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RUNNING SHEET MICROMETER

Filed June 2, 1930

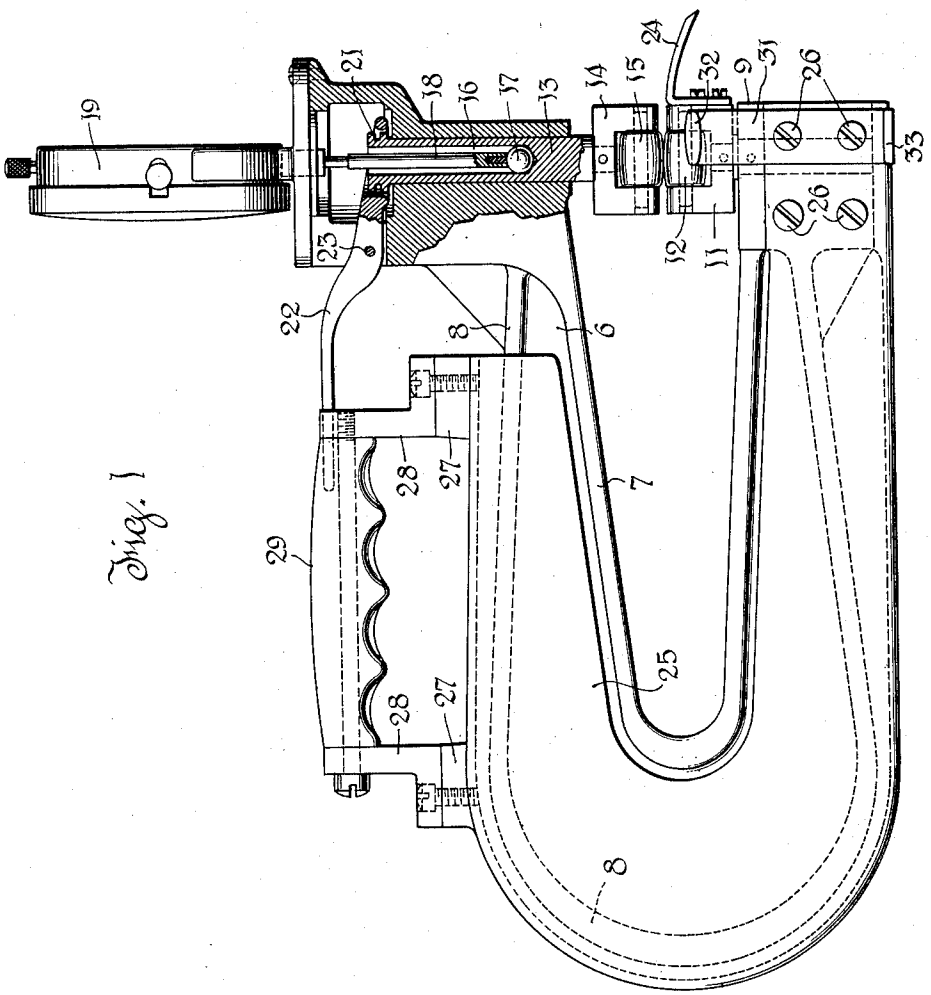


Fig. 1

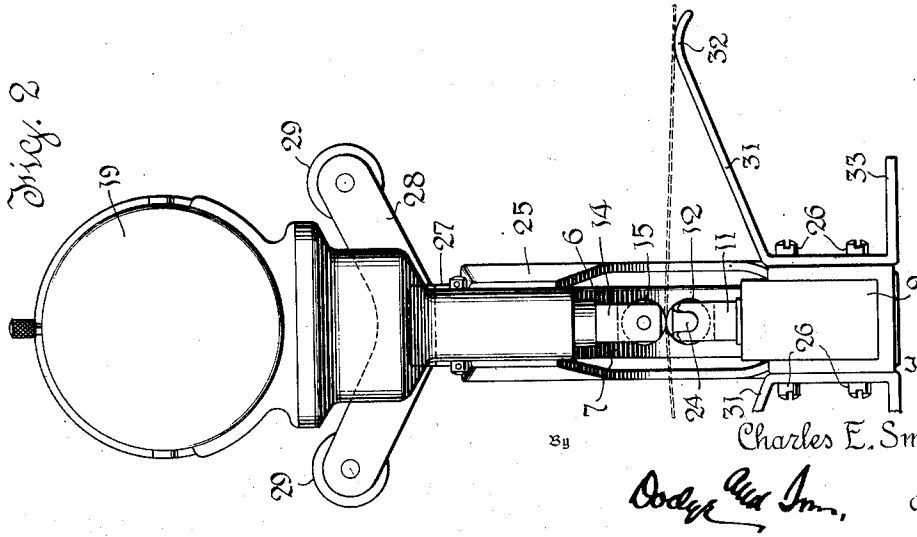


Fig. 2

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UNITED STATES PATENT OFFICE

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RUNNING SHEET MICROMETER

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This invention relates to measuring instruments, and particularly to a micrometer designed to measure the thickness of running sheets, for example, sheets of paper or like material, as these leave the sheet forming machine and before they are rolled.

Efforts to design a satisfactory micrometer for this peculiar service have led to the discovery of inherent difficulties. Such a micrometer must read at variable distances from the edge of the sheet, and the maximum distance is considerable. This means that the U-shaped yoke of the micrometer is quite deep, and consequently, sensitive to temperature changes which tend to produce unequal expansion of parts of the yoke and also sensitive to any mechanical stresses. The requirements of use were found to subject the yoke to unequal heat by contact with or proximity to the body of the user and to variable stresses incident to the pull of the sheet while the device was in use.

The present invention overcomes these difficulties by providing a combined heat deflecting or insulating shell which encloses the U frame of the micrometer and protects it from temperature changes and which at the same time supports the entire micrometer structure from a point adjacent the anvil. Since this anvil takes the pull of the sheet, and since the enclosing shell becomes the supporting member for the entire structure, the yoke of the micrometer is relieved of varying mechanical stresses.

The preferred embodiment is shown in the accompanying drawing, in which

Figure 1 is a side elevation of the complete device.

Fig. 2 is an end elevation looking at the left relatively to Fig. 1.

