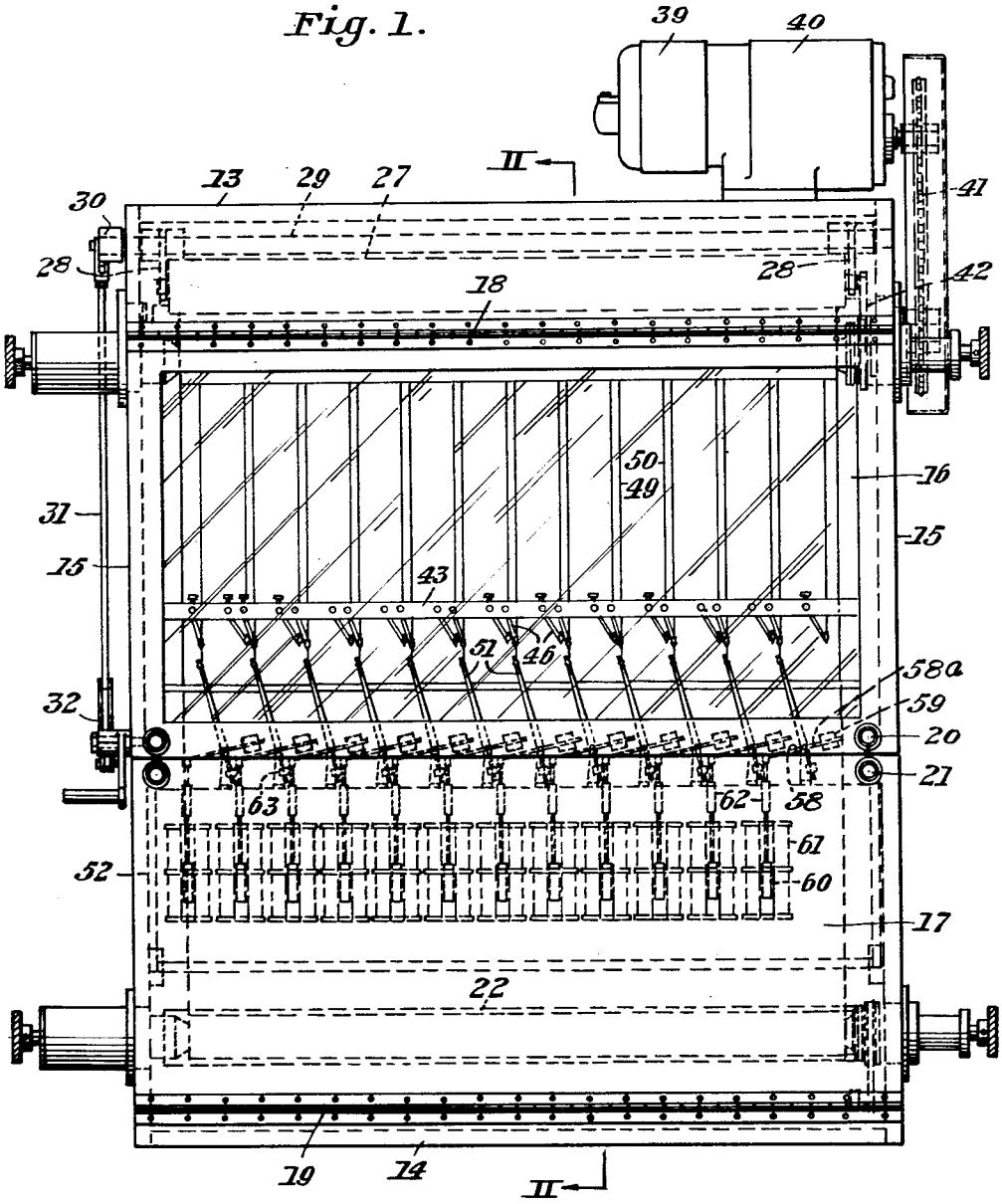
May 28, 1940. J. E. BUSHNELL 2,202,547

RECORDING APPARATUS

Filed Dec. 17, 1938 3 Sheets-Sheet 1

Fig. 1.



