April 4, 1961 D. U. HALVERSON 2,977,680

APPARATUS FOR USE IN CORRELATING OIL WELL LOGS

Filed July 11, 1957 2 Sheets-Sheet 1

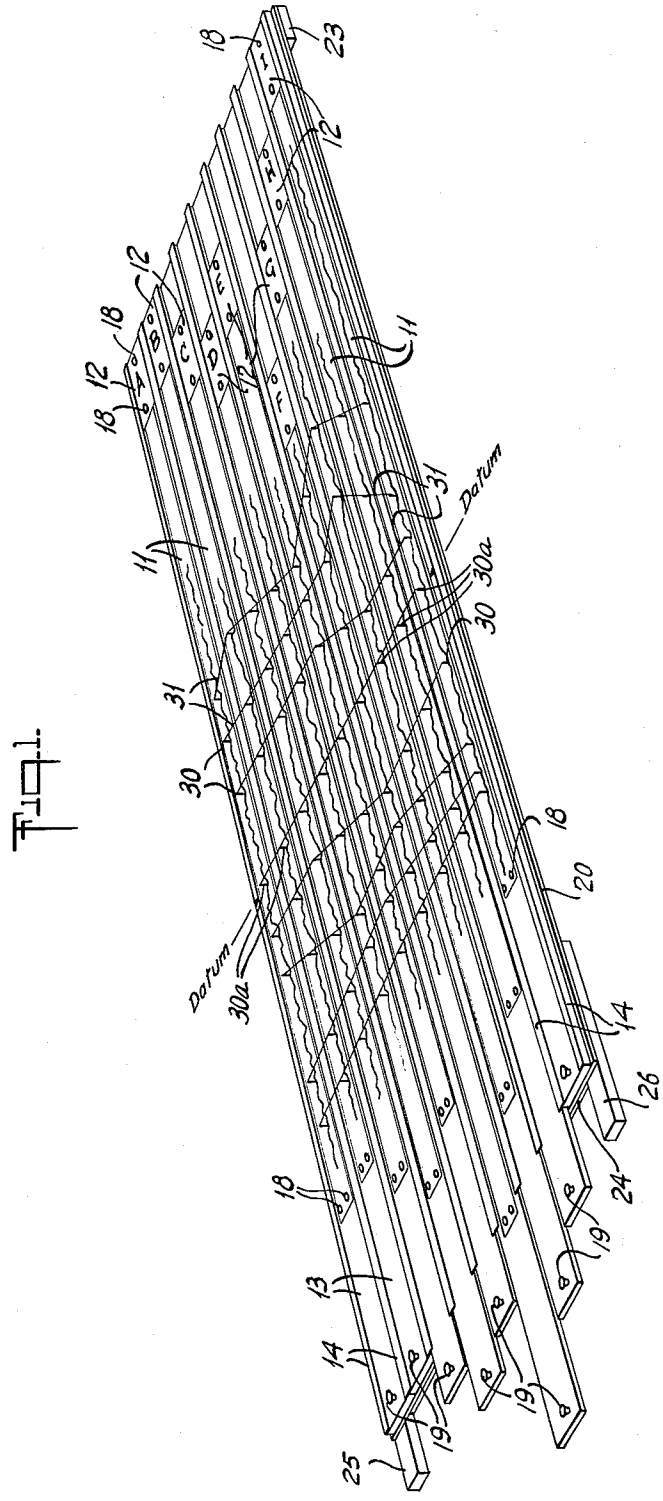


Fig. 1.

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Fig. 2.

