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Swerdlow et al.

[11] **3,843,241**

[45] **Oct. 22, 1974**

[54] **MULTIPLE SOUND SYSTEM FOR NARROW-WIDTH MOTION PICTURE SYSTEMS**

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[73] Assignee: **Cinacor, Ltd.**, Ontario, Canada

[22] Filed: **Aug. 20, 1971**

[21] Appl. No.: **173,580**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 129,935, March 30, 1971, Pat. No. 3,795,440.

[52] **U.S. Cl.**..... **352/29,** 179/100.2 MP, 352/10

[51] **Int. Cl.**..... **G03b 31/02**

[58] **Field of Search**..... 352/6, 8, 10, 26, 27, 28, 352/29, 30; 199/100.2 MP

[56] **References Cited**

UNITED STATES PATENTS

2,756,277	7/1956	Good et al.	352/10 X
3,508,816	4/1970	Bottani	352/10 X
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[57] **ABSTRACT**

Narrow-width motion picture systems are provided with a multiple-output sound capability by disposing on the film a plurality of magnetic recording stripes, each capable of recording an independent sound track. The projecting equipment is provided with a specially designed adapter, compatible with conventional equipment, for playing back sound tracks recorded on these stripes, and a plurality of speaker means are provided, each speaker having an independent switching arrangement for switching among the plurality of sound tracks.

