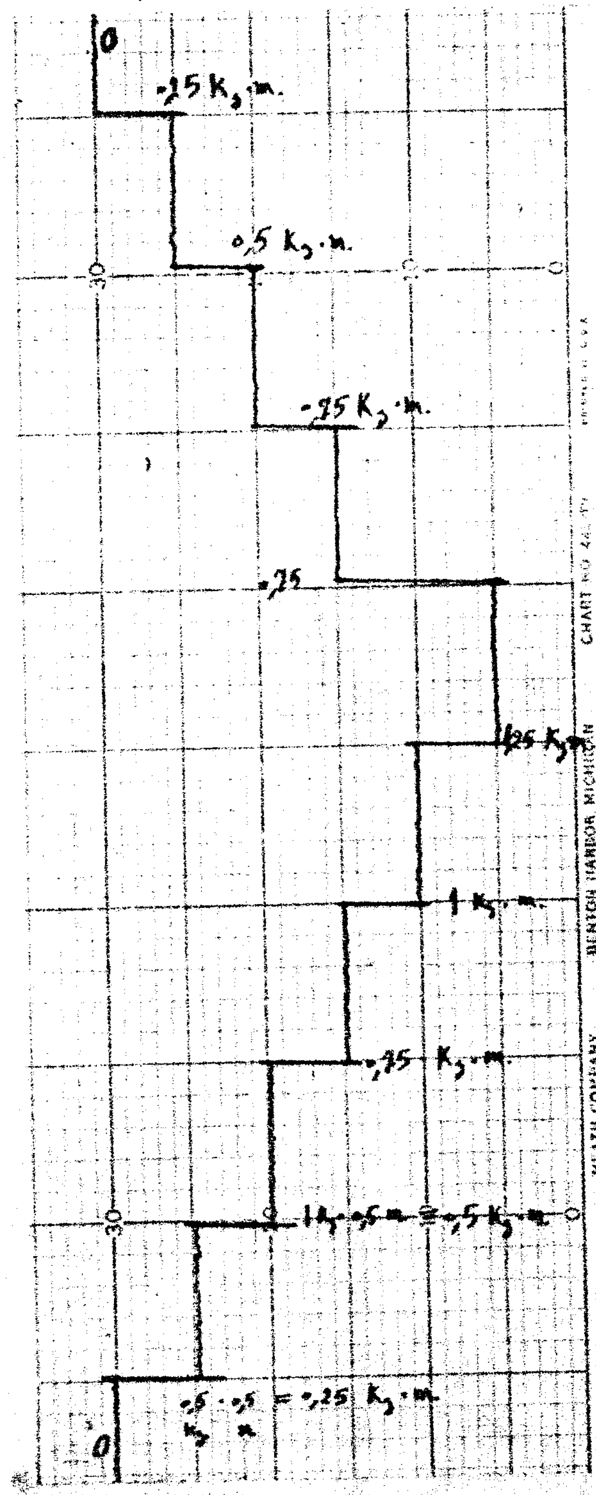

Fig. 6 Recorded output torque produced at stand-still condition of driven shaft.