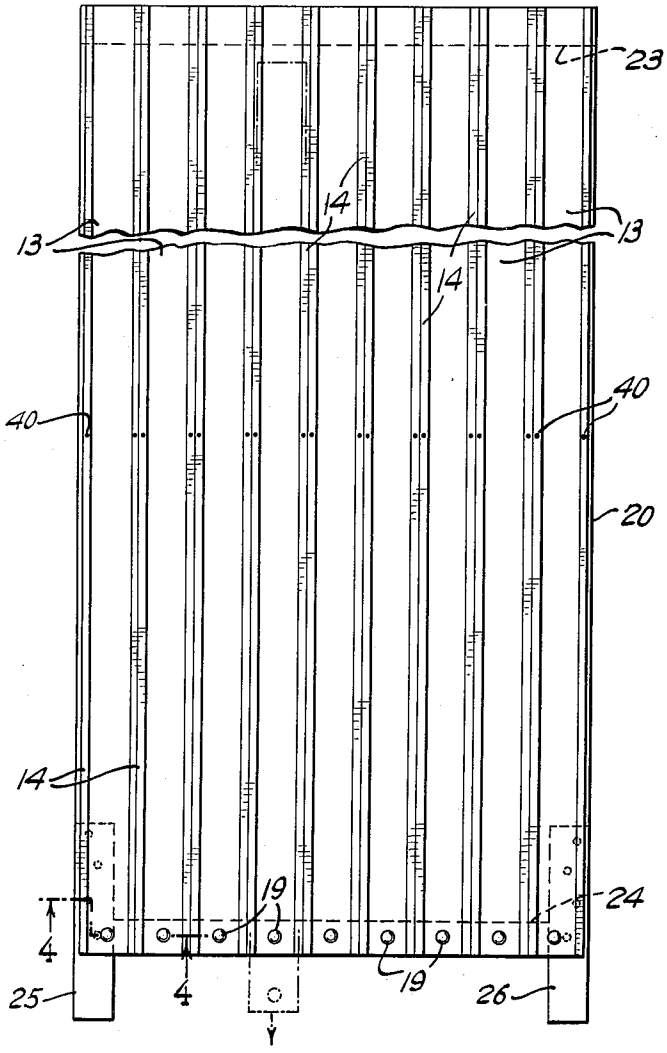


Fig. 3.

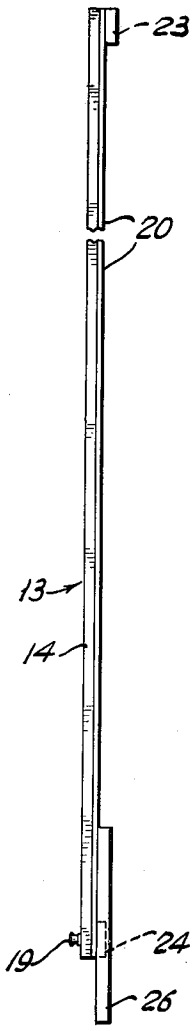
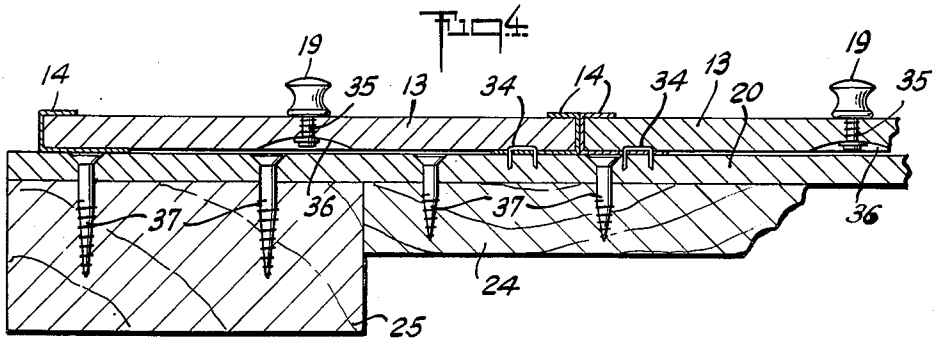


Fig. 4.



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APPARATUS FOR USE IN CORRELATING OIL WELL LOGS

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7 Claims. (Cl. 33—1)

This invention is concerned with apparatus for use in correlating oil well logs. More specifically, the apparatus involves a means for making adjustments when correlating oil well logs and the like, so that the data may be readily adjusted to any desired datum level.

In making a profile study using oil well logs, e.g., electric and/or velocity logs, the petroleum geologist works from correlations of such well logs by making a side-by-side study of these logs in order to study and interpret structural and stratigraphic problems. In carrying out such correlation, the procedure employed heretofore involved the tacking up side by side of any desired set of well logs, while horizontally aligning a given horizon as a datum plane. Then the various other strata would be located on the individual logs by inserting pins through the record strips of each of these logs. After this, a string would be connected from one pin to the next of a corresponding stratum, so that the relative structure of the various strata would be easily visible.

However, in carrying out the above described prior arrangement, whenever it was desired to change the datum from one strata to another; it would involve a lengthy and tedious job since all of the well log strips, except one, would have to be unpinned and have the tacks removed before readjustment could be carried out. Then the whole procedure would have to be repeated to set the logs up with a different stratum as the datum.

Consequently, it is an object of this invention to provide apparatus for overcoming the above-indicated difficulties.