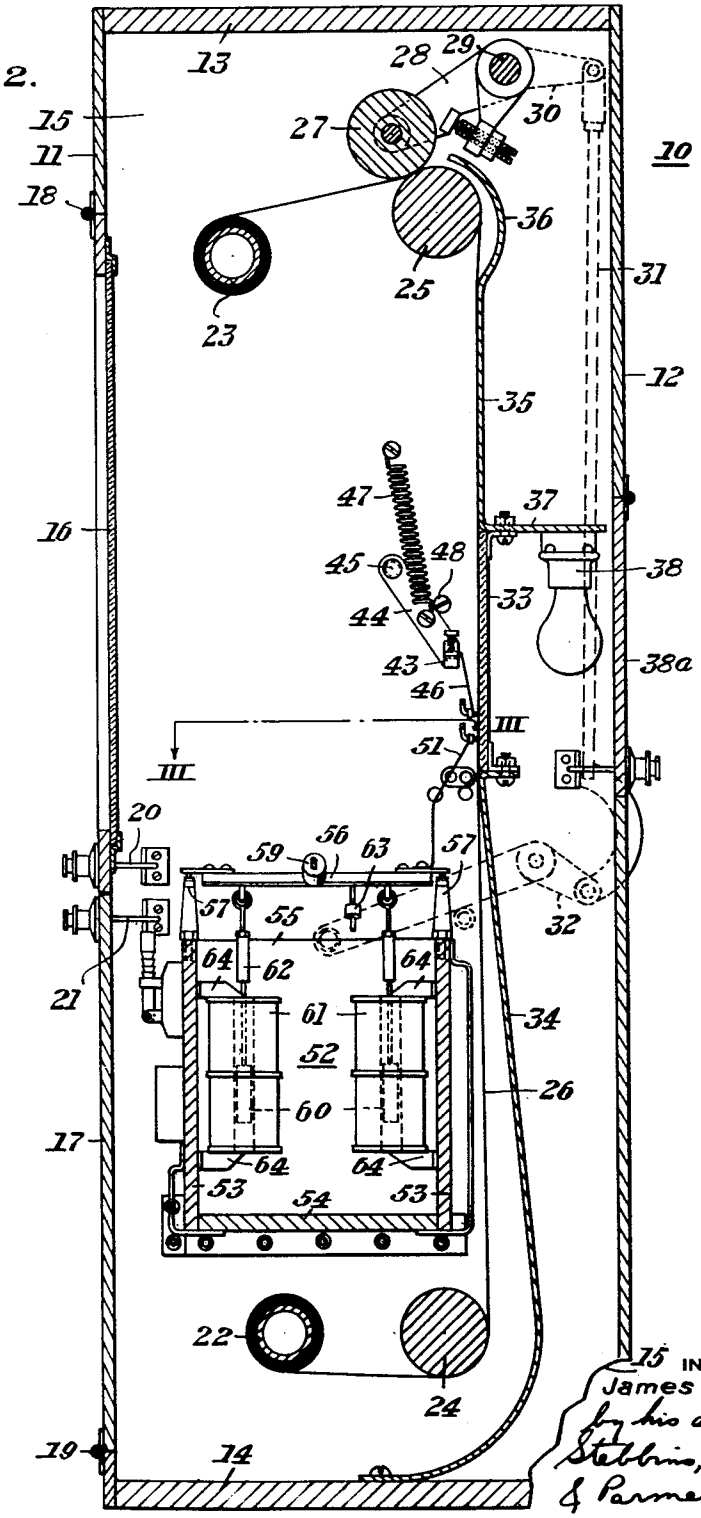
INVENTOR
James E. Bushnell
by his attorneys
Stebbins, Blenko & Parmelee

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Fig. 2.



