ON THE PROBLEM OF CONTROLLING AND PROTECTION THE TRANSMITTING BELTS AGAINST SUDDEN LOADS

By

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ABSTRACT

The object of this research work is to protect the transimitting belts from damage and to increase its life time. This was carried out by modification on the construction of the driven pully. It was fixed on a special base has a triangle from. This base can rotate arround one end and the second end free or attached with a special spring to minimize the vibration during running condition.

As a result of this investigation the belt will be subjected always to a self tension control. By this method it is possible to increase the operating time of belt and protect it against sudden shocks.

I. INTRODUCTION

The transmission of mechanical power by belts considers one from the main methods. It has a very wide application in many fields even in our daily life such as in motor cars. In this

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I. INTRODUCTION

As well known the efficiency of the shaper very low. Recently this machine used in a narrow range in maintenance workshops. One from the main factors characterized this machine is the large difference between the two speeds in the forward and backward direction. This difference can be reached more than 15 times. The problem now can be formulated as, how to produce a hammering force? and how to transfer it into a crushing force to crush a very fine particles needed for many industries such as medical and chemical industry (1).

II. CONSTRUSTION OF THE PROPOSED BALL MILL

The construstion of this ball mill is shown in Fig. 1. Of course it is a very simple construstion. The problem is now to investigate its characteristics and to introduce the performance of this mill. It consists of the following parts:

a. Vessel from steel with hight equals 15 cm. and diameter 10 cm. Fig. 1a,

b. Cover Fig. 1b. characterized with mechanical interlock to protect the vessel from the opening during the running condition,

c. A special cross base fixed on the ram of the shaper Fig.1c,

d. A lot of steel balls having variable diameters.

III. EXPEREMENTAL DATA AND INVESTIGATION THE PERFORMANCE OF THE PROPOSED MULTI BALL MILL.

The cross base was connected regidly with the ram of the shaper. This base can take any form but during our investigation it takes a cross base to keep the balance of the shaper.

At the end of each arm of it there was a fixed vessel . That is mean our system contains four steel vessels. Two of them was situated on the longatudinal axis of the ram, the rest was in perpenduclar position. Of course we can use a lot of distributed vessels fixed to the ram of the shaper used only in this mode of production especially this kinds of products needed a special type of ball mills.

A lot of questions was appeared during the construction of such system, the main of them are:

1. What is the suitable number of steel balles?
2. What is the suitable stroke length?,
3. What is the suitable diameter of the crushing balles?,
4. What is the suitable working time required to finish the crushing processes?,
5. What is the volume of charging from row material?,
6. What is the suitable dimension of steel vessel. L and D.?,
7. What is the suitable fixation of the vessel on the ram?,
8. What is the suitable speed or number of strokes per minuite?.

Of course each of the previous questions was investigated individually with respect to the others. The practical results was obtained as follow:

1. w.r.t. number of milling balls.

This factor was investigated as a function of the productivity of the machine by putting a certain fixed quantity of material under crushing in the vessel and all other parameters are constant such as strok L, speed S, diameter of vessel D, diameter of steel ball d_b and operating time t. The only variable in this experiment is number of balles. Determination of the effective number of balles required for crushing can be taken as a function of percentage of crushing material of a very fine products to the total material inside the vessel. Fig. 2 indicates the relation between this percentage by weight of this factor against the number of balls at constant other factors. Of course the factor W_p/W_t was obtained after making a seiving processes for the final products. We consider the weight W_p in gr. of a certain class as a reference value i.e. one sieve from the sieves cells consider as a reference one. This class was taken 320 micron. It was kept constant and the material passing through it considered in a powder form i.e. size particle less than 320 micron. This material was collected and weighted to determine the factor W_p/W_t where

W_p : weight of produced powder having a size particle less than 320 micron in, gr.
W_t : weight of total material under crushing in gr.
L : working stroke of the shaper, mm.,
S : Speed stroke/min.,
D : Vessel diameter in cm.
d_b : Diameter of steel balls in mm.,
n : Number of steel balls.

The investigation indicates that according to our condition the suitable number of steel balls equals 9 balls as in Fig.2.