Another object of this invention is to provide a rapidly adjustable apparatus, such that quick and simple changes may be carried out to facilitate studying a given geological profile by adjusting the well log data from a given set of wells for observing the changes in going from one stratigraphic horizon to the next. Thus a study may be carried out of the structural history of a given area.

Another object of this invention is to provide an apparatus whereby, migration or tilting of structure in a given geologic cross-section may be rapidly and more accurately studied in its relationship to geologic time, by making use of the teachings of this invention.

Briefly, the invention is concerned with apparatus for use in correlating oil well logs and the like, wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged. The correlation involved comprises a side-by-side comparison of a plurality of well logs in order to align said logs transversely along a given datum plane, and to observe the relative locations of various subterraneum strata. The said apparatus comprises an elongated mounting means for each record strip, and a means for supporting a plurality of said mounting means side by side. Said supporting means are slideable longitudinally, in parallel relation to one another. The arrangement of said apparatus is such that correlation for a plurality of different

datum planes may be rapidly carried out with a given set of logs.

The foregoing, and other objects and benefits of the invention, will be made clear by the following more detailed description thereof, and by the illustrations made in the drawings, in which:

Fig. 1 is a perspective view showing a complete correlation board in accordance with the invention;

Fig. 2 is a plan view of the correlation board without any well logs attached thereto;

Fig. 3 is an end view of the correlation board shown in Fig. 2; and

Fig. 4 is an enlarged cross-sectional detail taken along the lines 4—4 of Fig. 2.

Referring to Fig. 1, it will be observed that there is shown a plurality of well log strips **11** which have identifying tags **12** at the top of each strip with capital letter designations, A through I. These well log strips might take various forms, but are ordinarily in the form of photographic paper strips having the well log data recorded thereon in a well-known manner.

Each of the well log strips **11** are temporarily fastened in place onto one of a plurality of fibrous material boards **13**, which are each somewhat wider than the well log strip **11** attached thereto in order to provide for a pair of supporting guide channels **14** that overlap the longitudinal edges of each board **13**.

The well log strips **11** may be attached in a temporary manner by various means. In the illustrated embodiment they are fastened in place by use of thumb tacks **18**, applied near the ends of each strip. At the lower end of each board **13**, there is a handle **19** for use in sliding the board up and down along the guide-way formed by channels **14**.

All of the boards **13** are supported by a frame or body member **20** which, in this embodiment, is made up of a sheet of plywood that has upper and lower braces **23** and **24** respectively, that extend across the top and bottom of the frame **20** to provide additional stiffness therefor. In addition, there may be a pair of legs **25** and **26** that are attached at the lower outside corners of the frame **20** and extend beyond the bottom edge thereof. It will be observed that lower brace **24** extends between the legs **25** and **26** in abutting relation therewith.

It will be observed that there is employed a plurality of marking pins **30** which are inserted through the log strips **11** and into the backing boards **13**, at given stratigraphic indications on the well logs. In addition, there are a plurality of connecting strings **31** which are attached to each of the marking pins **30** of a corresponding strata, as determined by the well logs, from one well to the next. These strings **31** might take various forms, but it is preferred to employ an elastic string or the like, such that a taut condition will remain between pins **30**, irrespective of changes in the relative positions of the various backing boards **13** for the different well logs **11**.

It will be observed that in operation, the correlation board may be employed to study the relative migration or tilting of the various strata that are observed on the well log strips **11**. For example, a certain stratum, as marked by the given set of marking pins 30_a, may be employed as a datum level so that these pins will be set in a horizontal aligned condition, as illustrated in Fig. 1. This condition is rapidly and readily obtained by sliding the necessary ones of the various boards **13** along their guide-way supports, **14**, until all of the given stratum locating pins 30_a are properly aligned. Then the other strata that have been marked by the pins **30** and each separately identified readily by the strings **31**, may be observed for their relative loactions so that an indication

of the geologic history is readily obtained. It will be noted that a chronological study of migration or tilting, may be rapidly carried out employing each successive important horizon, starting at the bottom of the well log data available.

Referring to Figs. 2, 3, and 4, some additional structural details of the specific apparatus illustrated, will be pointed out. It is to be noted that although a particular structure is herein described and shown in considerable detail, many variations and relatively wide departure from this showing may be made without departure from the principles of this invention.

Most of the elements have been already indicated in connection with Fig. 1, but it will be noted in Fig. 4 that the guide channels **14** may be fastened to the frame or body member **20** by means of appropriately located staples **34**. These staples **34** might be recessed into the material of channels **14** if desired, but since the boards **13** are constructed of relatively porous or soft material, the presence of the staples **34** merely serves to provide additional friction in the fit of each board **13** in place in its guide channels **14**.