3 Claims, 8 Drawing Figures

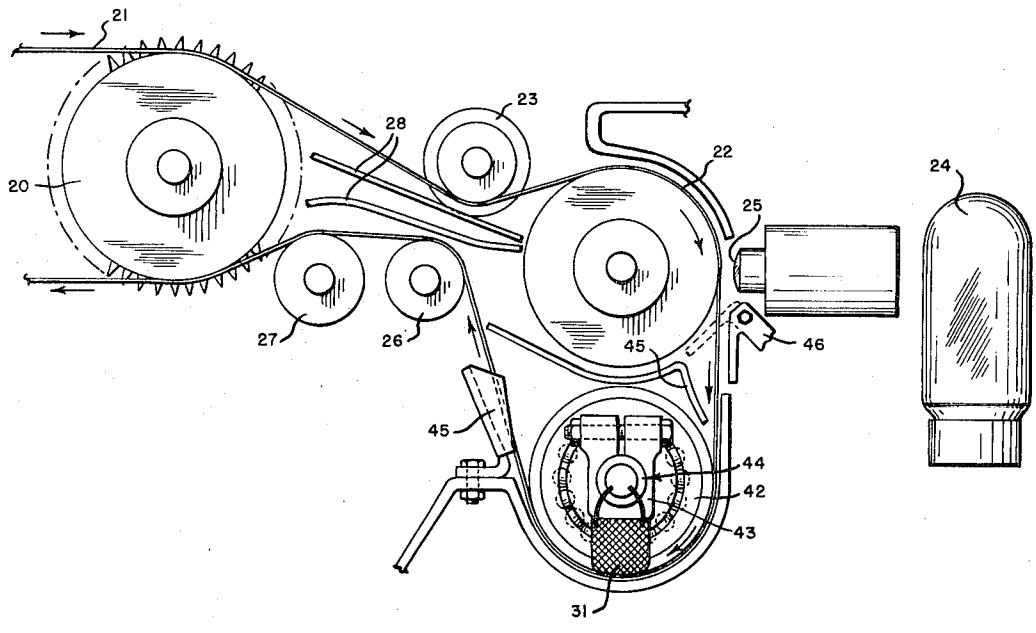


FIG. 1A

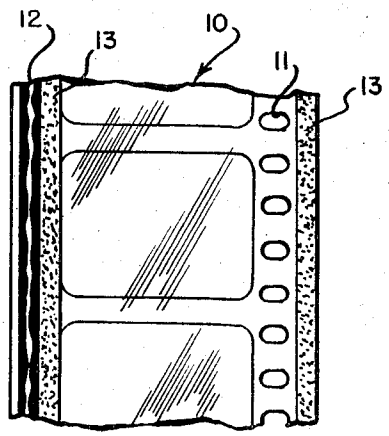


FIG. 1B

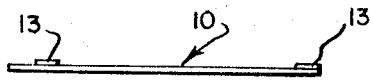
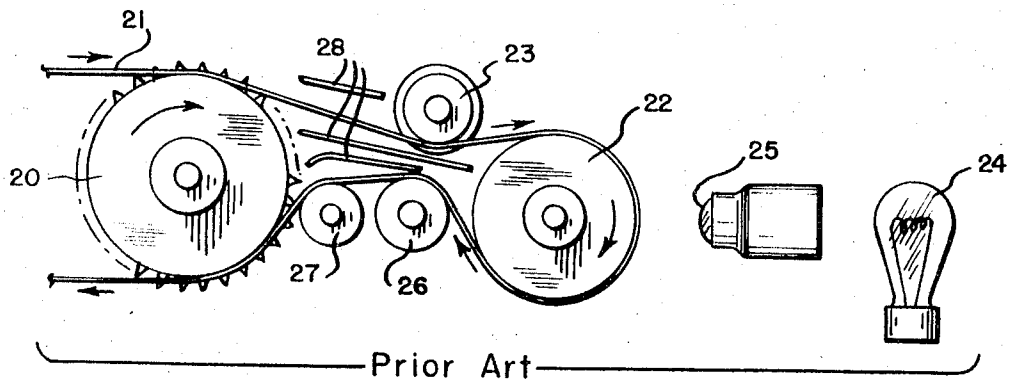