2. **w.r.t. Stroke:**

This factor was investigated as the previous one when all other factors are constants. Fig. 3 illustrates the relation between the ratio W_p/W_t and stroke in mm. It indicates that the maximum productivity was obtained when the stroke approximatelly equals 70 mm. Also it illustrates that by increasing stroke length the productivity of the machine increased to reach a maximum value corresponding to 70 mm stroke and then decreased by increasing stroke length of the shaper Fig.3.

3. w.r.t. diameter of Steel Balls

This factor considers one from the main factors characterized such ball mill, especially the volume or the capacity of this mill very small (volume of every vessel less than one Kg.). The experimental data idicates that by increasing the diameter of steel balls the productivity was increased at a certain zone after that by increasing the diameter the output not affected or it has a very small effect as Fig. 4.

4. w.r.t. Operating or Crushing Time

For such small ball mill the time factor was invistigated as a function of the previous mention percentage ratio W_p/W_t. Fig. 5 shows that by increasing the operating time the productivity of the ball mill increases, i.e. weight of powder material related to the total weight of the material under crushing increases also. According to Fig. 5 the time factor considers very effective one to a certain extend after that increasing the crushing time become usless. In our case after 25 minuits, increasing of the ratio W_p/W_t become very low and hence unexceptable from economical point of view to continue the operating time. As a result the suitable crushing time is from 20 to 25 minuits.

5. W.r.t Volume of Crushing Material

As mentioned previously this small mill designed for special purposes operation as in medical, chemical and some of technological processes for production rare metals. It characterized with small sizes. For this reason the suitable weight of ores or row materials added in the vessel was investigated. Fig. 6 shows that by increasing the total volume of charging material the productivity increased and then decreased.

IV. Characteristic of Final Products

The characteristic of the products can be measured according to distribution charts (2). Fig. 7 illustrates one of these charts and the composition of the final products according to its sizes. This charts were introduced according to resultant parameters which obtained from our experimental work. The following table represents the numerical practical data between size particular in mm. and percentage of powder material was obtained from one experiment.

Size particle (micron)	60	100	200	320	630	1000	1400	Remain
Weight of powder gm.	3.8	6.7	8.6	5.1	3.2	1.5	1.6	19.5
Percentage %	7.6	13.4	17.2	10.2	6.4	3.0	3.2	39.0

V. CONCLUSION:

- This research work represents a special purpose ball mill machine based on a new idea of operation. It has a low productivity and can be used in technological processes in a specified industry.
- One from the main conclusions of this work is how to utilize the large differance between the forward and backward speed of the shaper.
- It is possible to design a multi ball mill machine based on the mentioned idea by fixing many vessels on the ram of the shaper.
- Note only the performance of the proposed ball mill but also a new application of the shaper are presented in this research.

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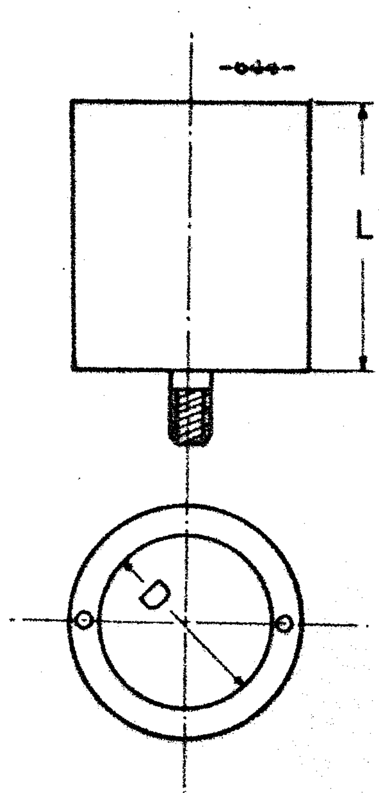

Fig.(1.a) steel vessel.

