# United States Patent [19]

**Stone et al.**

[11] **3,771,860**

[45] **Nov. 13, 1973**


[54] **PICTURE FILM AND SOUND FILM SYNCHRONIZER**


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[73] Assignee: **Syncro-System Corp.,** New York, N.Y.



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[21] Appl. No.: **225,380**

[52] **U.S. Cl.** ..... **352/12,** 352/129

[51] **Int. Cl.** ..... **G03b 31/04**

[58] **Field of Search** ..... 352/5, 12, 13, 22, 352/31, 129



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,602,606 | 8/1971 | Rigley | 352/12 |
| 3,427,099 | 2/1969 | Marsden | 352/12 |

FOREIGN PATENTS OR APPLICATIONS

| | | | |
|---|---|---|---|
| 1,016,927 | 1/1966 | Great Britain | 352/12 |



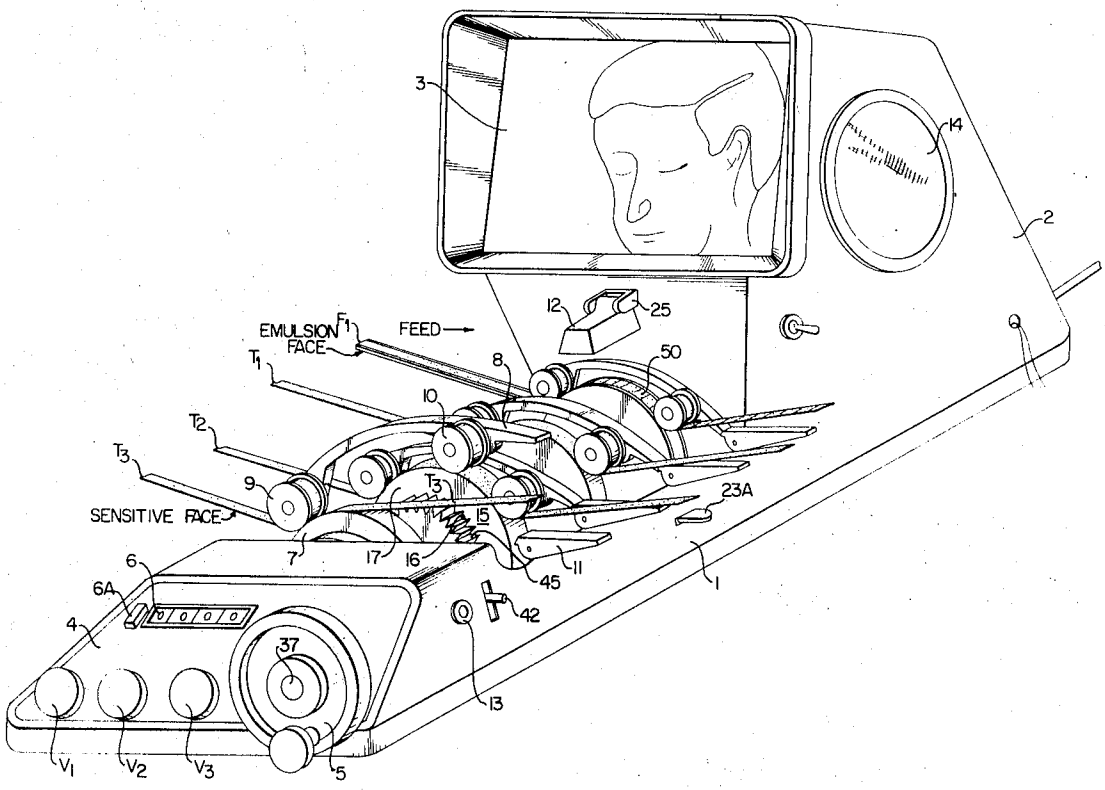
*Primary Examiner*—Samuel S. Matthews
*Assistant Examiner*—Michael L. Gellner
*Attorney*—Abraham A. Saffitz



[57] **ABSTRACT**

An apparatus for securing simultaneous reproduction of separately recorded sound and pictures from recordings having audible and visual signals which indicate the start and finish of a take and in which both the picture recording at the starting signal and the sound recording are locked to join the elements in common synchronized movement. The housing, clutch, and the locking member of the apparatus are assembled in a manner to permit the clutch to be actuated from the exterior of the housing.