FIG. 2



Prior Art

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FIG. 3

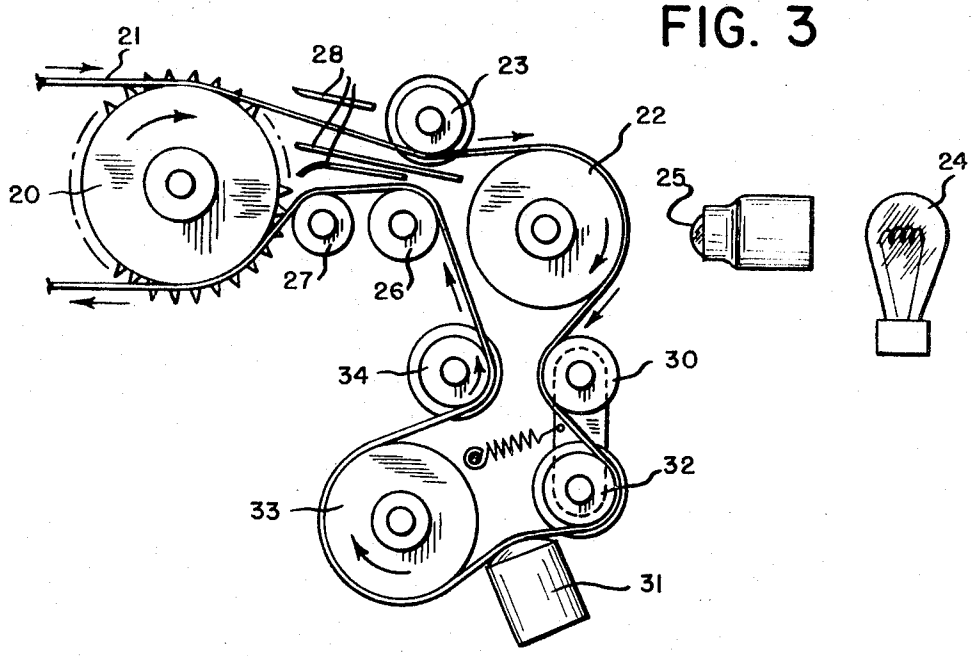
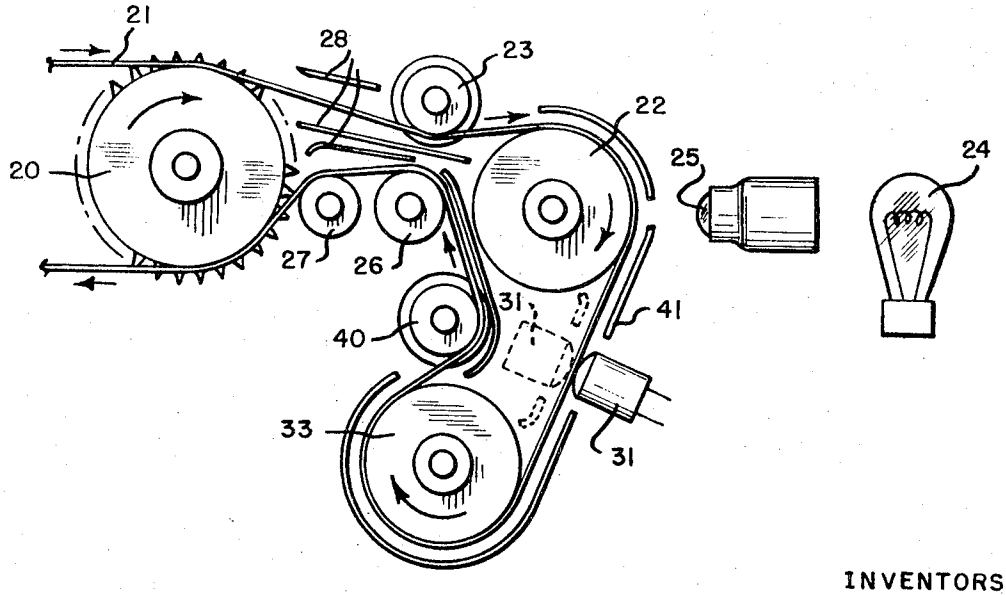
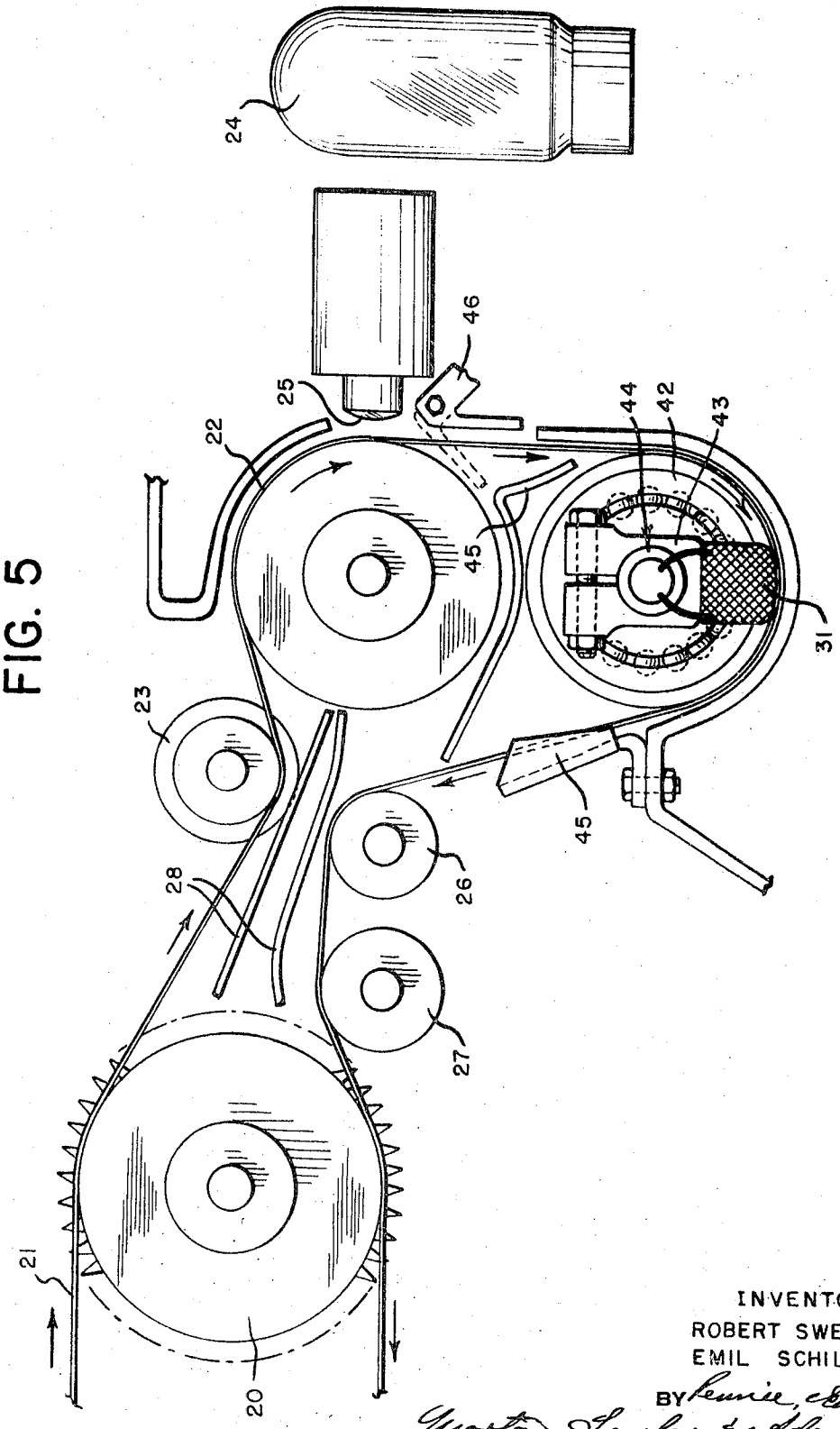