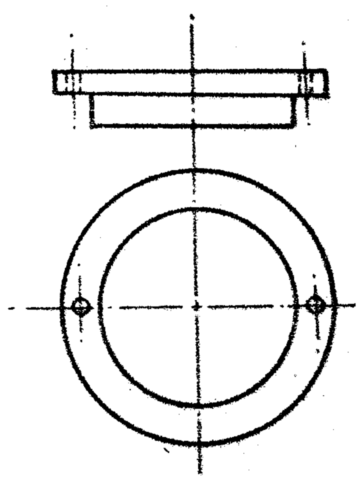

Fig.(1.b) special steel cover

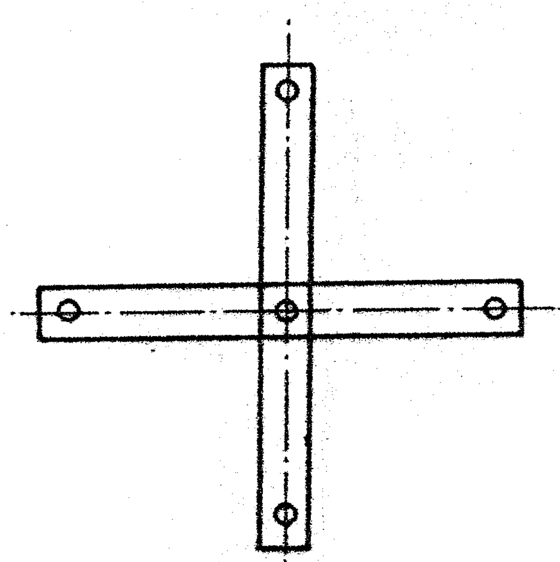

Fig.(1.c) cross base.