**12 Claims, 9 Drawing Figures**



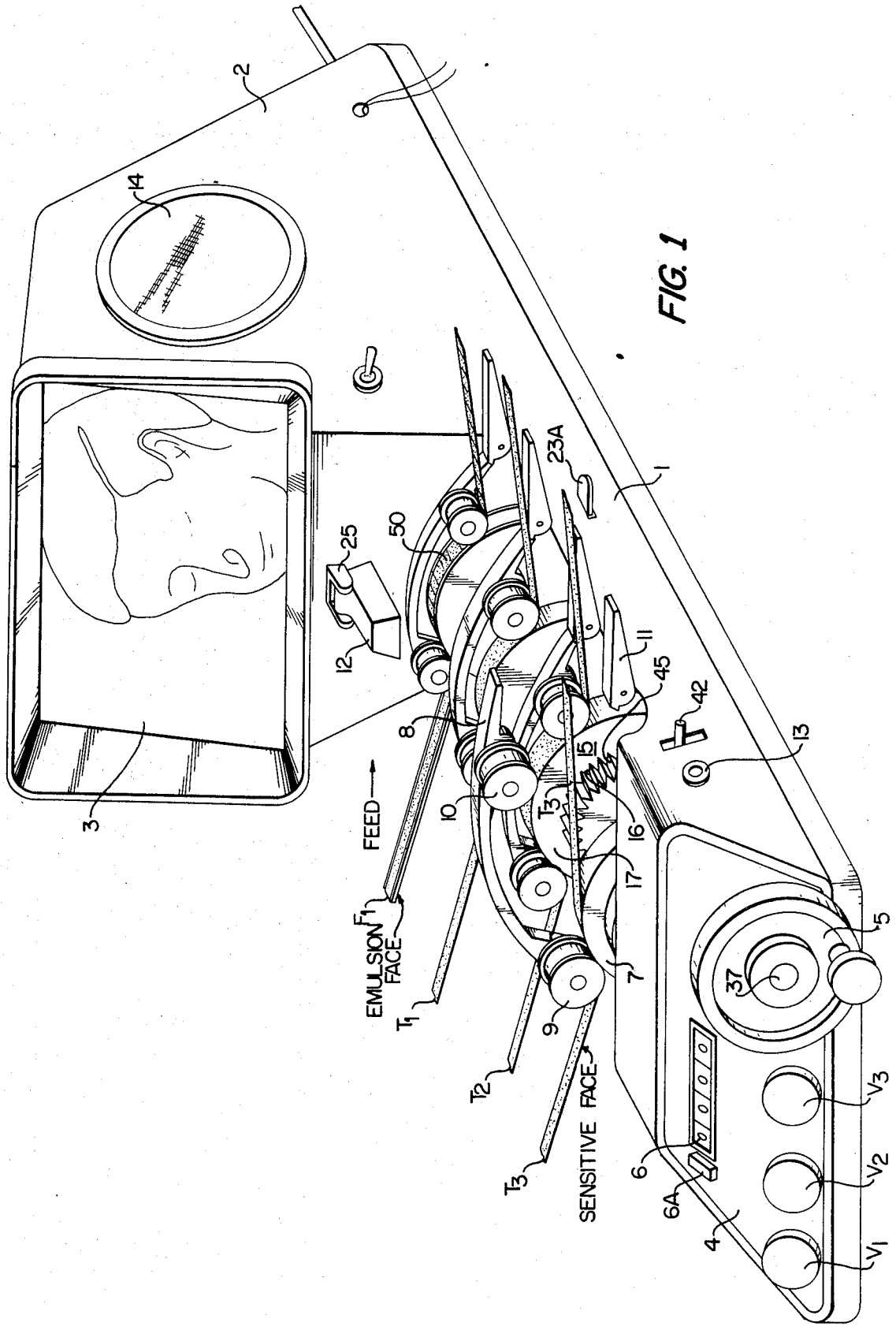

2
9
14
3
25
50
12
23A
1
11
45
42
13
8
15
10
T3
16
17
FEED
F1
EMULSION FACE
T1
T2
T3
9
7
37
5
SENSITIVE FACE
6
6A
4
V3
V2
V1