FIG. 4



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FIG. 5



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FIG. 6

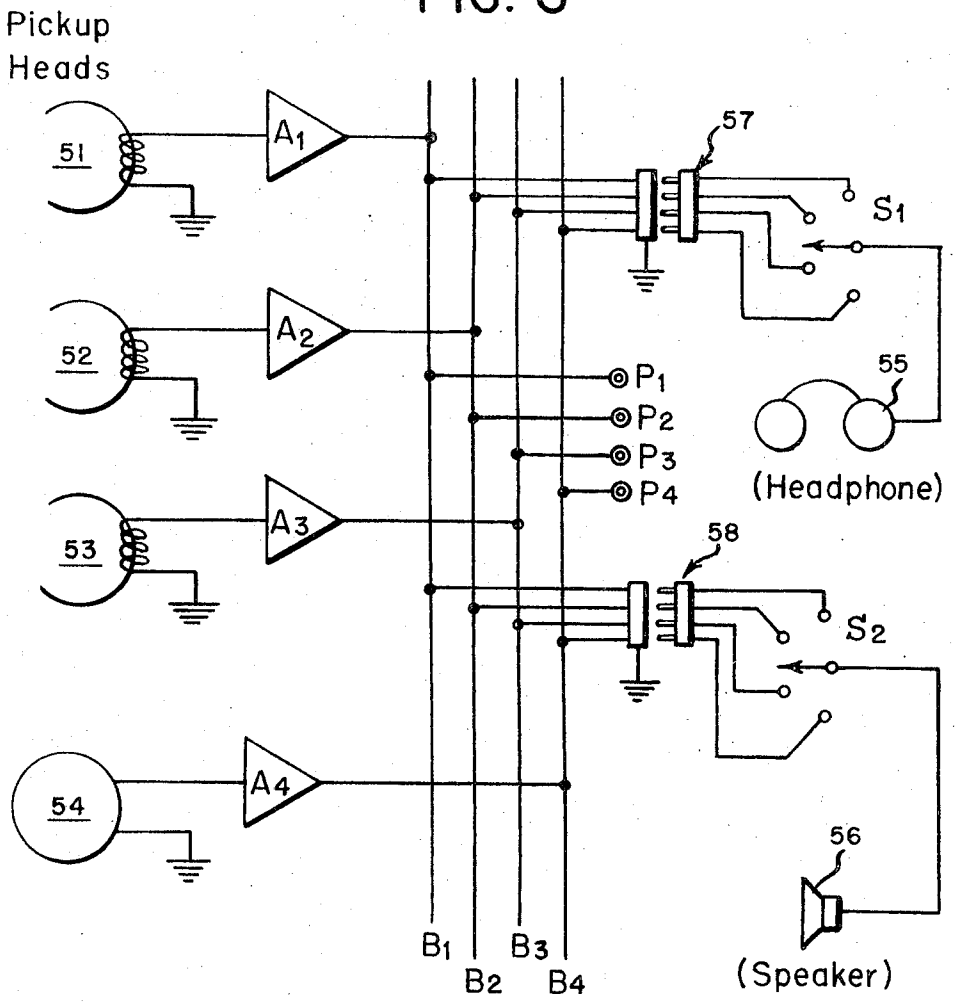
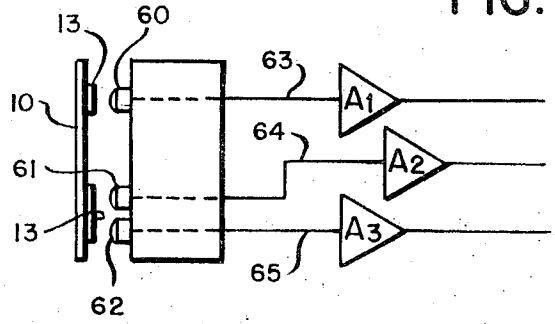