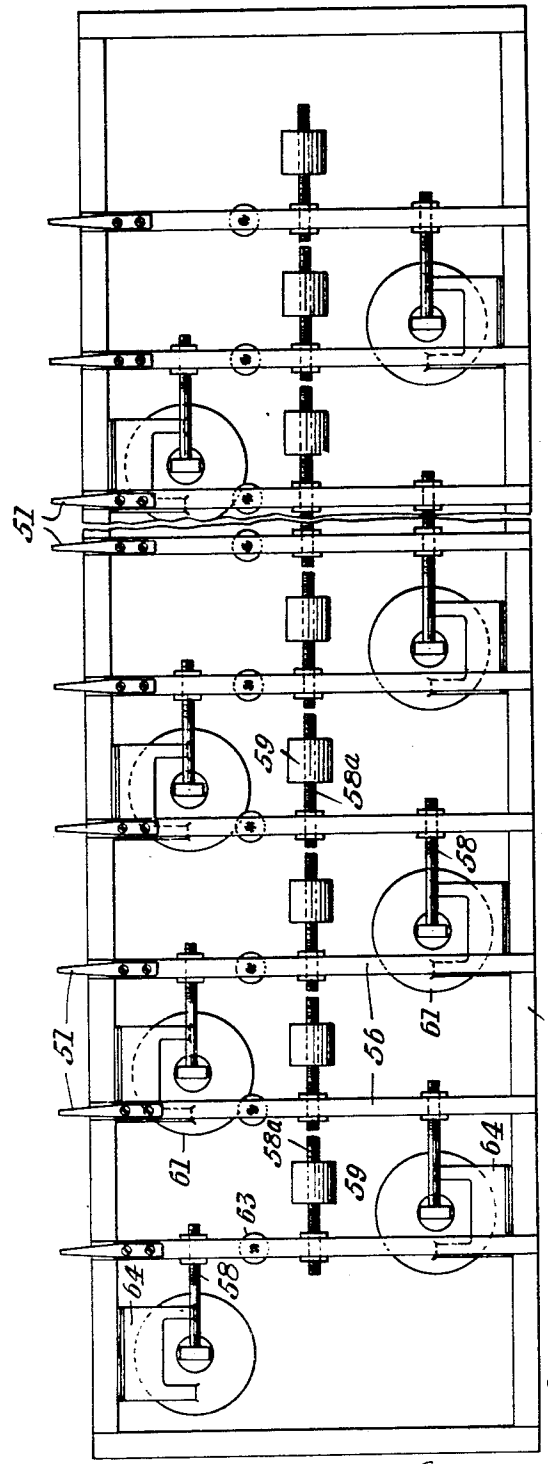
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Fig. 3.



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Patented May 28, 1940 2,202,547

UNITED STATES PATENT OFFICE

2,202,547

RECORDING APPARATUS

James E. Bushnell, Pittsburgh, Pa., assignor to Blaw-Knox Company, Blawnox, Pa., a corporation of New Jersey

Application December 17, 1938, Serial No. 246,348

3 Claims. (Cl. 234—66)

This invention relates to recording apparatus and, in particular, to apparatus adapted to record simultaneously the variation of a plurality of functions.

In many industrial operations, it is desired to record on a single strip of paper, the changes in a number of different variables. In the mixing and pouring of large amounts of concrete, for example, such as are involved in the construction of dams, it is desirable to know the amounts of the various materials such as sand, different grades of stone or gravel, cement and water, as these materials are weighed out and discharged into a mixer, as well as the consistency of the batch during mixing. Devices have been known heretofore for recording these variables on a single paper strip. Such devices, however, possess certain disadvantages, such as excessive overall height, inaccessibility of parts which have to be changed or renewed; and lack certain advantages characterizing the present invention which will be apparent from the following detailed description.

Among other merits, my invention possesses the following advantages over other recorders for similar purposes: it requires less head room; it provides for the placing and the removal of the rolls of paper for the records from the front of the recorder, thus rendering it unnecessary for access to be had to the rear of the machine for this purpose (this advantage is material, as apparatus of this kind usually is placed on an operator's platform where space is very limited and access difficult); and all the actuating mechanism for the recording pens is on a unit assembly, which may be placed in or removed from the recorder as one unit.

I achieve the above advantages by arranging the solenoids employed to actuate the recording pens in a plurality of rows at about the same level and disposing the solenoids in staggered relation in said rows. This, in turn, requires that the case enclosing the apparatus be deeper from front to back. To avoid the difficulty which might thus be involved in removing and inserting rolls of paper strip, if mounted as they have been heretofore behind the backing plate with which the pens cooperate, requiring access to and through the rear wall of the case, I mount the spindles for unwinding and rewinding the strip near the front wall of the case and below and above the backing plate, respectively, and provide suitable guide rolls for directing it across the backing plate. This permits the insertion and removal of the record strip to be accomplished easily from the front or observer's side of the device, at least a portion of the front wall being openable to give access to the interior.