FIG. 1

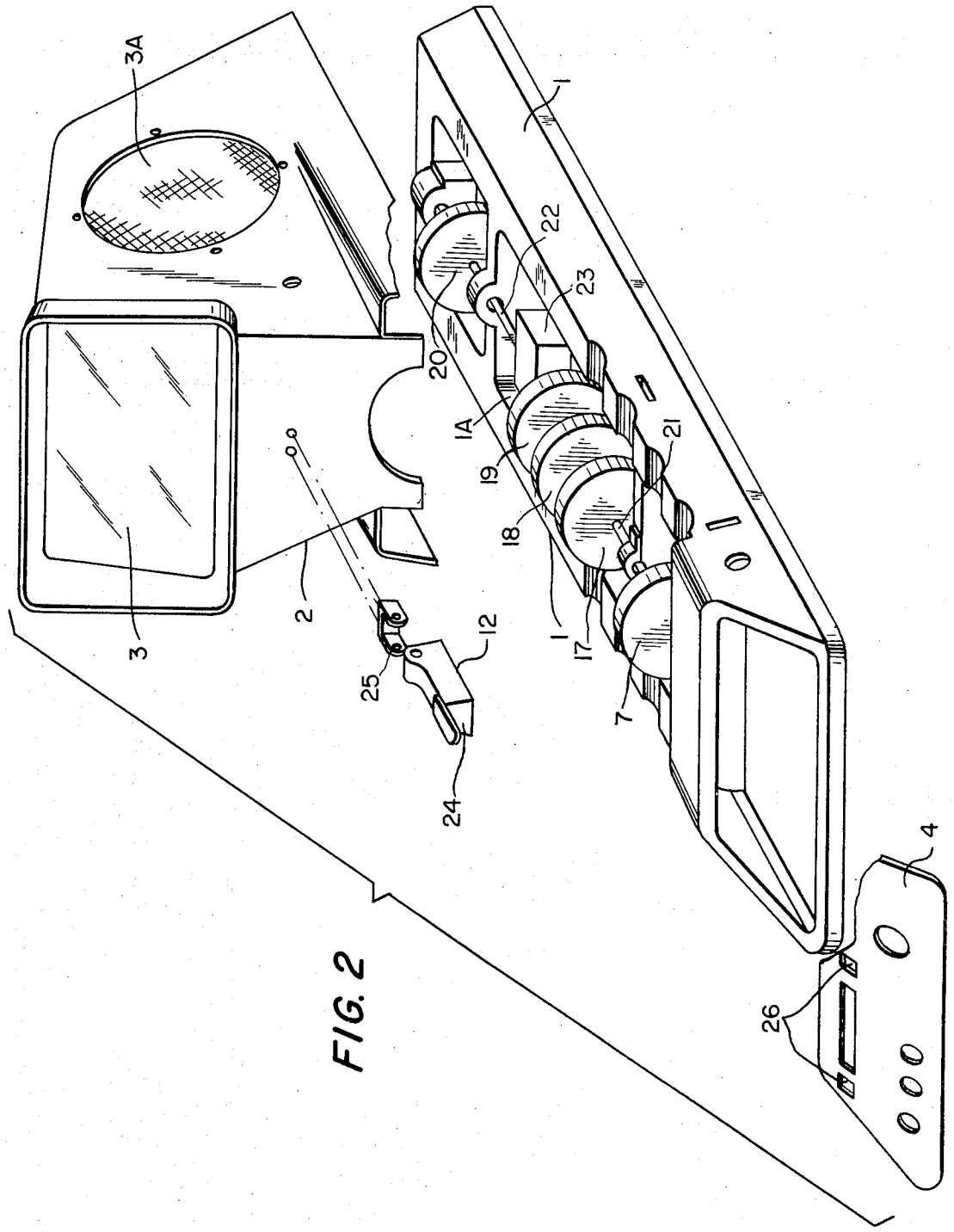



FIG. 2

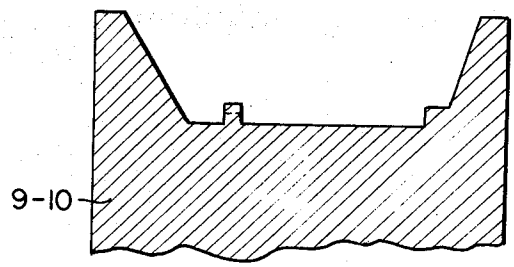



FIG. 3A

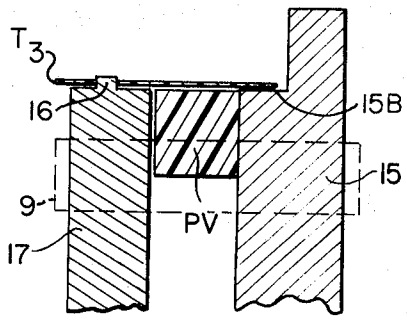
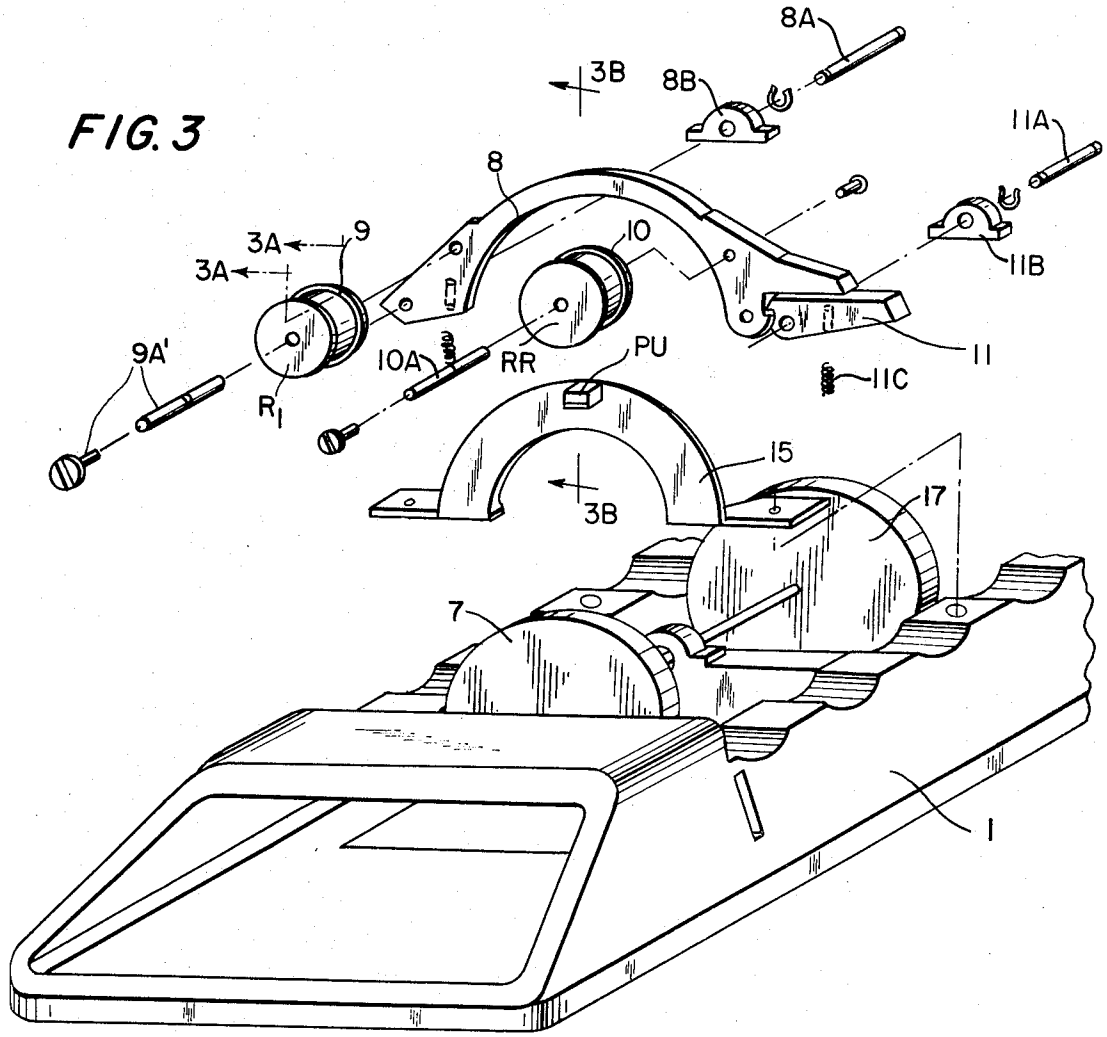