FIG. 7



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MULTIPLE SOUND SYSTEM FOR NARROW-WIDTH MOTION PICTURE SYSTEMS

CROSS-REFERENCES TO RELATED APPLICATIONS

This application is a continuation-in-part of the co-pending U.S. application Serial No. 129,935 filed Mar. 30, 1971 now U.S. Pat. No. 3,795,440.

BACKGROUND OF THE INVENTION

The present invention relates to a multiple-output sound recording and reproducing system for use with narrow-width motion picture film.

As tourism, business travel, and migration increases among different countries having different languages, techniques for communicating with multi-national groups become increasingly important. Such techniques are needed, for example, in schools having multi-national student bodies and in transportation media such as ships and international airlines which frequently have passengers of diverse nationality. While multilingual cards (whereon the same message is printed in several languages) are becoming increasingly common, they represent a relatively limited form of communication.

The present applicants envisage a more effective system of communication which provides the universal medium of motion pictures with a multilingual sound capability wherein the language of the sound track can be selected by each individual user. In the more limited practical sense, applicants have devised methods and apparatus for providing motion picture systems most frequently employed by the users in question (narrow-width motion picture systems) with a multiple-output (and hence multilingual) capability.

Both educational institutions and transportation media are typically limited to narrow-width (8 to 16 mm) motion picture equipment. In the case of schools, larger equipment is generally prohibitively expensive and in the case of airlines, for example, it is too bulky. However, as is pointed out in applicants' above-mentioned application, it was not heretofore considered feasible to provide narrow-width film with a plurality of independent sound tracks despite a long-felt need among the institutions, amateurs, and semi-professionals who typically use such film.

While multi-track systems are available to professionals, they have not been generally available to amateurs and semiprofessionals. For example, U.S. Pat. No. 2,628,288 issued to D. L. Blaney on Feb. 10, 1953, discloses a two-track system using one optical recording track and one magnetic track. This system is useful for the professional but of only limited value to the amateur who generally does not have the complex equipment required for optical recording. (See U.S. Pat. No. 2,479,868, issued to P. F. Rossman et al., Aug. 23, 1949.)

Films having two magnetic stripes are commercially available, but it has not been considered possible to record an independent sound track on the second stripe. Instead, the stripe has been merely used for balance. (See SMPTE Standard PH 22, 101-1963.) In U.S. Pat. No. 3,452,161 issued to D. Haffler on June 24, 1969, it was suggested that the second stripe could be used in conjunction with the first stripe to record a stereophonic track; but even in this patent the supposed incapacity of the second stripe to record an independent track was noted; and it was used only to record the difference signal of the stereophonic track.

SUMMARY OF THE INVENTION

In accordance with the present invention narrow-width motion picture systems are provided with a multiple-output sound capability by disposing on the film a plurality of magnetic recording stripes, each capable of recording an independent sound track. The projecting equipment is provided with a specially designed adapter, compatible with conventional equipment, for playing back sound tracks recorded on these stripes, and a plurality of speaker means are provided, each speaker having an independent switching arrangement for switching among the plurality of sound tracks.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages, the nature of the present invention, and its various features will appear more fully upon consideration of the various illustrative embodiments now to be described in detail in connection with the accompanying drawings.