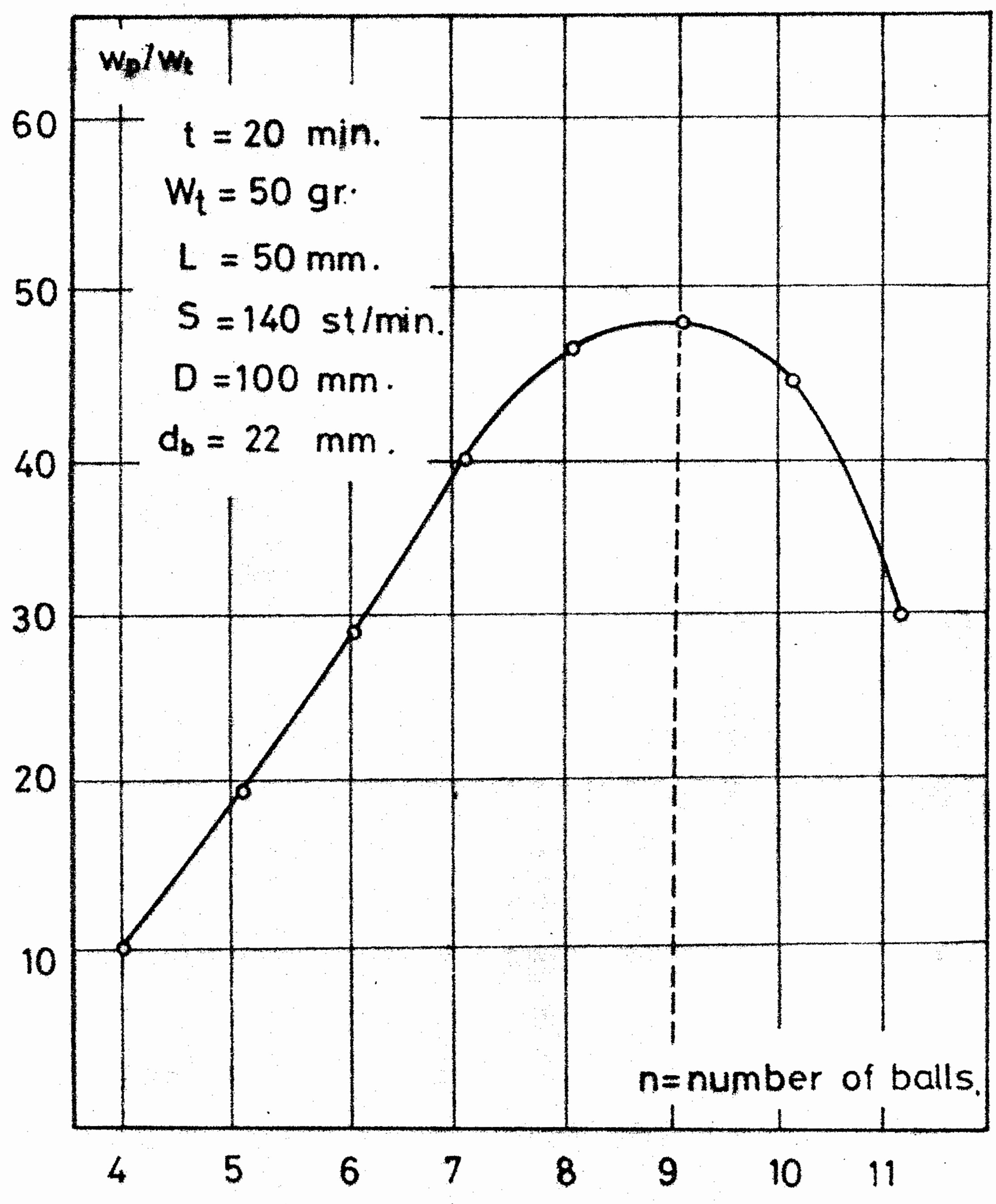

Fig.(2) output of powder material-number of steel ball characteristic.