FIG. 3B

FIG. 3



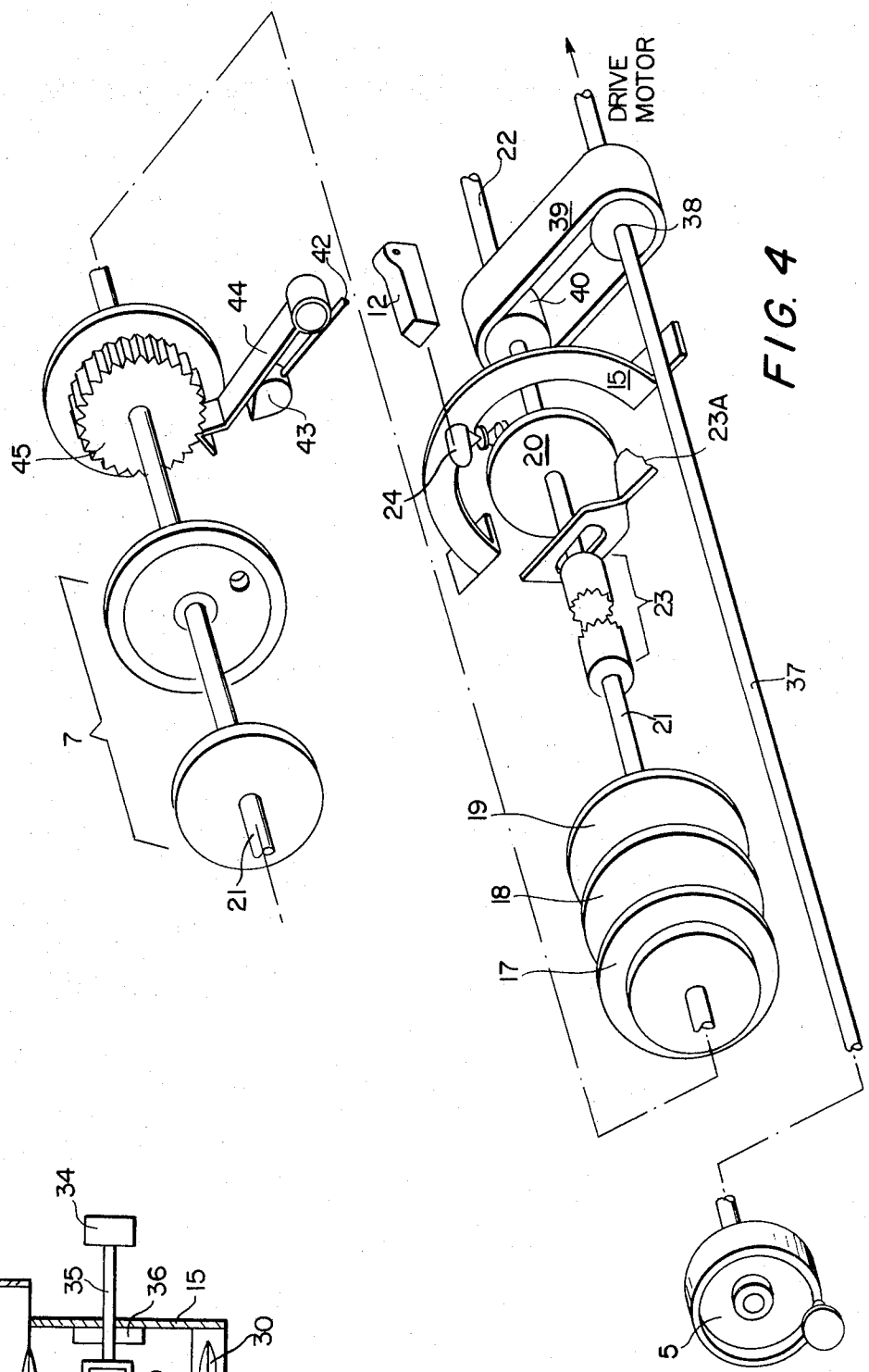
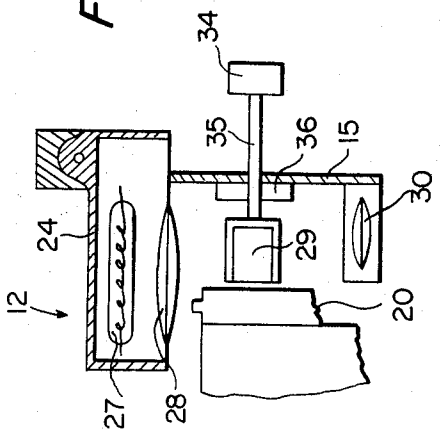