The micrometer proper comprises a U-shaped yoke 6 having an inner marginal flange 7 and an outer marginal flange 8, which serve to give it rigidity without undue weight. The lower arm of the U-shaped frame 6 terminates in a block, sometimes called an anvil, 9. Mounted on this anvil is a yoke 11 in which is journaled the lower sheet contacting roller 12. This roller is mounted to turn freely and is barrel-shaped, as shown, to avoid the contact of any sharp edge with the sheet. Guided in the upper arm of the yoke 6 is a plunger 13 which carries a yoke 14 similar to the yoke 11. Journaled in the yoke 14 is a barrel-shaped roller 15 similar to the roller 12. The sheet runs between the two rollers and separates them. The separating movement actuates a micrometer measuring device, which indicates the thickness of the sheet.

The plunger 13 is counterbored at the top as indicated at 16 and receives a thrust ball 17 which fills its lower end and is fixed in the lower end of a stem 18 which serves as a connection between the plunger 13 and the operating mechanism of a micrometer of ordinary form indicated generally by the numeral 19 applied to its case.

This micrometer may be of any known type, but preferably includes a hand which reads over a graduated dial and which is actuated by a multiplying gear from the stem 18. Consequently the hand has a wide range of movement for relatively minute movements of the stem 18. These micrometers are well known and take a variety of forms and as no novelty is claimed for the details of the micrometer, it is unnecessary to illustrate them.

In order to permit withdrawal of the roller 15 from the roller 12 preparatory to insertion of the sheet the stem 13 is provided at its upper end with a grooved collar 21. The thumb lever 22 pivoted at 23 on the upper arm of the yoke 6 is provided with lugs which engage the groove in the collar 21. Consequently, depression of the free end of the lever 22 draws the plunger 13 upward and separates the roller 15 from the roller 12. After the insertion of the paper, the lever is released and the spring mechanism customarily associated with the micrometer 19 urges the plunger 13 downward so that the separation of the rollers 12 and 15 corresponds with the thickness of the sheet. To assist in the insertion of the sheet, a guide plate 24 is provided.