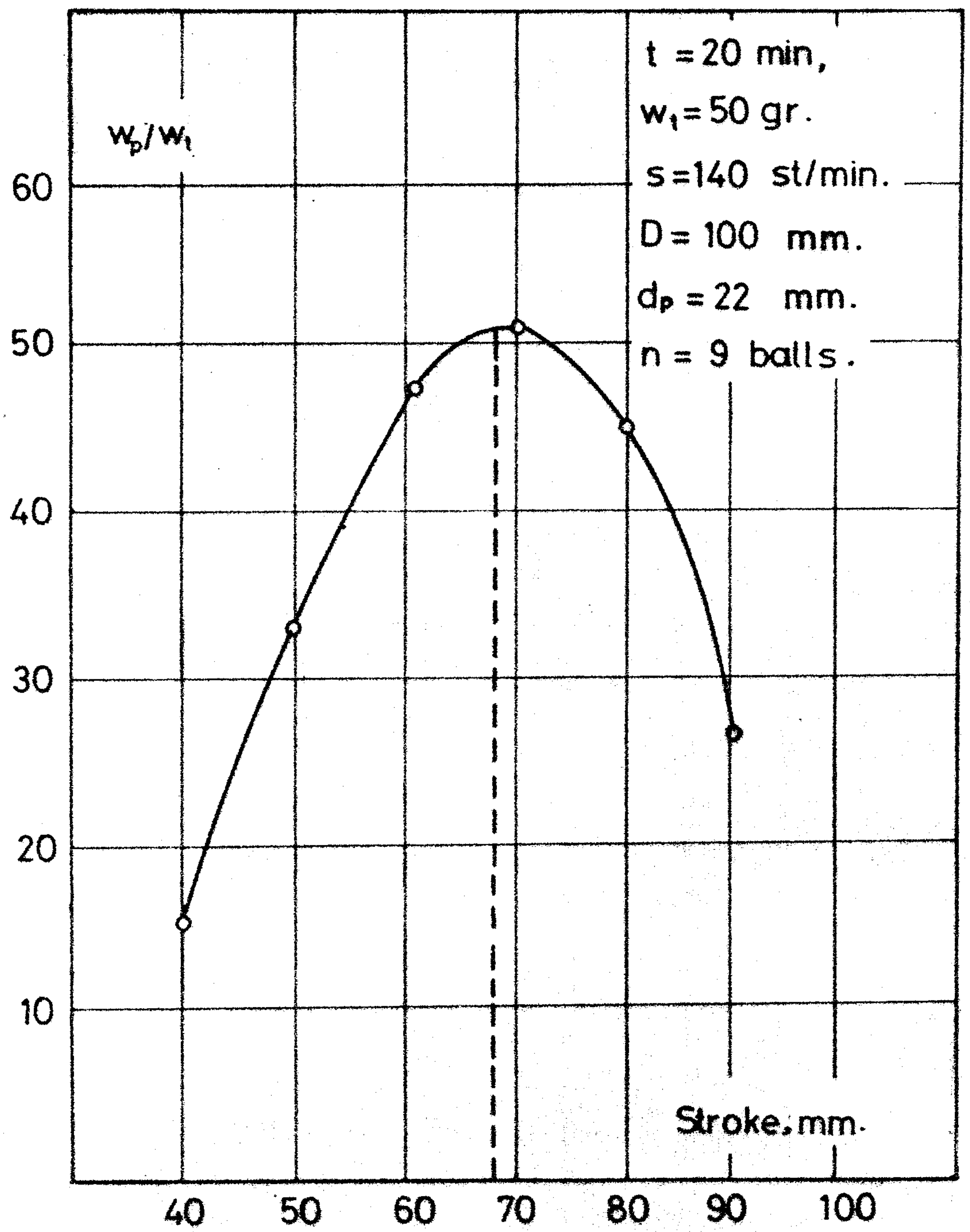

Fig.(3) output of powder material stroke lenght characteristic.

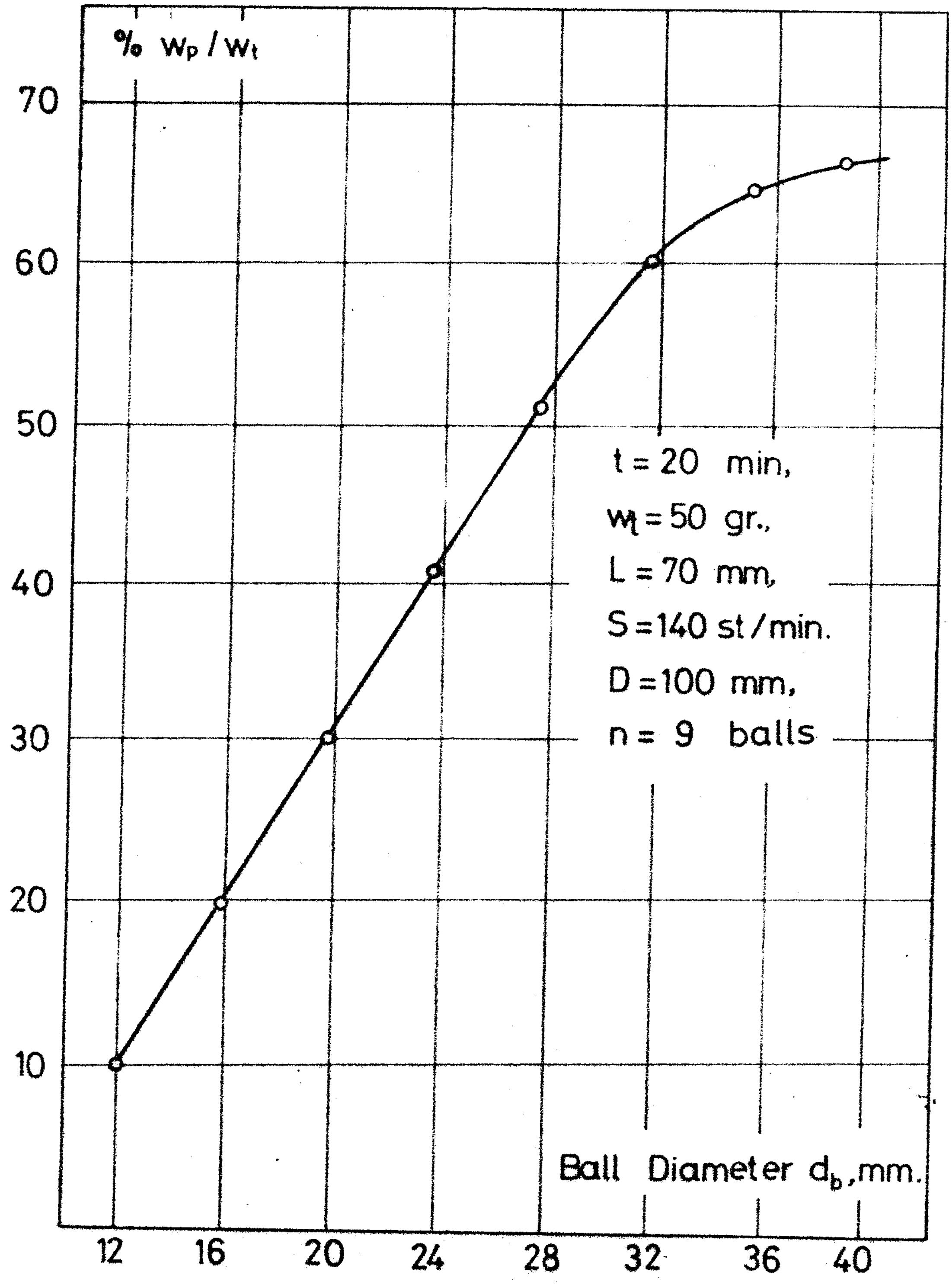

Fig.(4) output powder material diameter of steel ball characteristic.