DRIVE MOTOR
22
39
38
40
12
15
23A
20
24
23
37
21
19
18
17
5
42
44
43
45
7
21

FIG. 4

FIG. 5


34
35
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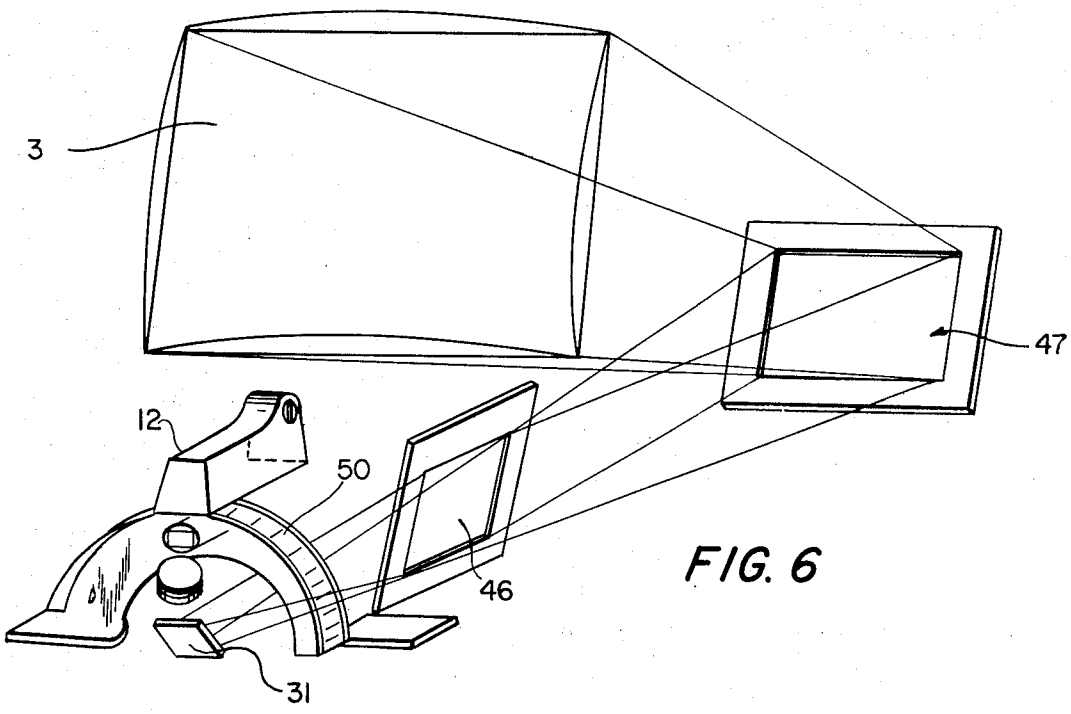

3
47
12
50
46
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FIG. 6

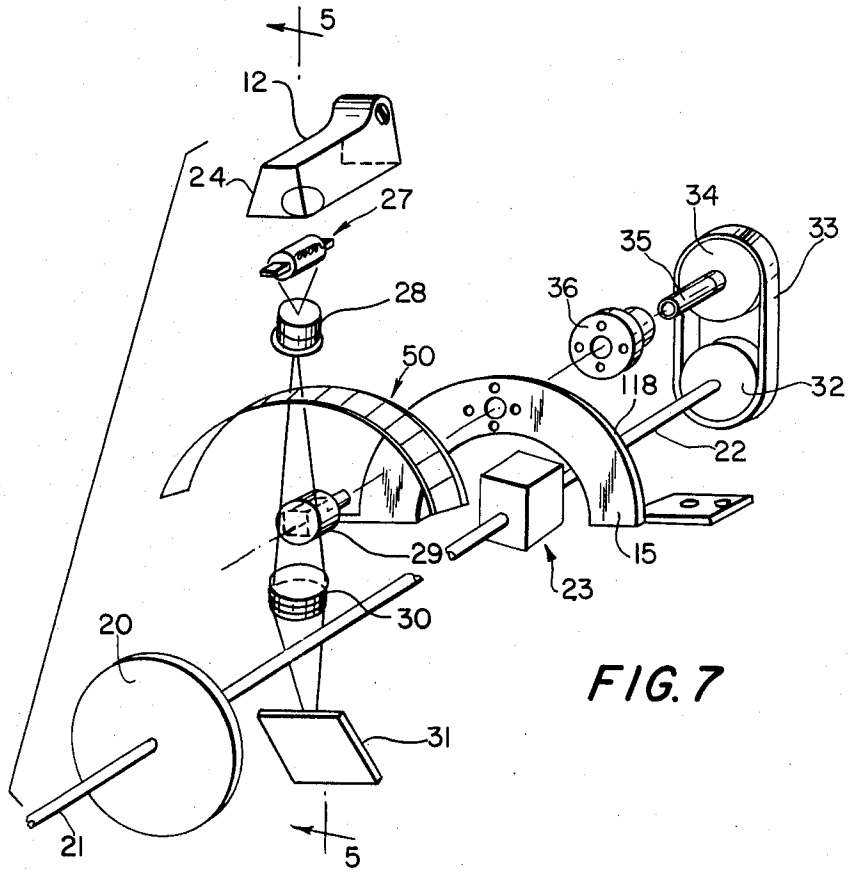

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118
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21
5

FIG. 7

# PICTURE FILM AND SOUND FILM SYNCHRONIZER

## BACKGROUND OF THE INVENTION

In the moving picture-sound recording field, many occasions arise where a preferred picture and a preferred sound record are not coincident. Pictures may be taken from several camera angles and/or with several lighting combinations. Sound recordings may be repeated with changes in microphone positions, or even with changes in the type of microphone used. All picture "takes" and sound "tapings" are then viewed in a studio "editor", the desired portions marked, cut out, and spliced together for the final film.