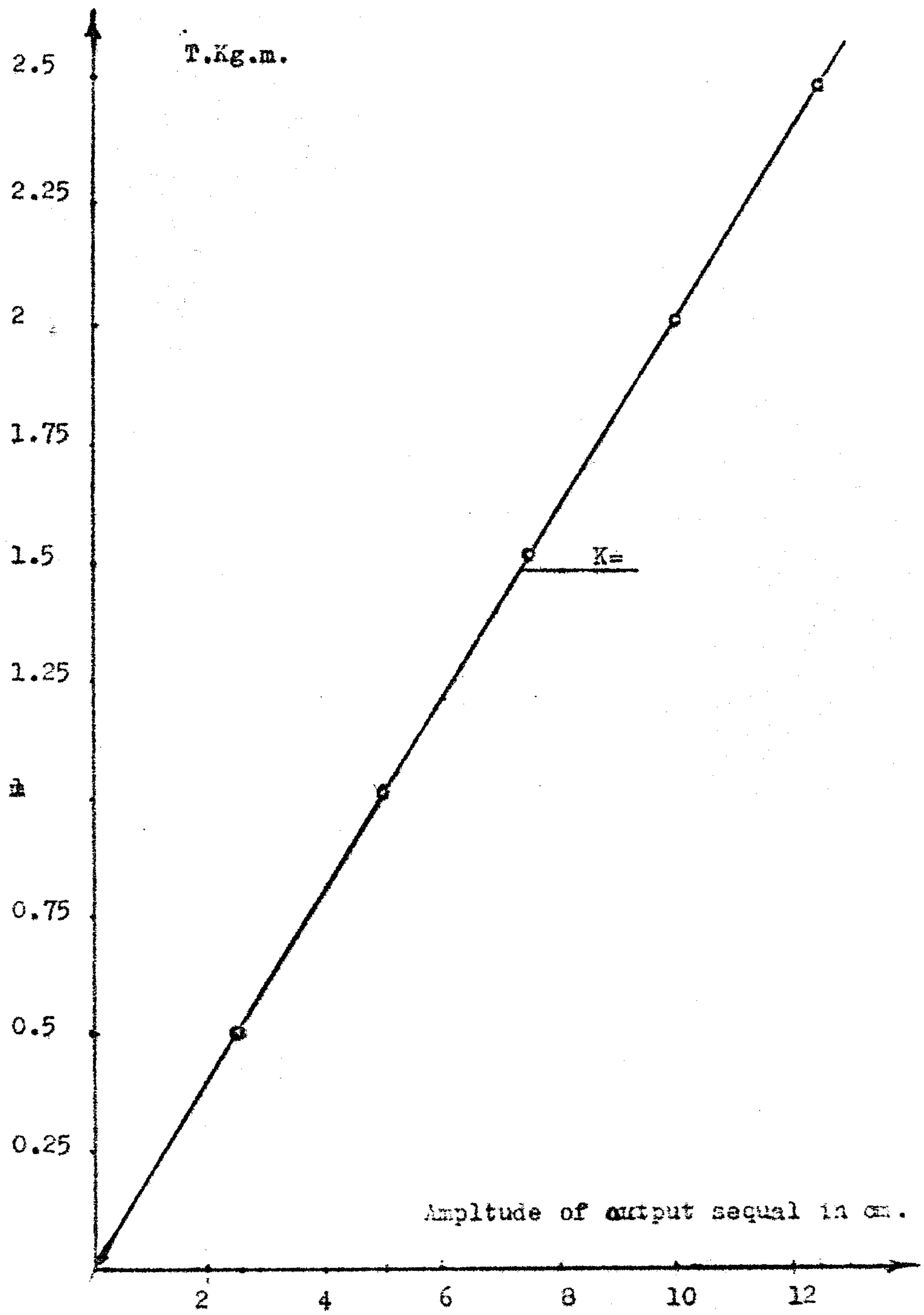

Fig. 7 Calibrating chart of output torque from transeducer.

حماية السيور من الاحمال التصادمية أثناء نقل الحركة وطرق التحكم فيها

١ ـ أ٠د / عبد الهادى عبد البارى ناصر ٢ ـ د٠/ سعاد محمد سراج
٣ ـ د٠/ عبد العزيز السيد عبد النعيم ٤ ـ م٠/ عارف شلاش عجيل

ملخص البحث

تعتبر السيور أكثر استخداما فى نقل الحركة بالنسبة للطرق الأخرى لذا عنى الباحثون الى ايجاد أنسب الطرق لاستخدامها لاطالة عمر السيور وحمايتها من الأحمال الفاجئة أثناء التشغيل ٠ وقد تم فى هذا البحث دراسة مقارنة لنقل الحركة عندما يكون قاعدة الطارة المنقادة مثلثية الشكل ومفصلية من أحد طرفيها بينما الطرف الاخر لها حر والطريقة الثانية عندما يكون القاعدة مفصلية أيضا ومقيدة الحركة بواسطة ياى وذلك بغرض امتصاص الذبذبات الناتجة عند التشغيل ٠

وقد أوضحت نتائج البحث المقارنة أن الطريقة الاولى أفضل من الثانية حيث يكون الشد فى السيور ذاتيا وهذا يؤدى الى امكانية اطالة عمر السير التشغيلى وكذلك امتصاص الاحمال الفاجئة التى قد تحدث أثناء التشغيل ٠