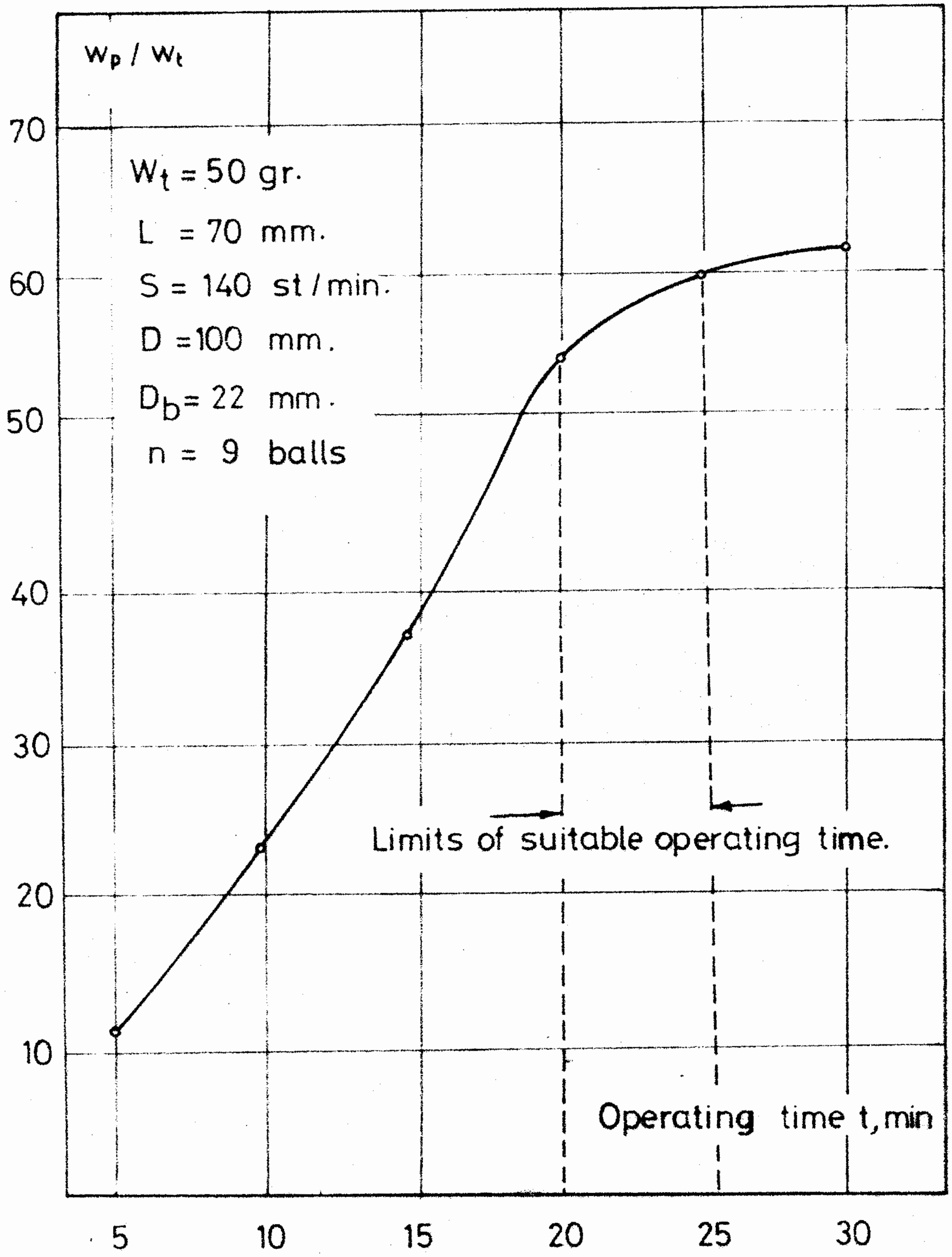

Fig.(5)output of powder material operating time characteristic.