No novelty is here claimed for the mechanism so far described. To relieve such a micrometer of the effect of localized changes of temperature and of mechanical stresses,

either or both of which will cause indeterminate errors, I enclose the yoke 6 in a U-shaped shell of channel cross section. This is indicated generally by the numeral 25. It is connected to the U-shaped yoke 6 only adjacent the anvil 9, the connection being made by eight screws 26. At all other points it is not only free from the yoke 6, but is spaced therefrom so as to preserve a dead air space between the two and minimize the transfer of heat. If desired, the enclosing shell 25 may be made of heat insulating material, for example, any one of the well known plastic compositions having good mechanical strength, but good results can be secured with a metal shell, the shell acting to diffuse heat from any local source and minimize its transfer to the yoke 6. As a suitable heat insulating material having good mechanical strength, various of the known phenol condensation products may be adopted.

The shell 25 is provided at its upper side with two bosses 27 to which are attached cross members 28. Bridging the two cross members and extending between the opposite ends thereof are two hand grips 29. These are preferably made of a plastic composition having low heat conductivity to minimize the transfer of heat from the hands of the user. It will be observed that these grips are spaced apart and are symmetrically located with reference to the median plane of the U-shaped yoke 6. It will also be observed that the end of the lever 22 projects between the two hand grips so as to be operable by the thumb of either hand.

Another important feature of novelty is a guide structure for preventing undue flexure of the sheet as it passes between the rollers 12 and 15. This guide structure takes the form of two identical oppositely projecting wings 31 rounded at their ends, as indicated at 32. Formed integrally with the wings 31 are feet 33 which offer a satisfactory supporting base for the gauge when resting on a horizontal surface.

A convenient mode of attaching the parts just described is to make use of certain of the screws 26, as clearly indicated in the drawing.

It will be observed that the entire weight of the gauge and any downward thrust of the sheet from the roller 12 are taken up by the enclosing frame 25 and transmitted to the grips 29 without any distorting stress on the yoke 6. Furthermore, any tendency of heat to flow from the user's body to the yoke 6 is retarded, if not completely prevented, by the shell 25. If the shell 25 be of material of low heat conductivity, its action is an insulating one. If the shell be of relatively high conductivity, as it would be if composed of metal, the air space between the shell and the yoke acts as an insulator and the shell 25 acts as a heat diffuser, functioning to prevent the transmission of strictly localized heat to the yoke 6. It is distortion incident to unequal heating of the yoke that introduces the inaccuracy. Consequently, although it is better to prevent the transmission of heat as far as possible, such diffusion as will prevent localized heat will have a beneficial effect. Consequently, it is not strictly essential that the shell 25 be of insulating material.

I claim:—

1. The combination with a micrometer including a bowed frame having two normally substantially horizontal arms one above the other, and measuring instrumentalities mounted adjacent the ends of said arms and adapted to measure objects positioned between the arms, of a supporting member connected to the lower arm adjacent the extremity thereof, extending thence above the upper arm and having a hand grip structure above the upper arm.

2. The combination with a micrometer including a bowed frame having two normally substantially horizontal arms one above the other, and measuring instrumentalities mounted adjacent the ends of said arms and adapted to measure objects positioned between the arms, of a supporting member connected to the lower arm adjacent the extremity thereof, and otherwise free of said arm, said member extending above the lower arm; and a pair of laterally spaced hand grips connected with said member a substantial distance above said lower arm.

3. The combination with a micrometer including a bowed frame having two normally substantially horizontal arms one above the other, and measuring instrumentalities mounted adjacent the ends of said arms and adapted to measure objects positioned between the arms, of a combined supporting and enveloping member connected to the lower arm adjacent the extremity thereof, said member substantially enclosing said frame and being spaced therefrom; and a hand grip structure mounted on said member.

4. The combination with a micrometer including a bowed frame having two normally substantially horizontal arms one above the other, and measuring instrumentalities mounted adjacent the ends of said arms and adapted to measure objects positioned between the arms, of a combined supporting and enveloping member connected to the lower arm adjacent the extremity thereof, said member substantially enclosing said frame and being spaced therefrom; and a hand grip structure mounted on said member above the upper arm of said frame.

5. In a micrometer, the combination of a bowed frame having two normally substantially horizontal arms one above the other; a supporting member connected with said frame and extending from said frame to a

point above the upper one of said arms; a hand grip carried by said supporting member above said upper arm; measuring instrumentalities including sheet contacting rollers between the arms adapted to receive a moving sheet; and guides supported on said frame and arranged to guide in an approximately straight path the portions of the sheet moving toward and from said rollers.

In testimony whereof I have signed my name to this specification.

CHARLES E. SMART.