When the "actors" are inanimate (puppets, cartoons, etc.), the people furnishing their "voices" and sound effects are separately recorded and then the sound tapes and the action film must be synchronized.

Viewing devices for sound and picture synchronizing (editors) are, of course, old and well-known. Marsden U. S. Pat. No. 3,427,099 and Hopwood-Gray British Pat. 1,016,927 are illustrative. They have several shortcomings, one of which is the practice of marking the "cuts" by grease pencil on the emulsion side of the film or on the oxide side of the tape, which is followed in the Marsden patent. Although the Hopwood-Gray British Patent marks the film for projection on the underside of the film, there is no means for simultaneously observing and synchronizing from a common drive with simple arm and release means permitting any one of the cuts to be independently tracked into the picture tape. These disadvantages are overcome by the present invention which provides a compact viewer and audio-monitor for editing a plurality of sound tapes and a single picture tape.

## THE INVENTION

The invention comprises a compact viewer for one picture film and one or more (up to three) sound tapes with means for locking or releasing any one for relative adjustment (synchronizing). A volume control means is provided for each sound tape; focus control means adjust the optical system. Sound pickup heads have individualized transistor amplifiers to operate the loud speaker. As an alternative, a jack is provided for headphone listening. A suitable light source, together with reflector and focusing lenses, provides an image of the filmed picture on a ground glass viewing screen. By using mirrors, a folded optical path is provided, resulting in a desired reduction of the overall dimensions of the viewer. The light source is mounted in a hinged housing so that it can be lifted away from the picture film, whereby access to the film is possible for marking purposes.

The three sound pickups are mounted adjacent a common shaft which is connected through a coupling unit to the shaft for the film picture unit. The common shaft for the picture pickup unit is belt-coupled to a second shaft which is parallel thereto. The second shaft may be revolved by either a manual crank or by an external electric motor.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of the assembled film-tape editor and viewer in use with three sound tapes and one picture film threaded therethrough;



FIG. 2 shows, in an exploded view, the base and housing structure of my novel viewer with certain components therein;

FIG. 3 shows, in an exploded view, the film or tape rollers and the film or tape sprockets and guides and their relationship to the base member;

FIGS. 3A and 3B are details of the film or tape rollers and the film or tape guides taken on lines 3A—3A and 3B—3B, respectively, on FIG. 3;

FIG. 4 is a schematic view of the sprocket drive system;

FIG. 5 is a schematic showing of the folded optical projector;

FIG. 6 is a view of the projecting lens and mirror system; and,

FIG. 7 shows the film reader including lamp, rotating barrel shutter and one lens and reflecting mirror of the optical projection system.

## GENERAL DESCRIPTION

The film viewing and sound tape editing or reading device comprises a base and housing member **1** which supports the various components. As illustrated in FIGS. **1** and **2**, base **1** is provided with upstanding walls forming a chamber **1A** for the reception of the elements of the device. Base **1** has an opening **1B** in front thereof closed by detachable panel **4** which supports the various controls of the device.

A casing **2** housing the projection or viewing screen **3**, sound means **3A** and the necessary components thereof is detachably secured to the rear end of base **1** by conventional securing means (not shown). Front panel **4** carries a hand wheel **5** to manually move the tapes and film, a conventional counter **6** to indicate the footage of the recorded tapes, a counter reset means **6A**, and sound, etc. control means $V_1$, $V_2$ and $V_3$. Earphones output means **13** may also be provided in base **1**.

The mechanism within chamber **1A** comprises tape feeding wheels **17, 18, 19** secured to a shaft **21** mounted in suitable bearing means within the chamber. The sprocket wheels may be of conventional design and may be provided with teeth to engage the holes in the tapes. A film feeding **20** is secured to a shaft **22** which is in axial alignment with shaft **21** but spaced therefrom and is supported in suitable bearing means. In the space between the shafts is a clutch device **23** which may be of any conventional design and functions to either engage or disengage shaft **21** to or from shaft **22**. Clutch **23** may be controlled by a lever **23A** extending through base **1**. A frame counter means **7** is secured to shaft **21** for visual observation in front of the device.

A semi-circular plate **15** is located to one side of each of the sprockets **17, 18, 19** and **20** and is secured to base **1** in proper relationship to the wheels by means of ears **15A** which may be fastened to the top of the walls of base **1**. As illustrated in FIG. **3B**, the semi-circular plate **15** is provided with a shoulder **15B** which is of the same diameter as the wheels. The tape, as $T_3$, is thus supported by a wheel and the shoulder **15B** of plate **15** associated with the wheel. Plate **15** supports a conventional pickup PU in the position to be energized by the moving tape.

To insure positive feeding of the tapes and film and at a proper spatial relationship to the pickups for the tapes and to the optical system of the film, there is provided a pivoted arm **8** carrying keeper roller **9** and **10**.