The handles **19** may be attached to boards **13** in any convenient manner, such as by means of a screw **35** for each handle which has the head thereof located in a recess **36** formed on the underside of each board **13**.

Since the illustrated structure employs a plywood frame **20** and wooden braces **23** and **24**, as well as wooden legs **25** and **26**; the fastening arrangement may include wood screws **37**, as illustrated.

Referring to Fig. 2, it will be noted that there is a series of small holes **40**, that are drilled through the upper surface of each of the guide channels **14** at approximately the middle of the longitudinal dimensions of the guides **14**. These holes are for use in case the boards **13** become worn to the extent that the friction contact thereof with their supporting guides **14** are insufficient to maintain the board in a given position. Thus, pins (not shown) may be inserted through the holes **40** into the edges of each board **13** after it has been set in a desired position so that no further movement of the board **13** may take place until the pins have been removed.

It is pointed out that the boards **13** are preferably constructed of a relatively porous material, such that easy application of thumb tacks may be employed in fastening the well log strips **11** in place. One commercially available material, that is quite suitable in this regard, is that sold under the trademark "Celotex."

While a given embodiment of the invention has been described above in considerable detail, in accordance with the applicable statutes, this is not to be taken as in any way limiting the invention but merely as being descriptive thereof.

It is claimed:

1. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs, a plurality of individual mounting means for said well logs, means for marking the locations of said strata on said logs, means for moving said mounting means along the longitudinal axes thereof parallel to one another in order to set up any desired datum for observation, means for connecting the corresponding marking means representative of each strata to be observed, and means for maintaining said connecting means under tension in order to provide straight line connection from one corresponding marking means to the next.

2. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs, a plurality of individual mounting means for said well logs, means for marking the locations of said strata on said logs, support means for holding said individual mounting means side-by-side and movable longitudinally in an individual manner in order to set up any desired datum for observation, means for connecting the corresponding marking means representative of each strata to be observed, and means for maintaining said connecting means under tension in order to provide straight line connection from one corresponding marking means to the next.

3. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs a plurality of individual mounting means for said well logs, means for marking the locations of said strata on said logs, support means for holding said individual mounting means side by side and movable longitudinally in an individual manner in order to set up any desired datum for observation, visual thread means for connecting the corresponding marking means representative of each strata to be observed, and means for maintaining said connecting means under tension in order to provide straight line connection from one corresponding marking means to the next.

4. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs, an elongated backing member for each well log record strip, a support frame for holding a plurality of said backing members side by side and slideable longitudinally in parallel relative to one another, pin means for marking the locations of said strata on said logs when mounted on said backing members, and elastic thread means for connecting the corresponding pin means of each stratum to provide straight line connections from one pin to the next and show the relative vertical positions.

5. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs, an elongated backing member for each said well log record strip, a support frame having a pair of guide channels for each backing member and attached to one face of said frame for slideably holding the longitudinal edges of the backing member, pin means for marking the locations of said strata on said logs when mounted on said backing members and elastic thread means for connecting the corresponding pin means of each stratum to provide straight line connections from one pin to the next and show the relative vertical positions.

6. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs, an elongated fibrous material backer for each said well log record strip, a handle on each of said backers for aid in slideably positioning the backers, a plywood sheet having a pair of guide channels for each backer located along the longitudinal edges of each backer and attached to said sheet, pin means for marking the locations of said strata on said logs when mounted on said backing members, and elastic thread means for connecting the corresponding pin means of each stratum to provide straight line con-

nections from one pin to the next and show the relative vertical positions.

7. Apparatus for use in correlating oil well logs to determine structural history in a given area by aligning a plurality of different stratigraphic horizons wherein said logs are recorded on elongated strips to a scale proportional to the depth of the wells logged, comprising in combination a plurality of said well logs, an elongated fibrous material backer for each said well log record strip, a handle on each of said backers for aid in slideably positioning the backers, a plywood sheet having a pair of guide channels for each backer located along the longitudinal edges of each backer and attached to said sheet, pin means for marking the locations of said strata on said logs when mounted on said backing members, elastic thread means for connecting the corresponding pin means of each stratum to provide straight line connections from one pin to the next and show the relative vertical positions, and a hole through each of said guide channels about midway along the length thereof and over the edge of the backer adjacent to said channel in order to provide for pins to hold said backer in a given position and prevent inadvertent sliding thereof.

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