In the drawings:

FIGS. **1A** and **1B** illustrate multi-track narrow-width motion picture film in accordance with one aspect of the invention;

FIG. **2** illustrates the sound station of a typical prior art motion picture projector;

FIG. **3** illustrates an adapter for a typical motion picture projector to permit the playback of multi-track, narrow-width film;

FIG. **4** illustrates a first alternative embodiment of such an adapter;

FIG. **5** illustrates a second alternative embodiment;

FIG. **6** is a circuit diagram of a system for controlling the operation of the playback systems shown in FIGS. **3–5**; and

FIG. **7** illustrates a recording head for recording sound tracks on the film of FIGS. **1A** and **1B**.

For convenience of reference, the same numbers are used to denote corresponding elements throughout the drawings.

DETAILED DESCRIPTION

Referring to the drawings, FIGS. **1A** and **1B** show front and cross-sectional views, respectively, of a multi-track, narrow-width motion picture film in accordance with one aspect of the invention. The film shown in FIG. **1A** comprises a strip of conventional, narrow-width motion picture film **10** such as 16 mm or super-8 mm film including sprocket holes **11**, an optical track **12**, and a plurality of magnetic tracks **13**, each capable of recording an independent sound track. As can be seen by reference to FIG. **1B**, three tracks are shown in this illustrative embodiment (the stripe adjacent optical track **12** comprising two separate tracks). It is clear, however, that up to six tracks can be provided by putting three additional tracks on the underside of the film. Preferably, a double magnetic track is placed on or adjacent the conventional optical track in the manner disclosed in the above-mentioned patent to Blaney. The remaining track is disposed on the opposing edge of the film.

The magnetic tracks comprise stripes of pulverized magnetic material such as iron oxide powder deposited

or coated on the film in accordance with techniques well known in the art. Each track is approximately one-sixteenth inch wide. Stripes of this width are sufficient to record an independent sound track, and they can be predisposed on the edges of film away from the exposed or exposable portion.

The film in a conventional projector for sound movies is fed from a reel past the visual projecting system with an intermittent movement, and thereafter it passes to a sound station where it travels with a uniform movement, the sound being normally picked up from an optical sound track along one edge of the film.

FIG. 2 illustrates a typical conventional mechanism for obtaining uniform movement of the film subsequent to its visual projection. The mechanism consists of a bottom loop sprocket **20**, which is driven, and over which the film **21** passes to a sound drum **22** having a flywheel (not shown), the film being pressed downwardly by a spring loaded snubber idler **23**. The film has an optical sound track adjacent one edge, and light from an exciter lamp **24** is directed through a lens **25** onto the optical track to cause sound reproduction in the conventional way. The sounds being reproduced correspond to the picture being visually projected, that picture being conventionally **26** frames back on the film.

After passing around the sound drum, the film of a conventional projector then passes directly to another spring loaded snubber idler **26** (by following the arrows in FIG. 2), a second idler **27**, and then passes under the bottom loop sprocket and out of the projector to a take up reel (not shown). The projector is often provided with guide plates **28** which make it possible to insert a film by simply pushing its leading edge into the projector, the guide plates ensuring that the film is directed through the correct path to emerge at the take up reel.

In accordance with a second aspect of the invention, an especially designed adapter is provided for permitting the playback of the additional magnetic tracks. In particular, the adapter is designed to be interposed between the conventional sound drum and the take up reel so that it can be added to most conventional projectors.

FIG. 3 illustrates such an adapter comprising, in essence, a magnetic pickup, an auxiliary sound drum, and a suitable arrangement of idlers. More specifically, the adapter comprises a spring loaded idler **30** for receiving film from the conventional sound drum, and a magnetic pickup **31** including a plurality of separate pickup heads. These heads should be constructed of a material which is sufficiently durable to withstand contact with motion picture film (which is substantially harder than conventional magnetic tape). The material should not be so soft that the film will wear it down, and it should not be so hard that it will cut through the film.