As illustrated in FIG. 3, arm 8 is pivoted by means of a journal pin 8A within a bearing 8B secured to base 1. Each of the rollers is secured to arm 8 by means of journal pins 9A and 10A. The profile of a keeper roller may be of the configuration illustrated in FIG. 3A. The configuration is such that it cooperates with a sprocket and its plate 15 to maintain a smooth positive feed. The tape or film is fed below the roller 9, over the top portion of a sprocket and its adjacent plate 15, and thereafter, below roller 10 to the take-up reel. It should be noted that the tapes are fed with the oxide sensitive face down and the film is fed with the emulsion face down, thereby presenting their non-sensitive faces to the operator of the device to be marked as contemplated by the invention.

To maintain arm 8 and rollers 9 and 10 in the feed positions, there is provided a latching means comprising latch member 11 pivoted on journal means 11A and 11B. The latch nose 11C cooperates with notch 8C of arm 8 to hold the arm in feed position. A compression spring 11C biases the latch into lock position.

The film optical system comprises a lamp assembly 12 hinged to housing 2 by bracket 25. As shown in FIGS. 2, 5 and 7, the lamp assembly comprises a reflective housing 24, bulb 27 therein and condenser lens 28 attached thereto, and forms a unit which may be swung upwardly on its hinged bracket to expose the film for marking and the like. The film portion 50 to be edited is below lamp 12 and is supported by sprocket 20 and its associated support plate 15. Below the film is a barrel type shutter 29. Shutter 29 is driven at a proper synchronized speed from shaft 22 by means of a pulley and belt system 32, 33, 34 and a shaft 35 mounted in bearing 36 secured to plate 15, shaft 35 being operatively connected to rotate shutter 29.

From the shutter 29, the optical path is to projection lens 30, properly inclined mirrors 31, 46 and 47 (FIGS. 6 and 7) onto screen 3.

In order to lock tape shaft 21 into a set position while film shaft 22 is manipulated, a shaft locking arrangement illustrated in FIG. 4 is provided. The locking means comprises a toothed wheel 45 secured to shaft 21, a detent means 44 cooperating with the teeth to hold wheel 45 and shaft 21 in a set position and a cam means 43, whereby detent means 44 may be positioned to engage the teeth of wheel 45 or be disengaged therefrom. Cam 43 is manipulated by a lever 42 extending through base 1 (FIG. 1) near the front of the device.

The drive for the various shafts comprises a shaft 37 connected at one end to hand wheel 5 (FIG. 4). Rotation of shaft 37 rotates shaft 22 by means of pulleys 38 and 40 and belt 30. The other end of shaft 37 may be connected to a motor drive.

As illustrated in FIG. 1, the several sound tapes $T_1$, $T_2$ and $T_3$ and film $F_1$ are fed into the left side of the device, the several tapes being fed below keeper rollers 9 over sprockets 17, 18, 19 and 20, and their adjacent semi-circular plates 15, under keeper rollers 10 and out to the take-up reels. FIG. 1 also illustrates arm 8 and its keeper rollers 9 and 10 for tape $T_3$ being in its unlatched raised position for proper manipulation of tape $T_3$. Lamp 12 is shown as brought down over film portion 50. The tapes and film are fed with their sensitive or treated faces down so that their untreated top faces are accessible to the operator. Controls $V_1$, $V_2$ and $V_3$ select the desired sound of the tapes and also the volume.

## OPERATION

In considering the operation of my device, it is necessary to know that a visible hand, audible signal is given on the movie set at the start and end of all movie "takes." It is called the "clap stick" signal. It is visible at the side of the picture but is not included in the film as projected. It is audible in the initial sound record, but is usually spliced out before public reproduction thereof.

Modern means for accomplishing synchronization utilizing a bloop light and corresponding audio signals, or beep sound may be used with easy facility in synchronizing picture and sound by means of my device, and this will be apparent in the following detailed description of the method for using my device.

To use by invention in synchronizing just completed "takes," proceed as follows:

a. Insert the sound track (base up) into any one of the three sound gangs and advance track (left to right), adjusting sound volume to a comfortable level. Listen for scene and take announcement and the sound of the "clap sticks" striking closed.

b. Mark the exact frame the clap sticks close on the base side of the sound track. Use a grease pencil or other suitable marking pen.

c. Insert the picture (base up) into the picture gang, disengage the coupling lever and advance the picture, watching in the viewer for the clap sticks to close. Stop advancing the picture and raise the light source away from the film. Mark the exact point frame of picture where the clap sticks close. Make sure that the sound track mark is in the top dead center position and lock the coupling lever. The picture and the track will both be in direct (editorial) synchronization.

d. Continue advancing the coupled sound and picture until the picture take ends. Usually a flash frame indicates a camera shut off.

e. Mark the frame line of the flash frame at the end of the take and advance the picture and sount. (This new take is now out of synchronization.) Stop the picture at the next clap stick close and mark the exact frame as before.

f. Continue advancing both picture and sound until you locate the next audio slate and clap stick striking closed on the sound track.