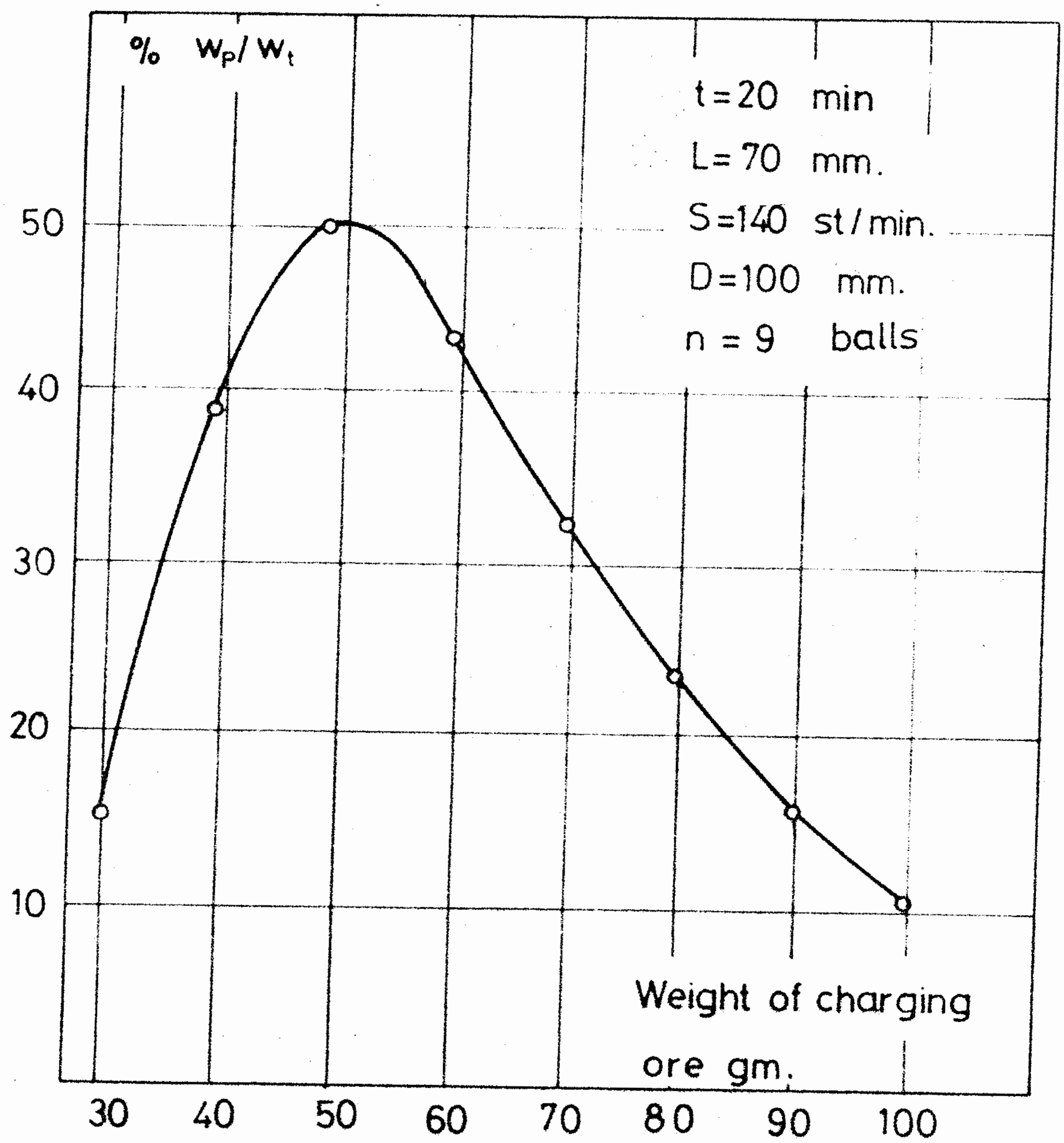

Fig.(6) output of powder material weight of charging ore characteristic.