A complete understanding of the invention may be obtained from the following detailed description of the preferred embodiment previously outlined hereinabove, which is illustrated in the accompanying drawings. In the drawings:

Fig. 1 is a front elevation;

Fig. 2 is a sectional view along the line II—II of Fig. 1; and

Fig. 3 is a plan view of a portion of the apparatus such as would be projected on the plane indicated by the line III—III in Fig. 2.

Referring now in detail to the drawings, the apparatus of my invention comprises a case 10 having a front wall 11, a rear wall 12, a top wall 13, and a bottom 14, as well as end walls 15. The front wall includes doors 16 and 17 hinged as at 18 and 19 and provided with latches 20 and 21. The door 16 is glazed to permit the apparatus therein to be observed from the exterior.

An unwinding spindle 22 is journaled in suitable bearings mounted in the end walls 15 adjacent the bottom 14. A rewinding spindle 23 is similarly journaled adjacent the top 13. The bearings for both the spindles 22 and 23 are adjacent the front wall 11 so they can be easily removed and inserted by opening the doors 16 and 17. The spindles 22 and 23 are of known construction and no further description thereof is necessary. A guide roll 24 and a feed roll 25 cooperate with the spindles 22 and 23 to feed a paper strip 26 from the spindle 22 to the spindle 23. A pressure roll 27 cooperates with the feed roll 25. The rolls 24 and 25 are journaled in suitable bearings mounted on the end walls 15. The roll 27 is journaled in bearings carried by levers 28 secured to a shaft 29 journaled in bearings carried on the end walls 15. A lever 30, a link 31 and a manually operable linkage indicated generally at 32 permit the pressure roll 27 to be raised when desired, for example, when threading the strip 26 through the recorder. The mechanism for raising the roll 27 is not part of the present invention but has been known heretofore.

In its passage from the spindle 22 to the spindle 23, the paper strip passes across a backing plate 33 supported between the end walls 15 by any convenient means. A strip guide 34 directs the strip upwardly toward the backing plate during the threading operation. Above the backing plate 33 is an auxiliary backing plate 35 having a curved upper portion 36 to facilitate the thread-

ing. The plane portion of the backing plate 35 permits notations to be marked on the strip by the observer as desired. The backing plate 35 has a rearwardly extending flange 37 which provides a mounting for lamp sockets 38. The rear wall 12 is provided with a hinged door 38a through which access may be had to the sockets 38. Lamps inserted in these sockets illuminate the backing plate 33 which is preferably of ground glass, thus bringing out sharply the records traced on the strip 26 by the pens to be described shortly.

The feed roll 25 is driven by a motor 39 through a gear reducer 40 and a chain and sprocket drive 41. The spindle 23 is driven from the roll 25 through gearing 42.

A pen bar 43 extends across the case and is secured to levers 44 pivoted to the end walls 15 at 45. Pens 46 are spaced along the bar and are held in engagement with the paper strip by springs 47 which urge the levers 44 against stops 48. The bar 43, however, may be manually retracted during threading. The pens 46 rule on the strip 26 lines 49 and 50 defining the upper and lower limits of the records produced by the several recording pens shown at 51.

The pens 51 are mounted in a pen assembly including a frame 52 having side walls 53, a bottom 54 and end walls 55. The frame is secured to the end walls 15 of the case in any convenient manner.

Each of the pens 51 is secured to a bar 56 pivotally mounted on knife edges 57 carried on the sides of the frame 52. Levers 58 and 58a extend from each of the bars 56. The latter has a counter-weight 59 threaded thereon for adjustment and the former is pivoted to a magnetic core 60 reciprocable in a solenoid 61. Turnbuckles 62 permit the adjustment of the cores 60 relative to the levers 58. Counter-weights 63 extend downwardly from the bars 56 to counterbalance the pens 51.

The solenoids 61, as best shown in Figs. 2 and 3, are arranged in two rows at substantially the same level. The solenoids are mounted on brackets 64 secured to the side walls 53 of the frame 52. The solenoids in the two rows are staggered relative to each other as shown in Fig. 3. It will be apparent that this arrangement of the solenoids permits them to be spaced more closely together along the frame 52 than would otherwise be the case. At the same time, each pen and its actuating mechanism is entirely independent of the others.