To use my invention in synchronizing new "takes," proceed as follows:

a. Back up the picture and sound by rotating the drive wheel in anti-clockwise direction until the picture clap sticks mark is in the top dead center position.

b. Set the frame counter and footage counter to zero feet and zero frames. Now advance both picture and sound track until the sound track clap mark is in the top dead center position. Read the footage and frame counters and note the amount.

c. Back up both picture and sound until the picture flash frame mark appears in the top dead center position. Now mark the sound track in the identical position and on the frame line.

d. Lock the rotor lock lever by depressing it and reset the footage counter and the frame counter to zero.

e. Unlock the rotor lock and advance the picture and sound track the exact amount noted previously in step b. Mark the frame line on the sound track exactly indicating that amount. Back up the picture and sound to the left of the unit passing the zero setting.

f. Remove (splice out) the amount of excess sound track between the two frame line marks made, or add in some unusual corcumstance. Always make changes on the left side of the Syncro-System unit.

g. Crank both picture and sound forward until the picture clap sticks appear on the viewing screen and the corresponding sound clap sticks on the sound track should be in direct (editorial) synchronization if the original footage and frame calculations were accurate.

Proceed in the same manner on the next take.

## SUMMARY

By arranging the viewer-synchronizer to use the film and sound tapes in a cell or base side-up position, and placing reference marks on their rear sides, no scratching or discoloration of the film gelatin or erosion or indentation of the magnetic outside on the tape is produced, whereby a superior presentation of both is possible.

The primary and unique function of the present invention is based upon its contributions to the film editorial process in cutting down editing time, by a compact apparatus which is easy to use.

Thus the advantages are:

a. Editing time is greating reduced because picture and sound tracks can be run in 'dead sync' at any speed. Straight across cutting can be easily accomplished on a Synchro-System, whereas it would be considerably more difficult with either the Moviola or synchronizer/viewer which are the most common editing systems in most cutting rooms.

b. The present machine is compact - all components are engineered into one integrated unit, (synchronizer, viewer, and amplifier) saving valuable physical space and expensive editing time.

c. The present machine can be used as the sole editorial device in the cutting room. In fact it can easily replace the Moviola as it performs all of the Moviola's functions, and, it is far more efficient than the tri equipment set-up of the separate synchronizer, viewer, and amplifier.

d. Whereas the prevalent existing techniques of: marking the film first on the Moviola, then taking the film and actually cutting it on the synchronizer and then once again putting it back on the Moviola interfere with the continuity of thought and creativity; the present machine allows for the marking, the cutting and the viewing in one continuous operation.

What is claimed is:

**1.** In an audio visual device, a combination comprising:

a. a rectangular base and housing member;

b. a shaft member located in the middle of said housing member;

c. A clutch member dividing said shaft into a longer front portion and a shorter rear portion;

d. a locking member associated with the longer portion, said locking member being actuable from outside the casing;

e. one or more sprocket wheels mounted on said front shaft portion, said sprocket wheels being adapted to mesh with the sprocket apertures of the magnetic sound tape; and,

f. a single sprocket wheel mounted on the rear shaft portion and adapted to mesh with the sprocket apertures of the picture film;

g. said clutch member being actuable from the exterior of the housing whereby the sound tape and the film may be shifted relative to each other for synchronizing purposes.

**2.** A device as claimed in claim **1,** with a second drive shaft parallel to, but at one side of said first shaft, said second shaft being belt-connected to the rear portion of said first shaft and extending through the rear wall of said casing, and a crank member being attached to said second shaft outside of said casing, whereby the second portion of said first shaft can be rotated relative to the first portion thereof and the film be displaced relative to the sound tape.

**3.** A device as claimed in claim **2,** including arched plate members secured to said base member immediately adjacent said sprocket wheels, the plate member over the shorter rear portion of said first shaft carrying a lens member and the arches over the front longer portion of said first shaft carrying a lens, shutter and sound pickup heads.

**4.** The structure of claim **3,** including curved roller arms adjacent each plate member, a roller mounted on each end of said arms and the combination comprising a guideway for ganging of the tapes, thus insuring the tape passage in close relationship to the sound pickup unit.

**5.** The structure of claim **4,** including locking means for said roller arms, said locking means being actuable outside of said casing.

**6.** The structure of claim **5,** including an optical housing member secured to the rear portion of said base member, said housing member carrying on its exterior surface a hinged lamp housing adjacent the film sprocket wheel,said housing containing appropriate lens and reflector means to project an image of the film on one side of said housing, and a ground glass screen mounted in said one side of said housing to view the projected image.

**7.** The structure of claim **6,** wherein the film is threaded through the film sprocket passageway with its emulsion side down.

**8.** The structure of claim **7,** wherein one or more sound tapes are threaded through the sound sprocket passageways with their oxide sides down.

**9.** The structure of claim **8,** including a resettable frame counter and a resettable footage counter associated with the central shaft.

**10.** The structure of claim **9,** including an extension of the second shaft through the rear wall of the casing, whereby it may be actuated by an external motor when desired.

**11.** An audio-visual device as claimed in claim **6,** including a loud speaker mounted in the second wall of said housing whereby the tape recording may be heard while viewing the film presentation.

**12.** An audio-visual device as claimed in claim **11,** including a volume control unit for each pickup unit, said controls being mounted on the end of the base member, transistorized amplifier units for each pickup unit, a transistorized combining amplifier for the loud speaker, a jack for a head phone unit, a rectifier power unit and a master switch therefor, and a micro switch associated with said lamp housing to turn off the lamp when the housing is lifted, all of these electrical elements except the control knobs for the volume control being internally positioned in the base unit or the optical housing unit.

* * * * *