A second idler **32** and a subsequent sound drum **33** are positioned to press the film against the heads of pickup **31** with each sound track in contact with a different head.

A third idler **34** is positioned for receiving film from the sound drum and feeding it to the snubber idler of the conventional sound station at the same angle it would have come directly from the conventional sound drum.

In operation, after the film leaves the conventional sound drum **22**, it passes downwardly (following the unbroken arrows) past spring loaded idler **30** (which keeps it in tension), around idler **32** and over magnetic pickup **31**. For a film having three magnetic sound tracks, the pickup has three heads. The idler **32** and subsequent sound drum **33** press the film against these heads, with each sound track in contact with a different head. After it passes the sound drum, the film travels past idler **34** to the snubber idler of the conventional sound station.

FIG. 4 shows a second illustrative embodiment of an idler in accordance with the invention in which the magnetic pickup is disposed between the sound drum of the conventional sound station and an adapter sound drum. Specifically, this adapter comprises a magnetic pickup **31** and a sound drum **33** positioned with respect to the sound drum of the conventional sound station to press the film against the pickup. An additional idler **40**, which is optional, may be provided between sound drum **33** and the conventional snubber idler in order to provide additional protection against "snaking" of the film. However, this additional idler is unnecessary if drum **33** is disposed to feed film to the snubber idler at approximately the same angle as it would arrive from the sound drum of the conventional sound station.

The components of the adapter can all be mounted on a single casting (not shown) that can be inserted as a unit into the conventional projector. The adapter can be provided with guide plates **41** to ensure that a film can be inserted by pushing its leading edge through the projector and the guide plates to guide it through the adapter. Additional means (not shown) can be provided to shift one or more guide plates to cause the film as it is inserted to bypass the adapter and follow the conventional path when the adapter is not required. This feature prevents unnecessary wear on the magnetic pickup heads when they are not in use.

As indicated by the broken outline in FIG. **4**, the magnetic pickup can be located at the opposite side of the film if magnetic tracks are provided on the base side of the film. Or, if desired, both sides of the film can be provided with up to three magnetic tracks, and the adapter can be provided with a magnetic pickup for each track, thus providing for a total of six magnetic tracks.

As previously mentioned, the conventional optical sound pickup occurs at a frame which is 26 frames ahead of the frame being visually projected. Similarly, the magnetic pickup heads and the sound recording on the magnetic tracks of the film must bear a known relationship to the pictures on the film, and a convenient standard is that the magnetic pickup occurs 32 frames ahead of the frame being visually projected.

FIG. **5** shows an additional and preferred embodiment of an idler in which the magnetic pickup is fixedly disposed adjacent an auxiliary drum. The drum is located in the film path between the sound drum of the conventional sound station and the subsequent snubber idler. The advantage of this embodiment is that it provides the desired adaptation with a minimum of new components.

In particular, this adapter comprises a magnetic pickup **31** including a plurality of separate pickup heads fixedly disposed adjacent an auxiliary rotatable drum **42** by one or more mounting clamps **43** engaging a mounting tube **44**. The heads of the magnetic pickup are conveniently disposed on either side of drum **42** to magnetically engage magnetic tracks on both edges of

film passing around the drum. The drum, in turn, is positioned to feed film passing therearound to the conventional snubber idler **26** at any angle suitable for subsequent feeding into conventional idler **27.**

As is the case for the other embodiments, this adapter can be mounted on a single casting that can be inserted as a unit into a conventional projector. Suitable guide plates **45** are provided, and guide plate shifting means **46** can be provided to adjust the adapted projector between the conventional path and the path through the adapter.