The solenoids 61 are energized by known means in accordance with the qauntities to be recorded by the various pens. It will be apparent that the pens 51 draw lines on the strip 26 which is driven continuously by the motor 39, thus providing a permanent record of the changes in the variables under observation.

It will be apparent from the foregoing description that the invention is characterized by advantages over devices of similar type previously known. By disposing the unwinding and rewinding spindles 22 and 23 adjacent the front wall of the case, and below and above the backing plate, respectively, they may be reached easily for removal and insertion. The arrangement of the solenoids 61 in parallel rows at the same elevation with the solenoids of each row staggered relative to those of the other row, makes it possible to reduce both the vertical and horizontal dimensions of the apparatus and the width of the record strip to a minimum. This results in a substantial saving in the cost of the record paper.

I have illustrated and described herein only a preferred embodiment, but it will be understood that changes in the construction and arrangement thereof shown herein may be made without departing from the spirit of the invention or the scope of the appended claims, which claims specify the features of my invention which I consider novel and desire to secure by patent, although I am aware that certain other features of the device shown have been known heretofore.

I claim:

1. In a recording apparatus, a case including a front wall having a transparency therein through which the recordings can be observed, at least a portion of the front wall being openable, backing means spaced rearwardly from said wall adapted to support a record strip fed thereacross in front of said backing means, a plurality of pens mounted for pivotal motion only, spaced across the width of the case and in front of the backing means and adapted to engage the front face of a record strip, means above and below the backing means for guiding a record strip across said backing means and forming continuations of the backing means, upper and lower strip-feeding and take-up spindles removably journaled in the case adjacent the top and bottom of the case and between said front wall and said guiding means, whereby the spindles may be inserted and removed through said openable portion, and actuating mechanisms for said pens mounted in said case and spaced apart across the width of the case between the front wall and the lower strip guiding means, said lower spindle being disposed below said mechanisms.

2. In a recording apparatus, a case including a front wall having a transparency therein through which the recordings can be observed, at least a portion of the front wall being openable, backing means speed rearwardly from said wall adapted to support a record strip fed thereacross in front of said backing means, a plurality of pens mounted for pivotal motion only spaced across the width of the case and in front of the backing means and adapted to engage the front face of a record strip, means above and below the backing means for guiding a record strip across said backing means and forming continuations of the backing means, upper and lower strip-feeding and take-up spindles removably journaled in the case adjacent the top and bottom of the case and between said front wall and said guiding means, whereby the spindles may be inserted and removed through said openable portion, a strip feeding roll between the upper portion of the strip guiding means and the take-up spindle, said strip guiding means having a forwardly extending curved portion for guiding the strip over the feeding roll toward the rewinding roll, and actuating mechanisms for said pens mounted in said case and spaced apart across the width of the case between the front wall and the lower strip guiding means, said lower spindle being disposed below said mechanisms.

3. A compact recording apparatus in which the strip feeding and take-up spindles, together with the recording pens and their actuating devices are accessible from the front of the apparatus, comprising a case including a front wall having a transparency therein through which the recordings can be observed, at least a portion of the front wall being openable, backing means spaced rearwardly from said wall adapted to support a

record strip fed thereacross in front of said backing means, means for guiding a record strip across said backing means forming continuations of the backing means, upper and lower strip-feeding and take-up spindles removably journaled in the case adjacent the top and bottom of the case and between said front wall and said guiding means, whereby the spindles may be inserted and removed through said openable portion, a plurality of pens mounted for pivotal motion only spaced across the width of the case and in front of the backing means in a plane normal to the strip and adapted to engage the front face of a record strip, a supporting frame for said pens between the lower strip guiding means and the front wall of the case, and actuating mechanisms for said pens mounted on said pen frame and spaced apart across the width of the case, said lower spindle being disposed below said pen frame.

JAMES E. BUSHNELL.

CERTIFICATE OF CORRECTION.

Patent No. 2,202,547. May 28, 1940.

JAMES E. BUSHNELL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 42, claim 2, for the word "speed" read --spaced--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of June, A. D. 1940.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

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