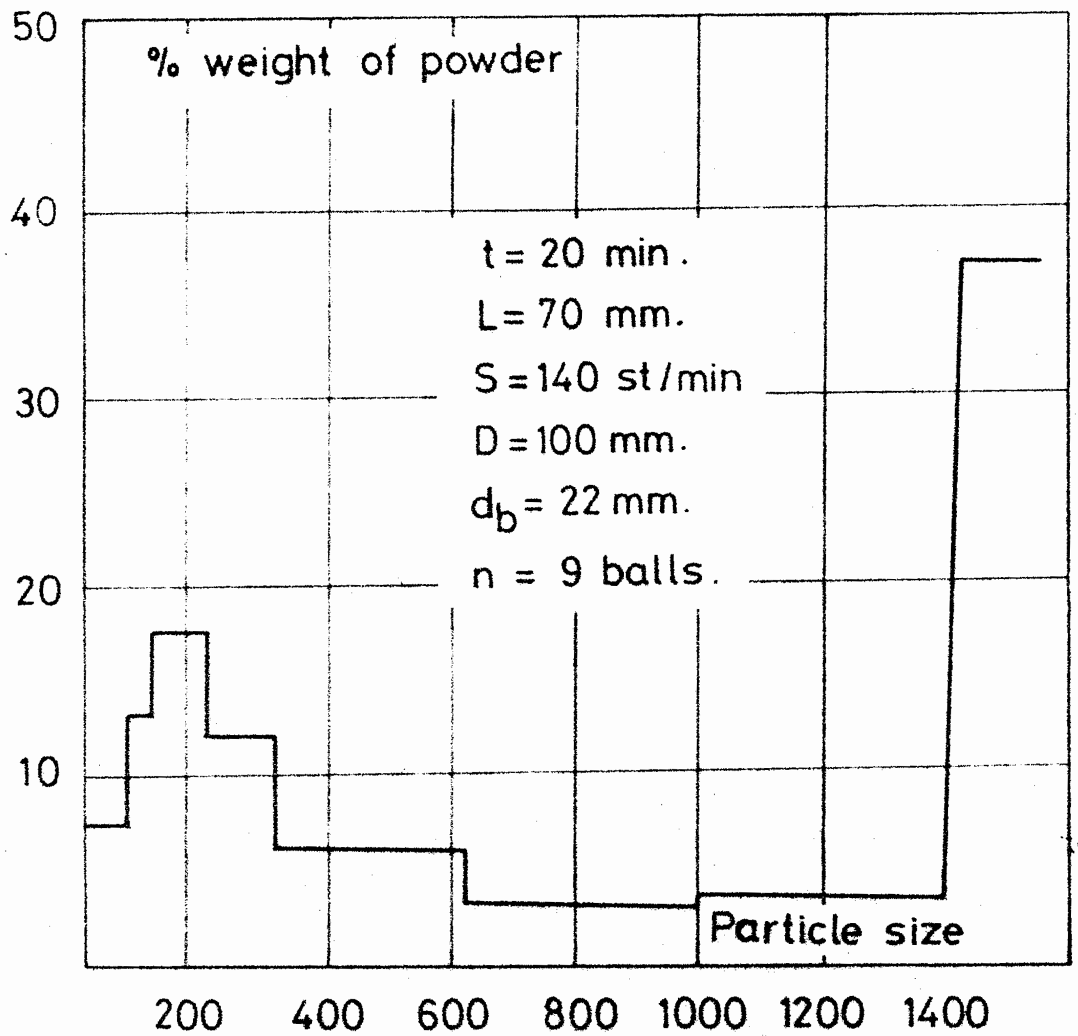

Fig.(7) Powder Distribution characteristics.

ملخص

استخدام المفشطة النطاحة كآلة ذات كسارات متعددة

دكتور / عبد العزيز السيد عبد النعيم ، دكتورة / سعاد محمد سراج

يهدف هذا البحث الى استغلال المفشطة النطاحة فى مجال أخر غير مجالات تطبيقاتها التقليدية المستخدمة فيه حاليا • نظرا لانخفاض كفاءتها

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