The sound system comprises, in essence, a plurality of speaker means (such as headphones and speakers) at least one of which is provided with means for separately switching among the plurality of available sound tracks. FIG. **6** is a schematic diagram of a preferred form of such a system comprising a plurality of speaker means coupled to a plurality of pickup heads **51** to **54** through separate switching means S_1 and S_2. More specifically, the pickup heads are connected to separate distribution buses B_1 to B_4, respectively, through amplifying means A_1 to A_4. Each of the distribution buses is, in turn, connected to each one of the speaker means **55** and **56** through switching means such as selector switches S_1 and S_2, respectively. Alternatively, the switching means can comprise a set of individual plugs P_1–P_4 connected to separate distribution buses among which a user can select and thus selectively access the pickup heads. In a preferred embodiment the pickup heads include one optical pickup (shown as photocell pickup **54**) and three magnetic heads. The connection between the separately switchable speakers and the distribution buses may be conveniently made through multi-point plugs **57** and **58.**

FIG. **7** is a schematic illustration of a recording head useful in recording sound tracks on the multi-track film of FIGS. **1**A and **1**B. The head differs from conventional recording heads primarily in that it includes a plurality of magnetic recording coils **60, 61,** and **62** positioned to record on each of the magnetic tracks **13** of film **10.** The coils **60, 61,** and **62** are independently controllable and are preferably connected by separate leads **63, 64,** and **65,** respectively, to amplifiers $A_1 - A_3$.

While the invention has been described in connection with specific embodiments, it is understood that these embodiments are merely illustrative of the many possible specific embodiments which can represent applications of the principles of the invention. Numerous and varied other arrangements can be devised in accordance with the principles of the invention without departing from the spirit and scope of the invention.

We claim:

1. A sound reproduction system for a narrow-width motion picture system, comprising:

a. narrow-width motion picture film;

b. more than one continuous recording means disposed on said narrow-width motion picture film for recording more than one independent sound track;

c. a motion picture film projector for projecting said narrow-width film;

d. an adapter for said projector for permitting the playback of sound tracks recorded on said recording means, said adapter comprising a magnetic pick-up including a plurality of separate pickup heads disposed in a position adjacent the return film path, first idler means for tensioning said film, spring means for spring biasing said idler, second idler means for guiding said film, drum means for maintaining said film in alignment with said magnetic pickup head, said second idler means and said drum means cooperating together to press said film against said magnetic pickup head, and third idler means for directing said film back along the path defined by said sound drum;

e. a plurality of buss means each for transmitting the output of one of said pickup heads and each coupled to said one of said pickup heads;

f. more than one speaker means; and

g. more than one connector means each of said connector means for coupling one of said speaker means to a desired buss means for playing a selected sound track.

2. A sound reproduction system for a narrow-width motion picture system, comprising:

a. narrow-width motion picture film;

b. more than one continuous recording means disposed on said narrow-width motion picture film for recording more than one independent sound track;

c. a motion picture film projector for projecting said narrow-width film;

d. an adapter for said projector for permitting the playback of sound tracks recorded on said recording means, said adapter comprising a magnetic pick-up including a plurality of separate pickup heads disposed in a position adjacent the return film path, drum means for maintaining said film in alignment with said magnetic pickup head, means for pressing said film against said magnetic pickup head, and idler means for directing said film back along the path defined by said sound drum;

e. a plurality of buss means each for transmitting the output of one of said pickup heads and each coupled to said one of said pickup heads;

f. more than one speaker means; and

g. more than one connector means each of said connector means for controlling one of said speaker means to a desired buss means for playing a selected sound track.

3. A sound reproduction for a narrow-width motion picture system, comprising:

a. narrow width motion picture film;

b. more than one continuous recording means disposed on said narrow-width motion picture film for recording more than one independent sound track;

c. a motion picture film projector for projecting said narrow-width film;

d. an adaptor for said projector for permitting the play-back of sound tracks recorded on said recording means said adaptor comprising a magnetic pick-up including a plurality of separate pickup heads fixedly disposed adjacent an auxiliary rotatable drum by mounting clamp means, the heads of said auxiliary drum, guide plates and guide plate shifting means for adjusting the adapted projector between the conventional path and the path through the adaptor;

e. a plurality of means each for transmitting the output of one of said pickup heads and each coupled to said one of said pickup heads;

f. more than one speaker means; and

g. more than one connector means each of said connector means for coupling one of said speaker means to a desired bus for playing a selected sound track.

* * * * *